



Do Macroeconomics News Releases Affect Gold and Silver Prices?

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Using intraday data, we document the responses of gold and silver future prices to monthly macroeconomic news releases. Both metals respond strongly to the release of Capacity Utilization. Gold also responds strongly to the release of the CPI. We also find that the release of the Unemployment Rate affects both gold and silver, whereas the Gross Domestic Product and PPI have significant effects on gold. Weak responses by gold to the release of the Federal Deficit and silver to the release of the CPI, Hourly Wages, Business Inventories, and Construction spending are also noted. © 2000 Elsevier Science Inc.

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I. Introduction

The incorporation of macroeconomic information into asset prices has been the subject of much research for more than two decades. Several studies document the response of various financial instruments to macroeconomic news releases (Harvey and Huang, 1991, Ederington and Lee, 1993, 1995, Becker, Finnerty, and Kopecky, 1993, 1995). The consensus has generally been that most of the information is incorporated within minutes of the news release but that subsequent adjustments can take several minutes. For example, Ederington and Lee (1993) show that, after macroeconomic news announcements, most of the price adjustment in future markets take place within the first minute of the release. They also note that higher volatility persists for approximately 15 min thereafter and remains slightly elevated for several hours.

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Despite widespread interest in gold and silver, it is surprising that there is little empirical evidence relating to the incorporation of monthly macroeconomic information in these two markets. We note from a survey of the literature that two studies (Frankel and Hardouvelis, 1985, Cornell and French, 1986) document the effects of weekly money supply announcements on gold and silver prices. We examine the incorporation of monthly macroeconomic information in gold and silver future prices. Monthly news releases are selected because major economic news is issued through these announcements.

In general, documenting information incorporation in different markets could not only aid market participants better devise trading strategies but could also provide useful information on market efficiency. However, issues relating to information incorporation in these two markets are arguably more important beyond these usual motives. Gold and silver are coveted by many in different parts of the world for their intrinsic properties. The global demand for these commodities suggests a different response to U.S. news announcements. To provide a basis of comparison, we also detail the response of Treasury bond and municipal bond futures to macroeconomic news. We are also interested in identifying the response of gold and silver to the release of macroeconomic news during periods of low and stable inflation. We suspect that the response of gold and silver to the release of inflation-related announcements will be muted during a period of low and stable inflation. Our sample period, 1992–1995, is characterized by low levels of inflation.

The information gathered from this study will be useful to a variety of market participants. Evidence from this study provides insight into the behavior of these two metals following macroeconomic news releases. Such information is important to market participants as it examines whether gold and silver prices relate to economic fundamentals. The evidence will also be useful to exchanges seeking to preserve orderly markets. Governments and central banks holding metal inventories or claims to these assets should also have an interest in knowing how these metals respond to U.S. macroeconomic news. In general, this information will better assist market participants manage risk and help build diversified portfolios.

II. A Brief Background on Gold and Silver and the News Releases

Gold and silver have a variety of uses. Investors view gold as a hedge against inflation, and many use it for fashion purposes. Its application in industry is numerous. For instance, gold is used in the health, electronics, and chemical industries. However, the traditional role of gold as a store of value and as a monetary cushion has not disappeared. Emerging countries purchase gold to back their currencies (see e.g., Rappleye, 1995). Central banks hold gold simply as a store of value. On occasion, central banks have been known to engage in buying and selling gold (see e.g., Burns, 1997). Most of the gold is mined in South Africa, the U.S., and Australia, the three largest producers of gold.

Like gold, silver has many uses and sometimes serves as a hedge against inflation. Demand for silver primarily comes from the fashion, sterling ware, photographic, and electrical industries. Silver gained notoriety during the Hunt brothers' manipulation of the silver market. The Hunts squeezed the market in 1979–1980 by buying silver and keeping it off the market while demanding delivery on their long futures positions.¹ Metal

¹ See Kolb (1991), pp 65–66.

traders consider silver to be more volatile than gold. Some investors attribute the high volatility in the silver market to market manipulation (see e.g., Einhorn, 1995).

In this study, 23 monthly macroeconomic news announcements are followed over 4 years. Actual and forecasted values for the announcements are purchased from Money Market Services (MMS). The 23 announcements, released by federal agencies and the National Association of Purchasing Managers (NAPM), can be grouped into four release times (all in CST): 7:30 a.m., 8:15 a.m., 9:00 a.m., and 1:00 p.m. Most studies find the first set of releases at 7:30 a.m. to have the most effect, particularly the Employment Report (Ederington and Lee, 1993). The Employment Report has three main components, the Civilian Unemployment Rate, Hourly Wages, and Non-Farm Payroll. Of the 23 announcements, 2 announcements, Installment Credit and Consumer Credit, do not have fixed release times during the day. Therefore, we cannot account for the effect of these two announcements. A listing of the news announcements, their release times, and the frequencies of release by time, day, and month is shown in the Appendix. The four markets examined open for trading before 7:30 a.m., allowing the responses of the instruments to major monthly news releases to be tracked.

The rest of this paper is organized as follows. Section III describes the data, research design, and the construction of returns. Section IV details the cumulative impact of the announcements, and in Section V the effects of individual announcements are reported. A summary and conclusions are offered in Section VI.

III. Data, Research Design, and Construction of Returns

Futures prices on the Treasury bond, the municipal bond, gold, and silver are sampled in 15-min intervals from January 3, 1992 to December 29, 1995.² The Treasury bond and municipal bond futures trade on the Chicago Board of Trade (CBOT), while gold and silver futures trade on the Commodity Exchange (COMEX). The Treasury and municipal bond futures are rolled over on the first day of the nearby contract's expiration month. For gold and silver, many futures contracts are inactive. Rollovers are designed to minimize the number of empty price intervals. This generally results in the most liquid contracts in all four instruments being selected. To avoid distortion due to rollovers, returns constructed from price relatives are used in the empirical tests. The trading day has 25 intervals, composed of an initial 10-min opening interval, from opening (7:20 a.m.) up to 7:30 a.m., followed by 24 15-min intervals.³ Returns across an interval for individual instruments are measured using the continuously compounded returns formula given below:

$$Return = \log \left(\frac{P_{je}}{P_{jb}} \right) \quad (1)$$

² We purchase the data from Tick Data Incorporated (TDI). TDI's database is compiled from official exchange time and sales records and any missing data points are filled with data from various real time datafeeds. TDI screens the data for missticks, gaps, or missing days.

³ The Treasury bond and municipal bond futures each have 27 intraday intervals. We discard the last two 15-min intervals (1:45 p.m. and 2:00 p.m.). This is done in order to match the intervals between the interest rate and metal futures. Also, studies find the effects of the last set of announcements at 1:00 p.m. to have mild effects (Christie-David and Chaudhry, 1998). Thus, any effects of the last set of announcements should dissipate long before 1:30 p.m.

where P_{je} = the ending price (je) in a sample interval, and P_{jb} = the beginning price (jb) in a sample interval.

To formally test for differences in variance we use the Brown and Forsythe (1974) modified Levene (1960) (henceforth BFL) statistic. The BFL F-statistic is given below⁴:

$$F = \left[\frac{\sum_{j=1}^J n_j (\bar{D}_{\cdot j} - \bar{D}_{\cdot\cdot})^2}{\sum_{j=1}^J \sum_{t=1}^{n_j} (D_{tj} - \bar{D}_{\cdot j})^2} \right] \left[\frac{(N - J)}{(J - 1)} \right] \quad (2)$$

where $D_{tj} = |R_{tj} - M_{\cdot j}|$; R_{tj} is the return for day t , period j ; $M_{\cdot j}$ is the sample median return for period j computed over the n_j days included in the test; $\bar{D}_{\cdot j} = \Sigma(D_{tj}/n_j)$ is the mean absolute deviation (from the median) over the n_j days for a given period j ; and $\bar{D}_{\cdot\cdot} = \Sigma \Sigma D_{tj}/N$ is the grand mean, where the D_{tj} is summed over j periods and n_j days and N is computed as $N = \Sigma n_j$ over j periods. The F-statistic is distributed $F_{J-1, N-J}$ under the null hypothesis. This methodology is frequently used [see e.g., Lockwood and Linn (1990), Ederington and Lee (1993)]. Regression tests are also employed to identify the effects of each announcement.

IV. The Impact of News Releases

Most studies find the first set of releases at 7:30 a.m. to have significant effects, particularly the Employment Report. Inflation-related announcements, such as the CPI and the PPI, are also released at 7:30 a.m.

Effects of the Announcements

To illustrate the effects of the announcements, return variance on announcement and nonannouncement days are presented in Fig. 1. The graphs show that variance for the interest rate instruments spike following the release of the announcements, particularly after the 7:30 a.m. announcements. The distribution of the announcements (see Appendix) indicates that 11 announcements (47.8%) are released at this time. However, no corresponding spike in variance is evident for gold and silver futures. For silver, variance on announcement days generally declines after the market opens. This continues for most of the announcement day. Around midafternoon, mild increases in variance are noted. For gold a similar decline in variance on announcement days is noted shortly after the market opens. Unlike silver, this is short-lived. Increases in variance for gold on announcement days are noted as early as 8:15 a.m. The preliminary evidence suggests that the 7:30 a.m. announcements have little impact on gold and silver futures prices. The graphs also show that variance on nonannouncement days for silver is actually higher than on announcement days. This is in complete contrast to the interest rate futures. The reader might note that the graphs are scaled to highlight differences in variance between announcement and

⁴ Conover, Johnson, and Johnson (1981) compare over 50 methods for testing differences in variances. They conclude that the modified Levene (1960) test is among the most powerful and is robust to departures from normality.

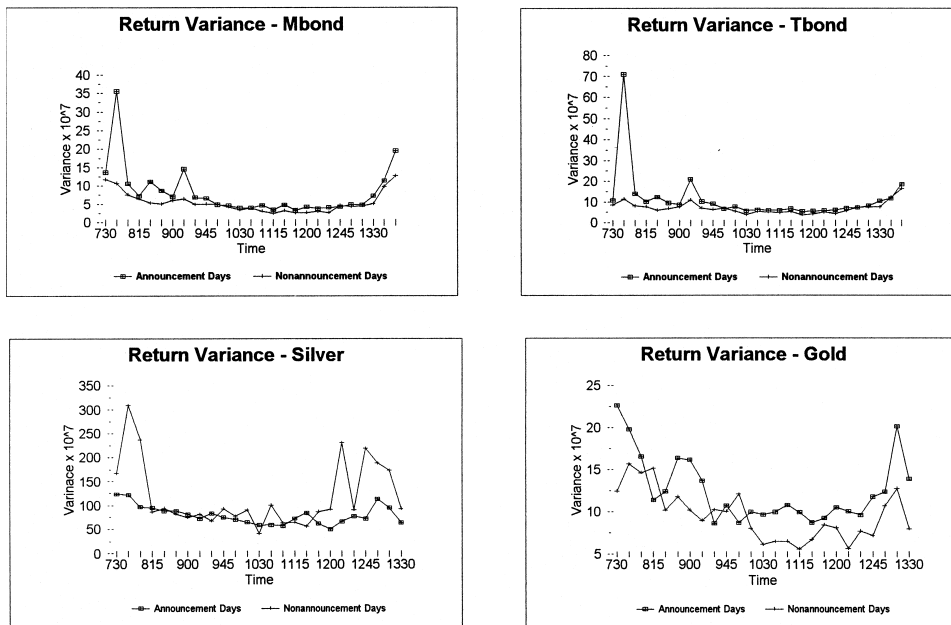


Figure 1. Variances for the four instruments are computed using 15-minute returns. The sample period begins on January 2, 1992 and ends on December 29, 1995.

nonannouncement days. To provide an idea of relative variances of the different instruments, we present in Fig. 2 variances on announcement and nonannouncement days for all four instruments. These figures indicate that the variance of silver is largest among the four instruments on both announcement and nonannouncement days. This is true despite silver having no perceptible reaction to the announcements. Reports of constant speculative trading in silver seems plausible given the high volatility in the silver futures market. Fineberg (1996) quotes a senior analyst with London’s Gold Field Mineral Services Ltd., as saying “Silver is ultimately a volatile market, and although increases or decreases in supply and demand are important, it is difficult to say where the price of silver will end up due to the constant presence of speculators.”

A summary of return variances for the interval immediately before and after each of the four sets of announcements (pre- and postannouncement intervals) is provided in Table 1. For example, the postannouncement interval after the first set of announcements issued at 7:30 a.m. is the 7:45 a.m. interval. The 7:45 a.m. interval on announcement days captures the immediate effects of the 7:30 a.m. announcements. We also provide variance values for the corresponding intervals on nonannouncement days.

Table 1 shows that variance for the interest rate instruments on announcement days exceeds the corresponding variance on nonannouncement days after all four sets of announcements. In one instance, the Treasury bond future following the 7:30 a.m. news releases, announcement variance is more than six times nonannouncement variance. This indicates strong information effects following the announcements. For gold, announcement variance following the news releases is always higher than nonannouncement variance. However, differences in variance between announcements and nonannouncements are smaller for gold compared with the interest rate instruments. For example,

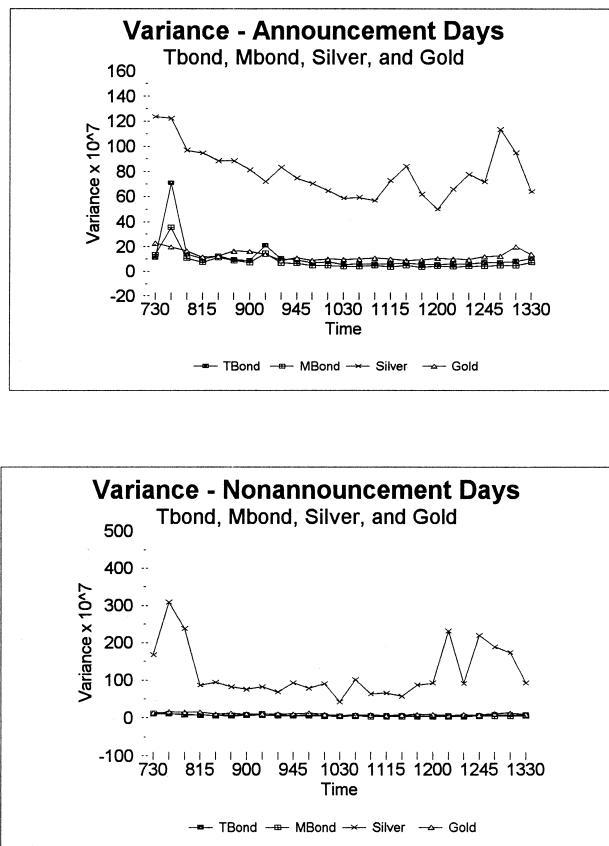


Figure 2. Variances for the four instruments are computed using 15-minute returns. The sample period begins on January 2, 1992 and ends on December 29, 1995.

variance for gold following the 7:30 a.m. announcements is only 1.27 times the corresponding nonannouncement variance. The corresponding values for the Treasury bond futures and municipal bond futures are 6.24 and 3.33, respectively. For silver, nonannouncement variance in postannouncement intervals is higher than announcement variance. For example, following the 7:30 a.m. announcements, nonannouncement variance for silver is more than 2.5 times announcement variance. Also noteworthy for silver, is that of the 25 intraday intervals only in 7 instances is announcement variance higher than nonannouncement variance (28%).⁵ For the Treasury bond futures, municipal bond futures, and gold futures announcement variance exceeds nonannouncement variance in at least 22 of the 25 intervals (88%).

The distribution of the announcements across days of the week is skewed. Almost 73% of the releases are issued on the last three days of the week, only 11% of the releases are issued on Mondays. Friday seems to have a particularly high concentration of news releases (36%). If information effects are associated with news releases, it is reasonable

⁵ Variances for each intraday interval are not reported for brevity, but can be made available upon request from the authors.

Table 1. Return Variance in Pre-and Post-Announcement Intervals and by Days of the Week

Time	7:30	7:45	8:15	8:30	9:00	9:15	1:00	1:15	Mon	Tue	Wed	Thu	Fri
MBond													
Announcements	13.66	35.53	7.24	11.14	7.04	14.58	4.79	4.76	4.76	6.85	6.89	6.64	10.61
Nonannouncements	11.72	10.67	6.40	5.31	5.95	6.36	4.26	4.45	3.84	4.67	5.29	6.03	6.65
TBond													
Announcements	10.84	70.99	10.09	12.43	8.73	20.96	7.20	8.18	6.22	8.88	9.02	10.73	16.99
Nonannouncements	8.63	11.36	7.70	5.97	7.51	10.88	7.48	7.52	5.56	6.63	6.70	7.47	7.67
Gold													
Announcements	22.64	19.82	11.38	12.40	16.15	13.66	12.35	20.15	13.75	9.53	11.00	14.05	13.78
Nonannouncements	12.45	15.66	15.15	10.18	10.17	8.94	10.68	12.72	8.58	8.87	9.79	12.26	9.46
Silver													
Announcements	123.68	122.13	94.63	88.37	81.38	72.01	113.48	94.86	69.23	74.63	70.06	89.16	86.06
Nonannouncements	167.25	309.06	86.25	93.97	74.61	81.26	188.31	173.44	72.89	71.91	96.09	117.77	406.69

Returns are calculated from 15-min prices. The trading day has 25 intervals, composed of an initial 10-min opening interval, from opening (7:20 a.m.) to 7:30 a.m., followed by 24 15-min intervals. A summary of return variances for the interval before and immediately following each of the four sets of announcements (pre- and post-announcement intervals) is provided in Table 1. For example, the post-announcement interval following the first set of announcements issued at 7:30 a.m. is the 7:45 a.m. interval on announcement days captures the immediate effects of the 7:30 a.m. announcements. We also provide variance values for the corresponding 7:45 a.m. interval on nonannouncement days. Variances are also presented on announcement days for each day Monday through Friday. The sample period begins on 01/02/92 and ends on 12/29/95. Actual variances have been multiplied by a factor of 10^7 .

to assume that return variance increases as the weekend approaches. To examine this, we present variance by day of the week also in Table 1. Variance for interest rate futures display a pattern that is consistent with this hypothesis. For instance, variance for municipal bond futures is highest on announcement Fridays (10.61). Gold presents a variance pattern that resembles interest rate futures in that variance generally increases on announcement days as the weekend approaches. However, for gold, differences between announcement and nonannouncement variance across days of the week are less pronounced. Other differences between gold and the interest rate futures are also noted. For gold, announcement Mondays display high variance and variance on announcement Thursdays is largest. Silver presents a different picture. Variance on nonannouncement days is consistently higher than on announcement days, except on Tuesdays. The largest variance for silver is displayed on nonannouncement Fridays. Such a pattern bears little resemblance to the frequency of releases.

Tests for Differences in Variance

To formally test for differences in variance we use the BFL test. The first series of BFL tests examine differences in variance for all four instruments between announcement and nonannouncement days in postannouncement intervals. The nonannouncement sample serves as a control. Thus, any significant differences in variance between the announcement and nonannouncement samples can be interpreted as evidence of information effects associated with the news announcements. The results from these tests, reported in Panel A of Table 2, indicate significant differences in variance in postannouncement intervals between announcement and nonannouncement days for the Treasury bond and municipal bond futures. For the two interest-rate instruments, the F-values are large, in excess of forty, and highly significant after the 7:30 a.m. announcements. The F-values and significance levels for the interest rate instruments decline as we progress from the first to the later announcements. This confirms the evidence seen before; that is, the earlier announcements have stronger information effects. The first set of announcements also have significant effects on gold. However, the F-value for gold futures following the 7:30 a.m. announcement is only 1.53% of the corresponding F-value for the Treasury bond futures. This suggests that the information contained in the 7:30 a.m. announcements has considerably less effects on gold prices. Notice that differences in variance between announcement and nonannouncement variance following the 7:30 a.m. announcements are also significant for silver. Importantly though, for silver, these differences are due to the higher nonannouncement variance.

A second series of BFL tests that examine differences in variance between announcements and nonannouncements across days of the week are performed. The results from these tests are reported in Panel B of Table 2. Significant differences in variance are detected for the interest rate futures on every day other than on Thursday. For the municipal bond future, we find no significant differences between announcement and nonannouncement Thursdays. The F-value is 0.01 and insignificant. Gold provides results that are similar to the results displayed by the interest rate futures, although no differences are detected on Wednesdays as well as Thursdays. For gold differences in variance on Thursdays between announcements and nonannouncements are insignificant despite announcement variance for gold being highest on Thursdays. Closer inspection of Table 1 reveals that nonannouncement variance is also high on Thursdays. For silver, we find significant differences in variance on Tuesdays and Fridays. While differences in variance

Table 2. Tests for Differences in Variance (Announcement vs. Non-Announcement Days)

	Mbond	Tbond	Gold	Silver
PANEL A—Post Announcement Intervals				
First Announcement: Release Time 7:30 a.m. CST				
F-value	43.37	75.71	1.16	0.44
<i>p</i> -value	(7E-11)	(2E-9)	(3E-6)	(2E-8)
Second Announcement: Release Time 8:15 a.m. CST				
F-value	6.84	13.59	1.48	0.89
<i>p</i> -value	(9E-3)	(2E-4)	(0.22)	(0.34)
Third Announcement: Release Time 9:00 a.m. CST				
F-value	21.86	14.81	2.87	0.59
<i>p</i> -value	(3E-6)	(1E-4)	(0.09)	(0.44)
Fourth Announcement: Release Time 1:00 p.m. CST				
F-value	1.70	1.76	0.99	0.12
<i>p</i> -value	(0.19)	(0.48)	(0.32)	(0.73)
PANEL B—Days of the Week				
Monday				
F-value	10.85	5.37	8.39	0.11
<i>p</i> -value	(1E-3)	(0.02)	(4E-3)	(0.74)
Tuesday				
F-value	24.23	11.37	9.38	7.99
<i>p</i> -value	(9E-7)	(7E-4)	(2E-3)	(5E-3)
Wednesday				
F-value	5.24	9.28	0.19	1.86
<i>p</i> -value	(0.02)	(2E-3)	(0.66)	(0.17)
Thursday				
<i>p</i> -value	0.01	8.14	0.59	0.37
F-value	(0.94)	(4E-3)	(0.44)	(0.54)
Friday				
F-value	13.37	34.53	5.97	12.43
<i>p</i> -value	(3E-4)	(5E-9)	(0.01)	(4E-4)

Results are calculated from 15-min prices. The sample period begins on 01/02/92 and ends on 12/29/95. Differences in variance between announcement days and nonannouncement days for the interval immediately following each of the four sets of announcements (post-announcement intervals) is examined. For example, the post-announcement interval following the first set of announcements issued at 7:30 a.m. is the 7:45 a.m. interval. The 7:45 a.m. interval on announcement days captures the immediate effects of the 7:30 a.m. announcements. To examine information effects we compare variance between the 7:45 announcement interval and the 7:45 nonannouncement interval. Differences in variance between announcement and nonannouncement days across days of the week are also examined. To test for differences in variance we use the Brown and Forsythe (1974) modified Levene (1960) (BFL) F-statistic. The BFL F-statistic is given below:

$$F = \frac{\sum_{j=1}^J n_j (\bar{D}_j - \bar{D}_..)^2}{\sum_{j=1}^J \sum_{t=1}^{n_j} (D_{tj} - \bar{D}_j)^2} \left[\frac{(N - J)}{(J - 1)} \right]$$

where $D_{tj} = |R_{tj} - M_j|$; M_j is the return for day t , period j ; M_j is the sample median return for period j computed over the n_j days included in the test; $\bar{D}_j = \Sigma(D_{tj}/n_j)$ is the mean absolute deviation (from the median) over the n_j days for a given period j ; and $\bar{D}_.. = \Sigma \Sigma D_{tj}/N$ is the grand mean, where the D_{tj} is summed over j periods and n_j days and N is computed as $N = \Sigma n_j$ over j periods. The F-statistic is distributed $F_{J-1, N-J}$ under the null hypothesis.

on Tuesdays can be attributed to higher announcement variance, differences in variance on Fridays reflect substantially higher nonannouncement variance.

The evidence presented suggests that the announcements have substantial effects on the interest rate instruments. These effects appear to be less evident with gold. For silver, the systematic presence of higher nonannouncement variance suggests that the price dynamic in

the silver market differs substantially from the interest rate markets. The tests so far aggregate the effects of the announcements. This masks the separate effects of each announcement. It is possible that some announcements have detectable effects on gold and silver. To identify the effects of each announcement on the metal futures, we conduct a series of regression tests.

V. The Impact of Each Announcement on Gold and Silver

The procedure employed modifies the procedure used by Ederington and Lee (1993). Unlike Ederington and Lee (1993), we use the surprise component of the announcements as independent variables. The model used is shown below.

$$\frac{|Rtn_{jt} - MRtn|}{MRtn} = \alpha_{0j} + \sum_{k=1}^K \alpha_{kj} Surprise_{kt} + \epsilon_{kt} \quad (3)$$

Surprise is computed as

$$Surprise = \frac{|Actual - Forecast|}{Forecast} \quad (4)$$

where Rtn_{jt} is the return across a given intraday interval j on day t , and $MRtn$ is the mean return for that particular interval across the sample period. The actual and forecasted values for the announcements are purchased from Money Market Services (MMS). This allows us to compute the surprise components associated with the announcements. MMS surveys about 40 academics and leading practitioners and then uses the median value from these forecasts as the expected value of a forthcoming announcement. The MMS forecast data has been used in prior studies (see e.g., Frankel and Hardouvelis, 1985, Almeida, Goodhart, and Payne, 1998). The absolute value of the surprise is used as we only estimate the intensity of the effects of the announcements.

Regressions for the time intervals following the first set of announcements (at 7:30 a.m.) but preceding the second set of announcements (at 8:15 a.m.) use the surprise variables of only the first 11 announcements issued at 7:30 a.m. For the intervals following the second (at 8:15 a.m.) and following sets of announcements (9:00 a.m. and 1:00 p.m.), the surprise variable of all announcements issued in the preceding intervals are employed. For example, following the second set of announcements we use the surprise variables for the eleven announcements released at 7:30 a.m. and the surprise variables for the two announcements released at 8:15 a.m. The surprise variables for the eleven announcements released at 7:30 a.m. now act as control variables, so that the effects of the 8:15 a.m. announcements can be discerned.

To capture the effects of the first set of announcements, we perform regressions on the interval immediately following 7:30 a.m. announcements (i.e., on the 7:45 a.m. interval). This regression has the surprise variables for the 11 announcements released at 7:30 a.m. acting as independent variables. We report all coefficients for announcements that have significant effects on at least one of the four instruments (at the 10% level of significance). Coefficients of announcements that have no effects on any instrument are not reported.

We apply the same procedure to the other three sets of announcements. For example, to capture the effects of the second set of announcements released at 8:15 a.m., we perform regressions on the 8:30 a.m. interval. This regression has the surprise variables for

the 11 announcements released at 7:30 a.m. acting as control variables and the surprise variables for the 8:15 a.m. announcements acting as independent variables.

In some instances, two announcements are issued at the same time. For example, Industrial Production and Capacity Utilization are released at the same time on the same day. The surprise variable for Industrial Production and Capacity Utilization are each multiplied by 0.5. The three components of the Employment Report, Non-Farm Payroll, the Unemployment Rate, and Hourly Wages are also released together. Thus, the surprise variable of each component of the Employment Report is multiplied by 0.333. Construction Spending and the NAPM Survey are mostly released on the same day. When this happens, the surprise variable that represents each of these two announcements is multiplied by 0.5.

The results of these tests are detailed in Table 3. Comparing results between the interest rate and metal futures provides a striking contrast. A number of announcements affect the Treasury bond and municipal bond futures; however, fewer announcements systematically affect the metal futures. For instance, among the announcements released at 7:30 a.m., we note that the CPI, the Unemployment Rate, Gross Domestic Product, and the PPI have significant effects on gold. For gold, among the later announcements Capacity Utilization has detectable effects at the 1% level of significance. Also, the Federal Deficit affects gold prices, but weakly (at the 10% level of significance). For silver, among the 7:30 a.m. announcements we note strong responses to the release of the Unemployment Rate and weaker responses to release of the CPI and Hourly Wages. Capacity Utilization, released at 8:15 a.m., is found to have strong effects on silver, whereas the release of Construction Spending and Business Inventories at 9:00 a.m. draw weaker responses from silver.

To provide some perspective on the effects of the announcements consider the effects of the announcements on a percentage basis. The percentage of announcements that have detectable effects on the Treasury bond futures, the municipal bond futures, gold futures, and silver futures at the 1% level of significance is 43.4% (7 of the 23 announcements), 30.4%, 8.7%, and 4.4%, respectively. Corresponding values (excluding the announcements affecting the instruments at the 1% level of significance) at the 5% level of significance are 17.4%, 0%, 13.0%, and 4.4%, respectively. The percentages for the metal futures are much less than the percentages for the interest rate futures. On the other hand, the strong response of gold to the release of the CPI and both gold and silver to Capacity Utilization is evidence that, even in a period characterized by stable inflation, the issue of some announcements still have pronounced effects on gold and silver prices. Both these announcements provide estimates of current and future levels of inflation. Thus, it is not surprising that these two announcements have strong effects on the metal futures. The CPI, issued by the Bureau of Labor Statistics in the second or third week of the month, measures prices of a comprehensive basket of goods and services and thus provides a measure of inflation from the demand side. Capacity Utilization, on the other hand, measures inflation from the supply side, as it estimates the capacity and availability of manufacturing resources. Frankel and Hardouvelis (1985) find that gold responds more strongly than silver to the surprise component of weekly releases of money supply announcements. Their sample spans the period July 7, 1980 to November 5, 1982 (see their Table 2). The Federal Reserve announced a change in operating procedures on October 6, 1979. This prompts them to examine a preannouncement period as well (September 29, 1977 to October 4, 1979). They still find the response of gold to be stronger than the response of silver to surprises in money growth (see their Table 5). Frankel and Hardouvelis (1985) results may not be directly comparable to ours, given the difference in sample periods, the types of announcements examined, and the difference in data frequency (they use daily

Table 3. Regression Tests to Identify the Effects of Individual Announcements

Dependence Variable	CPI	Unemployment Rate	Hourly Wages	Nonfarm Payroll	GDP	Housing Starts	PPI	Retail Sales	Durable Goods
First Set of Announcements: Release Time 7:30 a.m. CST									
Mbond	1.548* (1.80)	2.335*** (6.20)	0.799 (1.00)	1.820*** (6.21)	1.076* (1.90)	1.868 (0.560)	3.377*** (5.15)	1.632*** (4.77)	0.109 (1.60)
Tbond	2.772** (2.53)	3.365*** (7.02)	1.212*** (3.57)	3.740*** (5.18)	1.956*** (2.71)	0.937** (2.23)	8.004*** (9.59)	2.560*** (5.87)	0.169* (1.83)
Gold	2.693*** (4.32)	0.378** (2.04)	0.790 (1.01)	0.107 (0.65)	0.591** (2.07)	0.250 (0.08)	1.298** (2.04)	0.360 (1.07)	0.019 (0.27)
Silver	4.808* (1.71)	0.164** (2.13)	0.949* (1.74)	0.041 (0.07)	0.278 (0.15)	0.824 (0.76)	0.429 (0.20)	0.132 (1.18)	0.060 (0.25)
Dependent Variable	Industrial Production	Capacity Utilization							
Second Set of Announcements: Release Time 8:15 a.m.									
MBond	5.211*** (3.39)	3.145*** (3.31)							
Tbond	4.497*** (3.16)	4.990*** (5.68)							
Gold	0.259 (1.01)	6.274*** (5.89)							
Silver	0.567 (1.33)	9.003*** (2.99)							
Dependence Variable	Construction Spending	New Home Sales	Personal Spending	Business Inventories					
Third Set of Announcements: Release Time 9:00 a.m.									
Mbond	0.948*** (3.55)	0.268 (0.32)	0.140 (0.21)	0.612 (1.22)					
Tbond	1.057*** (3.50)	0.452*** (3.07)	0.477*** (2.03)	0.215* (1.76)					
Gold	0.069 (0.52)	0.188 (1.37)	0.277 (0.26)	0.602 (1.18)					
Silver	0.571* (1.64)	0.911 (0.25)	0.600 (0.22)	0.397* (1.76)					

Table 3. Continued.

Dependent Variable	Federal Deficit
Fourth Set of Announcements: Release Time 1:00 p.m.	
Mbond	0.040 (0.18)
Tbond	0.185** (1.99)
Gold	0.510* (1.66)
Silver	1.147 (0.82)

The procedure employed modifies the procedure used by Ederington and Lee (1993). The model used is shown below.

$$\left| \frac{Rtn_{jt} - MRtn}{MRtn} \right| = \alpha_{0j} \sum_{t-1}^R Surprise_{jt} + \epsilon_{jt}$$

Surprise is computed as the ratio of the absolute difference between the actual and forecasted values divided by the forecasted value. Rtn_{jt} is the return across a given intraday interval j on day t and $MRtn$ is the mean return for that particular interval across the sample period. Regression for the time intervals following the first set of announcements but preceding the second set of announcements use the surprise variables of only the first nine announcements issued at 7:30 a.m. For the intervals following the second and following sets of announcements, the surprise variable of all announcements issued in the preceding intervals are employed. To capture the effects of the first set of announcements we perform regressions on the interval immediately following 7:30 a.m. announcements (i.e., on the 7:45 a.m. interval). We apply the same procedure to the other three sets of announcements. In some instances two announcements are issued at the same time. For example, Industrial Production and Capacity Utilization are released at the same time on the same day. The surprise variable for Industrial Production and Capacity Utilization are each multiplied by 0.5. The three components of the Employment Report, Non-Farm Payroll, the Unemployment Rate, and Hourly Earnings are all released together. Thus, the surprise variable of each component of the Employment Report is multiplied by 0.333. Construction Spending and the NAPM Survey are mostly released on the same day. When this happens, the surprise variable that represents each of these two announcements is multiplied by 0.5. Significant coefficients have been multiplied by a factor 10^{-3} and t -values are given in the parentheses. The ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

data). We still find it remarkable that the results from both studies have such correspondence, in that we too find gold to respond more strongly to the release of the CPI than silver (at the 1% and 10% levels, respectively). The CPI is perhaps the most comparable monthly announcement in our sample to their weekly money supply announcement.⁶

VI. Summary and Conclusions

We document the effects of macroeconomic news releases on gold and silver futures prices using intraday data over a period of 4 years (1992–1995). Twenty-three monthly macroeconomic news releases are followed. The effects of macroeconomic news on Treasury bond and municipal bond futures are also examined. We use the response of the interest rate instruments as a basis of comparison.

Using robust nonparametric tests, we find differences in response to the announcements between the metal and interest rate futures. While the announcements substantially affect interest rate futures, the metal futures show modest responses to the release of macroeconomic news. For silver, variance on nonannouncement days is actually higher than on announcement days. Examining variance across days of the week reveal increases in variance for interest rate futures as the weekend approaches. This coincides with the increase in the number of announcements issued across days of the week. Some evidence of a similar increase in variance is displayed by gold futures.

To identify the impact of each announcement, we run regression tests using 15-min returns. The surprise component of each announcement is employed as dependent variables. The results show that the interest rate futures respond strongly to the release of many of the announcements, particularly the announcements issued shortly after the market opens for trading. Gold and silver respond strongly to the release of Capacity Utilization. Gold also responds strongly to the release of the CPI. The Unemployment Rate, Gross Domestic Product, and the PPI also have significant effects on gold. For silver, among the 7:30 a.m. announcements, we note strong responses only to the release of the Unemployment Rate. The results also suggest weak responses by gold and silver futures (at the 10% level of significance) to a few other announcements. Gold responds weakly to the release of the Federal Deficit, whereas silver responds weakly to the release of the CPI, Hourly Wages, Business Inventories, and Construction Spending. Other than these announcements, the rest have no detectable effects on gold and silver futures.

The overall results show that the news releases strongly effect interest rate futures, but have less pronounced effects on metal futures. Concluding that the return dynamic prevailing in the metal futures markets differs from that present in the interest rate markets seems reasonable. Fund managers should be cognizant of this. Such information is useful in portfolio construction. Some of the results relating to metal futures can reasonably be attributed to the economic climate that prevailed during the sample period, a period of stable inflation. Factors such as global demand may also play a role in explaining the results. For silver, the higher nonannouncement variance can be interpreted evidence of substantial speculation.

⁶ The results of Cornell and French (1986) cannot be compared with our results as their econometric procedure provides one result for all metals. The purpose of their study is to examine the effects of money shocks on real interest rates. To do this, they develop a measure of the real interest rate that is based on commodity own rates.

Appendix Macroeconomic News Announcements 1992–1995

Time	Announcement	Panel A: Day of the week				
		Mon	Tue	Wed	Thu	Fri
7:30 a.m.	Consumer Price Index	0	8	15	7	20
7:30 a.m.	Durable Goods Orders	0	2	23	12	10
7:30 a.m.	Civilian Unemployment Rate	0	0	0	2	47
7:30 a.m.	Nonfarm Payroll	0	0	0	2	47
7:30 a.m.	Hourly Wages	0	0	0	2	47
7:30 a.m.	Gross Domestic Product	0	5	10	15	18
7:30 a.m.	Housing Starts	0	21	13	9	6
7:30 a.m.	Merchandise Trade Deficit	1	7	14	18	9
7:30 a.m.	Leading Indicators	0	18	16	4	10
7:30 a.m.	Producer Price Index	0	12	5	18	13
7:30 a.m.	Retail Sales	0	14	6	17	11
8:15 a.m.	Industrial Production	5	9	11	4	19
8:15 a.m.	Capacity Utilization	5	9	11	4	19
9:00 a.m.	Business Inventories	10	2	13	7	16
9:00 a.m.	Construction Spending	18	10	10	5	5
9:00 a.m.	Factory Inventories	1	1	14	21	10
9:00 a.m.	NAPM Survey	19	9	9	6	5
9:00 a.m.	New Single-Family Home Sales	6	15	9	10	6
9:00 a.m.	Personal Income	15	3	6	11	12
9:00 a.m.	Personal Spending	15	3	6	11	12
1:00 p.m.	Federal Deficit	11	7	7	8	14
No Fixed time	Installment Credit	7	9	6	4	17
No Fixed time	Consumer Credit	8	9	6	5	17
Total		121	173	210	202	390
Percentage of Total		11	16	19	18	36
						Grand total
						1096

Appendix Continued

Time	Announcement	Panel B: Month												
		Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	
7:30 a.m.	Consumer Price Index	4	4	4	4	4	4	5	4	4	4	4	4	5
7:30 a.m.	Durable Goods Orders	4	4	4	4	4	4	4	4	4	4	4	4	3
7:30 a.m.	Civilian Unemployment Rate	4	4	4	5	4	4	4	4	4	4	4	4	4
7:30 a.m.	Nonfarm Payroll	4	4	4	5	4	4	4	4	4	4	4	4	4
7:30 a.m.	Hourly Wages	4	4	4	5	4	4	4	4	4	4	4	4	4
7:30 a.m.	Gross Domestic Product	4	2	6	4	4	3	4	4	4	4	4	3	6
7:30 a.m.	Housing Starts	4	4	4	4	4	4	4	4	4	4	4	5	4
7:30 a.m.	Merchandise Trade Deficit	4	5	4	3	4	4	4	5	4	4	4	4	4
7:30 a.m.	Leading Indicators	1	3	6	3	4	6	2	5	4	3	4	4	7
7:30 a.m.	Producer Price Index	4	4	4	4	4	4	4	4	4	4	4	4	4
7:30 a.m.	Retail Sales	4	4	4	4	4	4	4	4	4	4	4	4	4
8:15 a.m.	Industrial Production	4	4	4	4	4	4	4	4	4	4	4	4	4
8:15 a.m.	Capacity Utilization	4	4	4	4	4	4	4	4	4	4	4	4	4
9:00 a.m.	Business Inventories	4	4	4	4	4	4	4	4	4	4	4	4	4
9:00 a.m.	Construction Spending	3	4	5	4	4	4	4	4	4	4	4	4	4
9:00 a.m.	Factory Inventories	2	4	8	4	2	6	2	5	2	4	4	4	4
9:00 a.m.	NAMP Survey	3	4	5	4	4	4	4	4	4	4	4	4	4
9:00 a.m.	New Single-Family Home Sales	2	3	8	3	3	6	2	6	4	2	3	3	4
9:00 a.m.	Personal Income	4	0	7	4	2	6	4	4	4	5	2	2	5
9:00 a.m.	Personal Spending	4	0	7	4	2	6	4	4	4	5	2	2	5
1:00 p.m.	Federal Deficit	4	4	4	4	4	4	4	4	4	3	4	4	4
No Fixed Time	Installment Credit	3	3	4	3	4	4	4	4	4	4	4	3	3
No Fixed Time	Consumer Credit	4	3	4	4	3	5	4	2	4	4	4	4	4
Total		82	79	112	91	84	102	87	95	90	90	86	86	98
Percentage of Total		7	7	10	8	8	10	8	9	8	8	8	8	9

Note: All times in CST.

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