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**MACROECONOMIC NEWS ANNOUNCEMENTS AND
THE CDN/USD INTRADAY EXCHANGE RATE**

Alexandre Mazigi

**A Thesis
In
The John Molson School of Business**

**Presented in Partial Fulfillment of the Requirements
for the Degree of Master of Science in Administration at
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Abstract

Macroeconomic news announcements and the CDN/USD intraday exchange rate

Alexandre Mazigi

The paper empirically examines the effects of macroeconomic news announcements on the CDN/USD exchange rate. Our process started by dividing our sample observations into four groups: (1) Major US announcement days, (2) minor US announcement days, (3) Canadian news announcement, and (4) Non-announcement days. We compared the volatility for each of these groups based on five-minute intervals during the trading day. Using two different models, we examine which announcements have the greatest impact on the exchange rate.

We find that the U.S. announcements that had the most impact were housing starts, leading indicator and to a lesser degree federal funds rate and merchandise trade deficit. The Canadian news announcements that were found to be most significant was the official bank rate followed by Canadian unemployment and Canadian Building permits.

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Last but certainly not least, I dedicate this work to my muse: Caroline.

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I. INTRODUCTION

Any market participant will tell you that news, the element of this news that is truly unexpected, has a direct effect on asset price dynamics. It seems that a whole Para-governmental industry has bloomed on the production of these “news” about fundamentals of our economies. So it is no great surprise that the subject of the impact of news of fundamentals on asset prices, and exchange rates in particular, has been well researched.

However, surprisingly little has been done on the subject when it comes to the Canadian-U.S. dollar exchange rate. One would think that two countries exchanging 600 billion CDN dollars worth of trade annually would justify and attract a little more attention. Indeed, most of the previous studies have focused on the effect of US news announcements on different asset prices, mainly international exchanges rates.

Nevertheless, the bilateral nature of exchange rates would imply that news items from both countries would affect exchange rates. As exchange rates are the relative price of one asset stated as a function of another asset, any element affecting either asset would also have an impact on this relative price. This would make research that would only take into account domestic or foreign news incomplete, even biased.

Furthermore, according to the efficient market hypothesis, exchange rates should only respond to the unanticipated portion of the news effect as the expected part should already be reflected in the spot exchange rate. The hypothesis dictates that the reaction to any unexpected news should be quasi instantaneous. The use of intraday, high frequency data, will help us

better determine the exact speed of adjustment of the exchange rate to the different news items.

The use of futures prices as a proxy for the spot exchange rate can be justified by the unbiased forward rate hypothesis (UFH). The UFH states that the forward rate “fully reflects” all available information about the exchange rate expectation. This implies that economic agents expectations of exchange rate determinants are fully reflected in the forward rates, leaving only the ‘surprise’ element of the news items as the explanation for the volatility shock.

In this paper, we will provide empirical evidence of the impact of news on the intraday volatility of the U.S.-Canadian dollar exchange rates by looking at different fundamental factor announcements. We will determine which news affects individual exchange rates and in which way. The study will proceed as follows. We will first review existing work on the subject. The third section will describe the data and the different fundamental factors used to study the impact on volatility. Section 4 will study the behavior of exchange rate volatility during announcement days vs. non announcement days. Section 5 will look at which announcements do actually have an impact on the exchange rate market in a significant manner, while section 6 will cover the volatility and the speed of adjustments to news shocks. The last section summarizes and concludes our work.

II. LITERATURE REVIEW

Research on macroeconomic news effects on different assets are legion and provide sometimes contradictory results. Studies like those of Wasserfallen (1989), Mitchell and Mulherin (1994), and Fitzpatrick (1994) find that macroeconomic news has little impact on equities. Oppositely, Cutler, Poterba, and Summers (1989) affirm that unexpected macroeconomic developments are responsible for 35% of stock returns variability. Instinctively we can relate to this finding by noting the impact of interest rate changes on equity markets.

The literature on the impact of news on exchange rates is based on the idea that if foreign exchange markets are efficient, all anticipated relevant information should be reflected in current exchange rates. Studies by economists, even echoed by the Federal Reserve's Alan Greenspan in his August 17th, 2002, speech to congress, have shown that exchange rates are particularly hard to forecast and that news about fundamentals better explain exchange rates than other types of models (see Branson (1983), Edwards (1982, 1983), and MacDonald (1983)). But again, studies like the one performed by Wolf (1988) which used a monetary model that included news effects found that the model did not improve on a random walk model in forecasting future exchange rate movements.

Literature on the impact of news on exchange rates dates back to the early to mid-eighties (See Edwards (1983), Hoffman and Schlagenhauf (1985), Hakkio and Pearce (1985), and Ito and Roley (1987), for example). Frenkel (1981) estimated the impact of news regarding interest rates on the dollar/franc, dollar/sterling and dollar/mark exchange rates over the 1973-1979 period. The result indicated only a weak role played by news in the determination of the

exchange rates. Hardouvelis (1988) was the first to emphasize the necessity of isolating the shock of news announcements to quantify its impact. The main critique of his approach is the use of daily currency prices to measure the impact of individual news announcements.

The early nineties brought the use of intraday data for such research. Early attempts used so much data, i.e. transaction data, that it became cumbersome and limited the time frames to about three month windows (Goodhart et al. (1993)). With experience and refinements, researchers began using intraday data with more success. Tanner (1997) highlighted the possible improvements by using intraday spot data prices. To begin with, the use of intraday spot data permitted the isolation of the market's response to news announcements, therefore avoiding unrelated noise that may occur during the same day. The second improvement is related to the efficient market hypothesis and its instantaneous integration of new information. Intraday data should clearly show the speed at which the markets respond to information. Abnormal behavior well beyond the announcement can be interpreted as a sign of market inefficiency.

Once again, the amount of work done on this aspect of the subject is important. In 1985, Hakkio and Pearce used quotes from 9:00 am, noon and 4:40pm to research the announcement effects of macroeconomic news. They found that the persistence of the news impact was almost insignificant.

More relevant to our purposes, Ederington and Lee (1993, 1995) used high frequency deutschmark futures prices to study return volatility and its persistence. They found that volatility increased coinciding with several with numerous U.S. macroeconomic news announcements. They studied the market's adjustment speed by the length of time the

volatility remained above normality. Like so many before them, they found short and fast adjusting impacts on exchange rates. The brunt of the shock was felt during the first five minutes and volatility returned to normal within 45 minutes after the announcement. This seems to be constant across different studies.

III. DATA AND ANNOUNCEMENTS

3.1 CDN/US\$ FOREIGN EXCHANGE DATA

Our research will be based on tick-by-tick transaction futures prices for the CDN/US\$ exchange rate traded on the Chicago Mercantile Exchange (CME). The data was obtained from The Institute for Financial Markets data center and covers the period from January 2nd, 1998 to December 31st, 2001. As mentioned earlier, the use of futures contracts is justified by the unbiased futures hypothesis, stating that futures prices better reflect trader's expectations on the underlying asset.

We concentrated on the nearby contracts, i.e. the contracts with the closest maturity. These contracts are the most liquid and thus, could be judged as being priced the most accurately. This was also the approach used by Ederington and Lee in their 1993 work. The CME offers electronic access to its futures products 24-hours a day but limits the maximum price fluctuation by imposing bands. However the main trading is done as "Open Outcry" on the floor of the CME from 7:20 am to 2:00 pm Central Standard Time and has no such fluctuation limitations. Trading on contracts ceases at 9:16 am Central Time on the business day immediately preceding the third Wednesday of the contract month (usually Tuesday). This is when our nearby contract is rolled over to the next closest maturity. The Canadian dollar futures are quoted in U.S. dollars per Canadian dollar. Trading occurs in \$.0001 per Canadian dollar increments (\$10.00/contract). The standard contract size is 100,000 Canadian dollars.

One significant characteristic of the present context is the close relationship between both economies. As stated earlier, the proximity of both countries and the fact that they are located

in the same time zones makes for an interesting possible conclusion. The speed of integration of news could be influenced by the fact that there is no reason to wait for the opening of the markets to take a position on the futures market due to recent news announcements. Any news announcement will directly impact future expectations and will be reflected in the futures exchange rate. Arguably, this context could spell the fastest possible reaction time for news announcements.

3.2 U.S. NEWS ANNOUNCEMENTS

Appendix 1 describes our monthly U.S. macroeconomic news announcements. Our research will demonstrate the effects of these macroeconomic news announcements on the exchange rate futures. Most of these news announcements have become a constant in this type of study. They have been used by researchers such as Ederington and Lee (1993,1995, 1997) more recently by Anderson, Bollerslev, Diebold and Vega (2002). Money supply, the trade deficit, the unemployment rate, the consumer price index, the producer price index and industrial production have appeared in numerous studies. They represent fundamental factors that best characterize the American economy and that are easily available. Their release can have an affect on exchange rates either because they are viewed as signaling a likely change in demand for foreign exchange or because market participants believe these are important variables which the central bank considers in setting monetary policy.

Our monthly announcements and the analyst's expectations were obtained from the Bloomberg database. Out of 19 announcements, eleven were released at 7:30 a.m., one at 8:15 a.m., four at 9:00 a.m., and one at 1:00 p.m.. The Fed Fund Rate, even if the announcement

date is known, has no set declaration time. After experimenting with different time releases, we concluded that the best time to 'lock in' the announcement was when the Fed meeting officially began. Please note that all times are recorded at Central Standard Time to coincide with our futures contract trading.

3.3 CANADIAN NEWS ANNOUNCEMENTS

Appendix 2 displays the different Canadian news announcements. They also were obtained from the Bloomberg database and were released by different governmental agencies. The similarities between both U.S. and Canadian announcements are additional evidence of the integration of both economies. Out of our eleven announcements, two were at 6:00, eight were at 7:30 and one at 9:00 am (Central standard Time).

To the best of our knowledge, only two studies have looked at the effect of macroeconomic news announcements on the volatility of the Canadian dollar. Although their research was on central bank interventionism, Murray, Zelmer and McManus (1996) and Beattie and Fillion (1999) used some of these variables to see the impact of news announcements on the exchange rate. For example, Beattie and Fillion (1999) used the monthly variables CPI, Labor force survey, merchandise trade and GDP to do their evaluation.

4. INTRADAY VOLATILITY BEHAVIOR: ANNOUNCEMENT DAYS VS NON-ANNOUNCEMENT DAYS

We began by examining intraday volatility. We calculated log returns, $\ln(P_t/P_{t-1})$, from prices on the nearby contract for each five-minute period over the trading day. Separating our sample into four subgroups, we created the following:

1. A-sample of major US announcements
2. B-sample of minor US announcements
3. C-sample of Canadian announcements
4. N-sample of non announcements

Figure 1 shows the standard deviations of the log returns calculated across individual sample periods for each five-minute interval. In each figure, the horizontal axis indicates the ending interval time in Central Standard Time, e.g., 7:55 for 7:50 to 7:55 returns. Appendix 3 displays the sample size for each of these groups.

The panel A in figure 1 plots the exchange rate volatility during trading days in which a major US macroeconomic announcement occurs versus days during which no announcements were made. To our surprise, the graphs show that volatility remains consistently high during the entire Major US announcement day when compared to the non-announcement days, showing that the market takes some time to completely absorb the effect of the major news announcements. As no spike is observable on the non-announcement line, we can be certain that the volatility peak between 7:30 and 7:35 is due to our news announcements. The market's integration of the new information appears to be producing a slight volatility spike at

7:35. These results are consistent with Ederington and Lee (1993) and Leng (1996), who also found higher volatility when announcements are made. However, the fact that volatility remains high throughout the trading day comes in sharp contrast to the quick shock recovery concluded by Ederington and Lee. The erratic volatility observed later in the day may be due to the lack of volume during the later hours of trading. The major portion of volume is observable in early morning trading. The lack of volume later in each trading session means that we might have bigger gaps in price changes per five-minute interval between the different trading days.

The following panel B compares minor US news announcement, trading days to days with no announcements. Not only does the volatility remain higher during the day compared to non-announcement trading days, but the volatility is even higher than on the major US announcements trading days. Even if some major and minor announcements happen on the same day and that there are more minor than major trading days, minor announcements trading days are clearly more volatile than any other type of announcement day. We will later decompose the US minor announcements to find out which element has been the most significant.

Panel C in figure 1 compares trading days in which Canadian announcements were made to days where no announcements were released. Once again volatility was constantly higher for Canadian announcements throughout the announcement day. Most Canadian announcements are made early in the trading session, yet the volatility remains high during the entire trading day.

To complement the thoroughness of our variance analysis of all four groups, we calculate the Brown-Forsyth-modified-Levene (B-F-L) test statistics to test for constancy of error variance for our three comparisons. We test the null hypothesis that the variances of returns are equal for our three populations compared to the non-announcement population. As noted by Ederington and Lee (1993), this test for homogeneity of variance is “among the most powerful [of over fifty methods considered] and is robust to non-normality. Indeed, this test is robust to departures from normality contrary to tests such as Hartley’s. Table 1 shows that the null hypothesis is rejected at the 1 percent level for all of the groups. The null is clearly rejected for all announcement groups.

5. WHICH ANNOUNCEMENTS MOVE THE MARKET?

The following section deals with the “surprise” or unanticipated components of the news release that affects the CDN futures prices. We analyze Canadian announcements in parallel to those made in the US since the bilateral nature of exchange rates dictates that Canadian news announcements would affect the price just as US announcements would. Furthermore, the interdependence of these economies could indicate that one country’s announcement would be followed by a similar announcement by the other country. Because of this, offsetting announcements by each country are not expected to be a problem.

We use two different models to study the implications of the releases. Our first model will help us isolate the surprise component of the news announcements by taking into account the market expectations on each announcement. The second identifies the volatility changes by using dummy variables that do not take into account market expectations. Canadian dollar futures contracts prices were taken at five-minute intervals to better isolate the announcements without drowning ourselves in data and limiting our study period.

5.1 MARKET SURVEY MODEL

Our first mission was to zero in on the effects of major US macroeconomic news announcements on our futures prices. Using Tanner (1997) as a starting point, we modified his model to obtain the following:

$$\Delta \text{Log} E_t = \alpha_0 + \alpha_1 \text{CPI}_t + \alpha_2 \text{UR}_t + \alpha_3 \text{GDP}_t + \alpha_4 \text{DGO}_t + \alpha_5 \text{MTD}_t + \alpha_6 \text{PPI}_t + \alpha_7 \text{RS}_t + \varepsilon_t \quad (1)$$

Where, $\Delta \text{Log} E_t$ is the percentage change in the futures price between the 5-minute intervals measured on day t . Our various independent variables (listed in Appendix 1) are defined by the value of their surprise component. This surprise component is nothing more than the percentage difference between the markets expectation on the announcement and the actual value of the announcement. For example, a positive coefficient on the US GDP figures would indicate that the Canadian dollar futures increase in value in response to higher-than-expected US GDP, and decrease with lower-than-expected US GDP.

Under the null hypothesis of market efficiency, the market incorporates news rapidly, therefore the coefficients on the surprise component of the announcements should equal zero in the time interval in which the announcement was made. The alternative hypothesis is that over a particular time interval the market either over or under reacts to the news item, and thus subsequent intervals may exhibit significant responses.

Our minor news announcement model (Ederington and Lee (1993), Leng 1996, and Tanner (1997)) closely resembles our previous equations. The minor independent variables are modeled as follows:

$$\Delta \text{Log}E_t = \beta_0 + \beta_1 BI_t + \beta_2 CS_t + \beta_3 PI_t + \beta_4 HS_t + \beta_5 IP_t + \beta_6 CU_t + \beta_7 NAPM_t + \beta_8 NHS_t + \beta_9 LI_t + \beta_{10} WI_t + \beta_{11} FB_t + \beta_{12} IR_t + v_t \quad (2)$$

where all the independent variables are once again defined in Appendix 1.

As logic would dictate, the Canadian macroeconomic news announcement surprise model is in the vein:

$$\Delta \text{Log}E_t = \gamma_0 + \gamma_1 IPP_t + \gamma_2 CHS_t + \gamma_3 NMV_t + \gamma_4 ITB_t + \gamma_5 M_t + \gamma_6 WS_t + \gamma_7 RT_t + \gamma_8 CI_t + \gamma_9 RMPI_t + \gamma_{10} CUR_t + \gamma_{11} CPI_t + \gamma_{12} IR_t + \omega_t \quad (3)$$

The independent variables are once again measured by their surprise component and are listed in Appendix 2.

5.2 DUMMY VARIABLE MODEL

Contrary to Tanner's model, Ederington and Lee's approach does not take into account market anticipations or surprise components to evaluate the impact of macroeconomic news announcements on futures prices. However, as did Schwert (1989), they utilize dummy variables to isolate announcements when they occur. Using the dummy variable D_{kt} and assigning it a value of 1 if announcement k is made on day t and $D_{kt} = 0$ otherwise. Our model is defined as follows:

$$\left| R_{jt} - \bar{R}_j \right| = \alpha_{0j} + \sum_{k=1}^K \alpha_{kj} D_{kt} + e_{jt} \quad (4)$$

The dependant variable is the absolute value of the difference between the actual return R_{jt} for the five-minute interval j on day t and the mean return \bar{R}_j for interval j over all trading days. Over our study period, separate regressions are run for each five-minute period following the announcements over our study period.

If log returns are normally distributed with constant mean but time-varying variance,

$E\left|R_{jt} - \bar{R}_j\right| = (\pi/2)^{0.5} \sigma_{0j}$, where σ_{0j} is the standard deviation of returns in interval j on day t . As a result, the product $(\pi/2)^{0.5} \alpha_{0j} = 1.2533\alpha_{0j}$, will provide an estimate of the standard deviation of returns in interval j on non-announcement days (Schwert (1989)). If the market response to a announcement results in a surprise of either good or bad news, α_{kt} should be positive if announcement k impacts the market. The estimated standard deviation of returns in

interval j on days when k is announced is given by $1.2533 (\alpha_{0j} + \alpha_{kj})$. If an announcement is ignored by the market, α_{kj} should be approximately zero.

5.3 ESTIMATION RESULTS

The results of our regressions based on our different models are reported in Tables II, III, IV, V, VI and VII. The impact of the different announcements using the market survey model are reported in Table II through IV, while the results from our version of Ederington and Lee's dummy variable model is detailed in Tables V through VII. Both methods can yield consistent results.

Looking at the major U.S. announcements, the market survey model gave us the most interesting results. Merchandise Trade Deficit was significant at the 5 percent level, while the Producer Price Index was significant at the 10 percent level. These announcements help explain the volatility spike during the 7:30 – 7:35 time period on days when major U.S. announcements are released. Ederington and Lee (1993) and Tanner (1997) also found that the merchandise trade deficit was significant, albeit at the 1 percent level, when explaining USD-DM returns. PPI results conform to a sticky price equilibrium scenario (Tandon and Simaan (1985)), whereby unexpected increases in producer price index give rise to higher real interest rates that stimulate capital flows into the country, causing exchange rates to appreciate.

Both models seem to agree when looking at minor announcement effects. Both models yielded results significant at the 1 percent level for the leading indicator. Furthermore, the

dummy variable model gave us significant results for housing starts (at the 1% level) and for federal funds rate (at the 5% level). We must clarify that federal funds rate changes were included in our analysis when they occurred since they are not announced in a regular basis.

As for Canadian announcements, they are displayed in Tables III and VI. The market survey model yielded the most interesting results. Changes in the official bank rate were significant at the 1 percent level when using the market survey model. Canadian building permits were also significant at a 5 percent level using the model. Both models agreed on the Canadian Unemployment rate being significant at the 10% level. The dummy variable model also gave us the same significance level for the consumer price index and the composite index.

6. VOLATILITY PERSISTENCE, AND THE SPEED OF ADJUSTEMENT

Finally, we will examine the speed at which markets incorporate American and Canadian news announcements. The efficient market hypothesis dictates that that all information is reflected in the price of the asset almost instantly when it is released. Therefore once the information is integrated into the currency trader community, the standard deviation of returns should return to normal after some relatively fast increase.

Table VIII reports our volatility persistence results. We started by calculating the five-minute return variance from 7:20 to 13:55 for each of our four groups: (1) major U.S. announcement days, (2) minor U.S. announcement days, (3) Canadian announcement days, and (4) non-announcement days. Ratios of each the announcement groups to our non-announcement group are reported along with the Brown-Forsyth-Levene test for homoscedasticity.

What we initially observe is the consistency at which the variance remains high during announcement days. For example, US minor declaration days testify to volatility remaining between 38 to 41 percent higher than non-announcement days. The same can be said about Canadian (31 to 34 percent) and US major (15 to 17 percent) macroeconomic news releases.

In addition, even if major US announcements had the least volatile returns of our three announcement groups, it had the most significant B-F-L F ratios. The B-F-L ratios corresponding to our 7:30-7:35 and 7:35-7:40 major news releases were the most significant (at 1 percent level). Arguably, the phenomena continued until 8:25 where B-F-L F ratios remained significant at the 5 or 10 percent levels.

The minor US announcements had the highest volatility, but the B-F-L F ratios were not as clear as for the major news releases. Even if we can observe a very slight volatility increase between 7:30 and 7:35, the B-F-L F ratio didn't confirm any significant departure from the mean variance. However, we did have a significant B-F-L F ratio (at the 5% level) for the 8:15-8:20 interval corresponding to the time when industrial production numbers are released, though our models did not find any significance for industrial production. Very slight B-F-L F ratio significance (at the 10 percent level) was found for 9:00-9:05 interval, our models most noteworthy news release interval, even if volatility did not appear to increase.

As for the Canadian dollar return volatility, it also remained high throughout the day. The most significant B-F-L F ratios were in the 7:40-7:45, close to our most important announcement time of 7:30. Our volatility persistence analysis did not give us any significant results for the bank rate announcement which was the most significant according to our survey forecast model.

Notable was the 9:55-10:05 interval that yielded significant B-F-L F ratios, albeit at various levels, for all of our three announcement groups. None of explanatory variables corresponded with that interval and further research might be interesting on this effect.

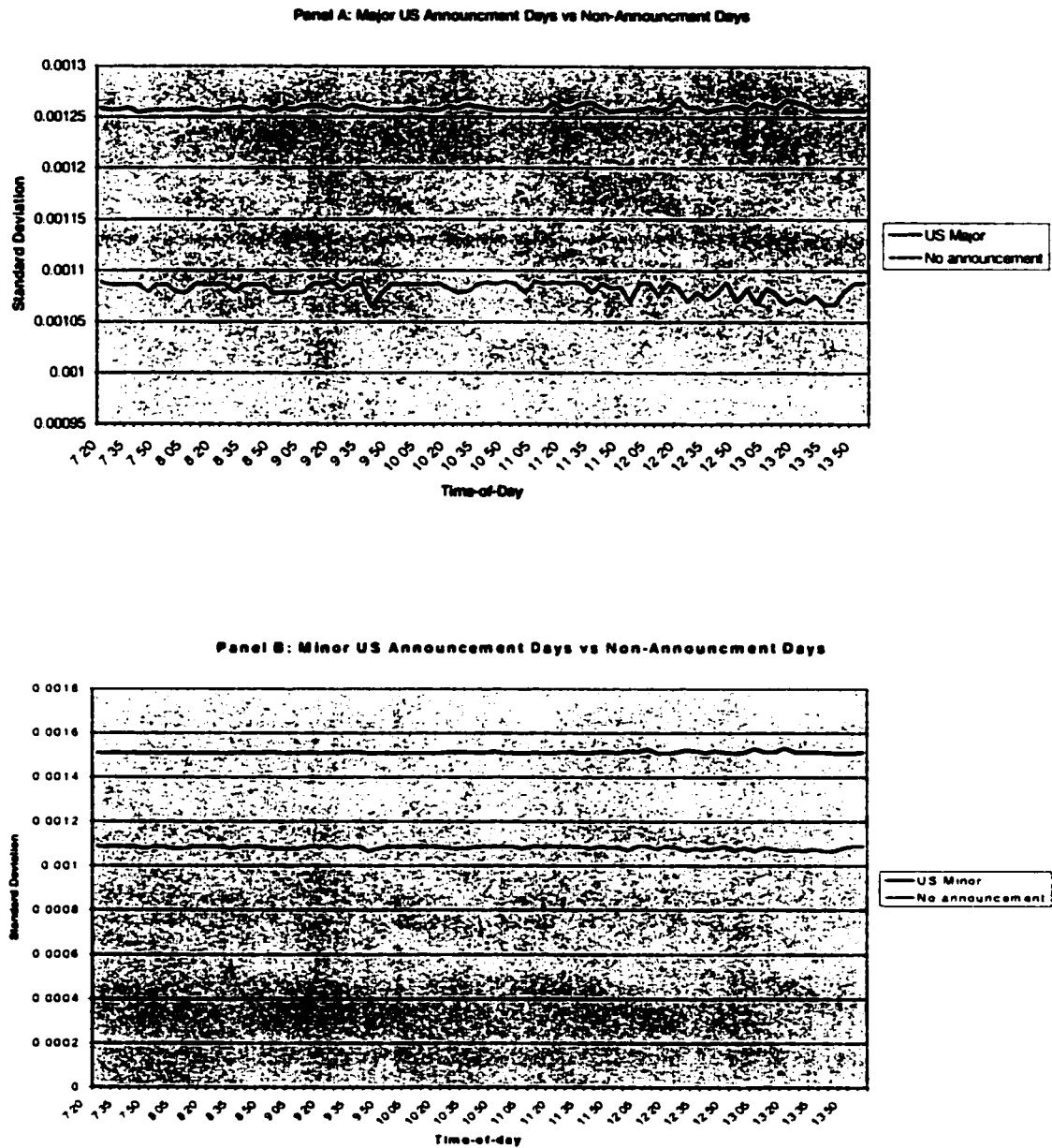
7. SUMMARY AND CONCLUSION

Our paper examined the impact of macroeconomic news announcements by governmental organizations on the Canadian dollar future traded on the Chicago Mercantile Exchange. The study highlights the bilateral nature of exchange rates proving that both U.S. and Canadian news announcements affect the price of the futures contract. This is particularly interesting due to the fact that both financial systems are extremely linked, starting with identical market trading hours. As we have seen, the news items that affect the exchange rate varies for the two countries. The U.S. announcements that had the most impact were housing starts, leading indicator, federal funds rate and merchandise trade deficit. The Canadian news announcements that were found to be most significant was the official bank rate followed by Canadian unemployment and Canadian Building permits. The disparities in results between both countries can be attributed to inequalities in the informational content of each announcement or the different importance attached to each item by currency traders.

We have observed that the announcement day's volatility remains high during the entire day. However, departures from mean variance were found that do not coincide with any of our announcements. Further research could look into this unexplained volatility.

FIGURE 1

Five-Minute Ln Returns of Announcements Days verse Non-announcement Days



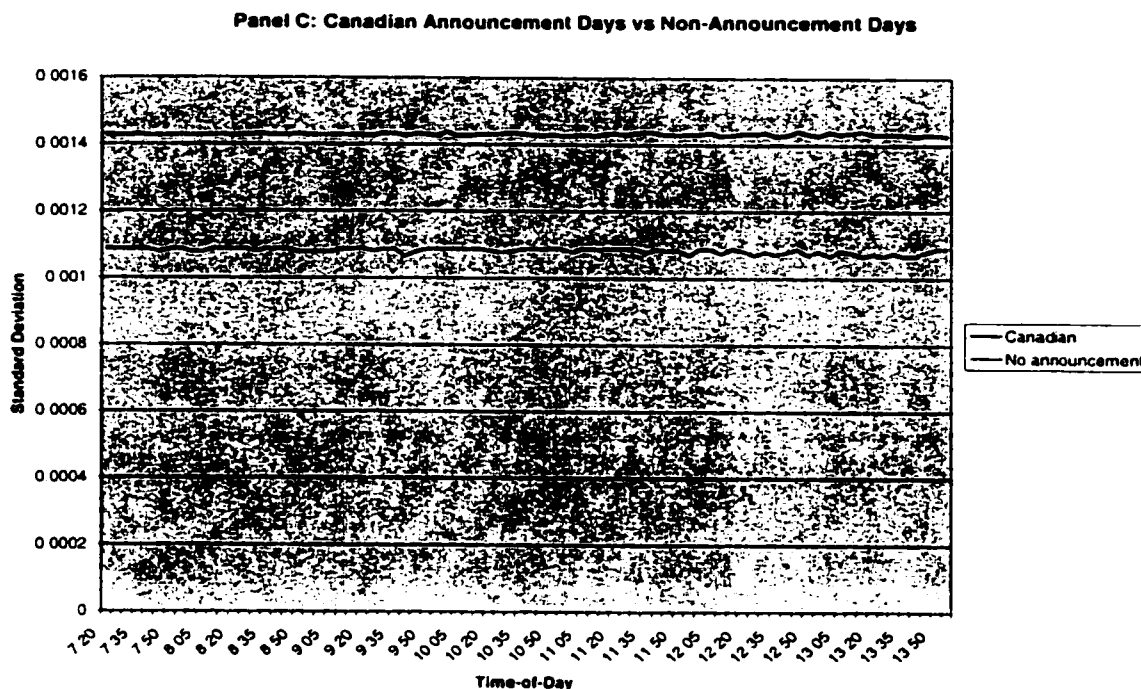


Figure 1. Intraday return volatilities on announcement and non-announcement days. Standard deviations of five-minute returns are reported for trading days with major US announcements, minor US announcements, and Canadian announcements (solid lines) versus days with none of these announcements (dashed lines). Daily observations from January 1, 1998 through December 31, 2001 are utilized. Times shown are interval ending times (CST).

Table I**Test of Homoskedasticity of the Return Variables**

Brown-Forsythe-modified Levene test statistics are reported; F1 is the test statistic for equality of the variances across the 80 intraday five-minute intervals. The Brown-Forsythe-modified Levene test statistics is

$$F = \frac{\sum_{j=1}^J n_j (D_j - D_{..})^2 (N - J)}{\sum_{j=1}^J \sum_{t=1}^{n_j} (D_{jt} - D_j)^2 (J - 1)}$$

where $D_{jt} = |r_{jt} - M_j|$; r_{jt} is the return for day t , interval j ; M_j is the sample median return for interval j computed over the n_j days included in the test; $D_j = \sum_{t=1}^{n_j} (D_{jt} / n_j)$ is the mean absolute deviation (from the median) for interval j ; and $D_{..} = \sum_{j=1}^J (D_j / N)$ is the grand mean, and $N = \sum_{j=1}^J n_j$. The statistic is distributed $F_{J-1, N-J}$ under the null hypothesis. One, two, and three asterisks indicate significance at the 0.1, 0.05, 0.01 percent levels, respectively.

	Major U.S. A - Days	Minor U.S. A - Days	Canadian A - Days
F	20.8613 ***	8.1288 ***	10.4447 ***

Table II

**The Impact of Major US Announcements on the Immediate Five-Minute Interval
Return for Canadian Dollars Futures Contracts**

Survey Forecast Model

Coefficients α_{ij} of the regression $\Delta \text{Log } E_t = \alpha + B_1 \text{CPI}_t + B_2 \text{DGO}_t + B_3 \text{EMP}_t + B_4 \text{GDP}_t + B_5 \text{MTD}_t + B_6 \text{PPI}_t + B_7 \text{RS}_t + \varepsilon_t$, are reported. $\Delta \text{Log } E_t$ is the log return over the five minute interval j . The regression is estimated for the interval of 7:30 to 7:35. One, two, and three asterisks indicate significance at the 0.1, 0.05, 0.01 percent levels, respectively.

	7:30 - 7:35 Regression Coefficient (T-Value)
Intercept	-0.0000659 (-0.88008)
Consumer Price Index	0.061017 (-0.5757)
Unemployment Rate	0.095884 (0.7303)
Gross Domestic Product	-0.055217 (-0.8841)
Durable Goods Orders	0.049954 (0.8866)
Merchandise Trade Deficit	-0.000275 (-1.7864)**
Producer Price Index	-0.094265 (-1.3658)*
Retail Sales	0.037979 (0.9830)
R ²	0.1084

Table III

**The Impact of Minor US Announcements on the Immediate Five-Minute Interval
Return for Canadian Dollars Futures Contracts
*Survey Forecast Model***

Coefficients α_{kj} of the regression $\Delta \text{Log } E_t = \alpha + B_1 IP_t + B_2 CAP_t + B_3 BI_t + B_4 CON_t + B_5 FI_t + B_6 NHS_t + B_7 PI_t + B_8 BUD_t + \varepsilon_t$, are reported. $\Delta \text{Log } E_t$ is the log return over the five minute interval j . The regression is estimated for the interval of 7:30 to 7:35, 8:15 to 8:20, 9:00 to 9:05, 13:00 to 13:05 from 1998 to 2002. One, two, and three asterisks indicate significance at the 0.1, 0.05, 0.01 percent levels, respectively.

	<u>7:20 - 7:25</u> Regression Coefficient (T-Value)	<u>7:30 - 7:35</u> Regression Coefficient (T-Value)	<u>8:15 - 8:20</u> Regression Coefficient (T-Value)	<u>9:00 - 9:05</u> Regression Coefficient (T-Value)	<u>13:00 - 13:05</u> Regression Coefficient (T-Value)
Intercept	-0.0001513 (-0.9300)	-0.0000659 (-0.88008)	-9.236E-05 (-0.9969)	-9.481E-05 (-1.0484)	-0.0001430 (-0.9772)
<u>7:20 A.M. Announcement</u> Federal Funds Rate	-0.18473 (-0.6288)				
<u>7:30 A.M. Announcement</u> Business Inventories		0.106558 (0.5785)			
Housing Starts		-1.30074E-07 (-0.6271)			
Personal Income		-0.2001 (-0.9534)			
Consumer Spending		-0.1325 (-1.3005)*			
<u>8:15 A.M. Announcement</u> Industrial Production			0.0687 (0.5011)		
<u>9:00 A.M. Announcement</u> NAPM				-0.000268 (-1.3590)*	
Leading Indicator				-0.7999 (-2.3460)***	
New Home Sales				-1.901E-08 (-0.0023)	
Wholesale Price Index				0.02882 (0.2139)	
<u>1:00 P.M. Announcement</u> Federal Budget					9.166E-05 (0.6250)
R ²	0.0226278	0.1084	0.0639	0.1135	0.0447

Table IV

**The Impact of Canadian Announcements on the Immediate Five-Minute Interval
Return for Canadian Dollars Futures Contracts
*Survey Forecast Model***

Coefficients α_{ij} of the regression $\Delta \text{Log } E_t = \alpha + B_1 \text{CA}_t + B_2 \text{MBT}_t + B_3 \text{MO}_t + B_4 \text{CON}_t + B_5 \text{DIFF}_t + B_6 \text{HS}_t + B_7 \text{WPI}_t + B_8 \text{CPI}_t + B_9 \text{EMPL}_t + B_{10} \text{MS}_t + B_{11} \text{CS}_t + \varepsilon_t$, are reported. $\Delta \text{Log } E_t$ is the log return over the five-minute interval j . The regression is estimated for the interval of 7:20 to 7:25, 7:30 to 7:35 from 1998 to 2002. One, two, and three asterisks indicate significance at the 0.1, 0.05, 0.01 percent levels, respectively.

	<u>7:20 - 7:25</u> Regression Coefficient (T-Value)	<u>7:30 - 7:35</u> Regression Coefficient (T-Value)	<u>9:00 - 9:05</u> Regression Coefficient (T-Value)
Intercept	-6.48054E-05 (-0.9181)	-7.54773E-05 (-1.0141)	-9.74E-05 (-1.0795)
<u>7:20 A.M. Announcement</u>			
Consumer Price Index	0.1317 (0.9965)		
Canadian Unemployment Rate	-0.2012 (-1.3323)*		
<u>7:30 A.M. Announcement</u>			
Industrial Product Prices		-0.1198 (-1.2322)	
Canadian Building Permits		-0.0131 (-1.7640)**	
New Motor Vehicle Sales		0.0213 (1.2264)	
International trade balance		0.0004 (0.6884)	
Manufacturing		-0.0026 (-0.1354)	
Wholesale Sales		0.0029 (0.0935)	
Retail Trade		0.0431 (-1.0754)	
Composite Index		0.0141 (0.1128)	
Raw Material Price Index		-0.0192 (-1.0884)	
<u>9:05 A.M. Announcement</u>			
Bank Rate			-0.330145 (-2.2307)***
R ²	0.0598	0.124931	0.093032

Table V

**The Impact of Major US Announcements on the Immediate Five-Minute Interval
Return Volatility for Canadian Dollars Futures Contracts
*Dummy Variables Model***

Coefficients α_{kj} of the $|R_{jt} - R_j| = \alpha_{0j} + \sum_{k=1}^K \alpha_{kj} D_{kt} + \varepsilon_{jt}$, are reported. $R_{jt} = (P_{jt} / P_{j-1,t})$ is the log return over the five minute interval j where P_{jt} is the price at the end of interval j on day t . $D_{kt} = 1$ is announcement k released on day t . The regression is estimated for the interval j of 7:30 to 7:35. One, two, and three asterisks indicate significance at the 0.1, 0.05, 0.01 percent levels, respectively.

	<u>7:30 - 7:35</u> Regression Coefficient (T-Value)
Intercept	0.0035 (27.5316)***
Consumer Price Index	-0.000152 (-0.2074)
Unemployment Rate	0.000372 (0.6267)
Gross Domestic Product	-0.000116 (-0.2300)
Durable Goods Orders	-0.000671 (-1.1305)
Merchandise Trade Deficit	0.000175 (0.3593)
Producer Price Index	0.000373 (0.6427)
Retail Sales	-0.000234 (-0.3610)
R^2	0.05816

Table IV

**The Impact of Minor US Announcements on the Immediate Five-Minute Interval
Return Volatility for Canadian Dollars Futures Contracts
*Dummy Variables Model***

Coefficients α_{kj} of the $|R_{jt} - R_j| = \alpha_{0j} + \sum_{k=1}^K \alpha_{kj} D_{kt} + \varepsilon_{jt}$, are reported. $R_{jt} = (P_{jt} / P_{j-1,t})$ is the log return over the five minute interval j where P_{jt} is the price at the end of interval j on day t . $D_{kt} = 1$ is announcement k released on day t . The regression is estimated for the interval j of 7:30 to 7:35, 8:15 to 8:20, 9:00 to 9:05 and 13:00 to 13:05. One, two, and three asterisks indicate significance at the 0.1, 0.05, 0.01 percent levels, respectively.

	<u>7:30 - 7:35</u> Regression Coefficient (T-Value)	<u>7:30 - 7:35</u> Regression Coefficient (T-Value)	<u>8:15 - 8:20</u> Regression Coefficient (T-Value)	<u>9:00 - 9:05</u> Regression Coefficient (T-Value)	<u>13:00 - 13:05</u> Regression Coefficient (T-Value)
Intercept	0.0034759 (32.3503)***	0.0035430 (30.21499)***	0.003825 (26.8616)***	0.003545 (22.5902)***	0.0048000 (21.3498)***
<u>7:20 A.M. Announcement</u> Federal Funds Rate	-0.0007825 (-1.5037)**				
<u>7:30 A.M. Announcement</u> Business Inventories		-0.000217 (-0.4064)			
Housing Starts		-0.001244 (-2.2272)***			
Personal Income		-0.00063 (-0.2103)			
Consumer Spending		0.001032 (0.3383)			
<u>8:15 A.M. Announcement</u> Industrial Production			0.000113 (0.1641)		
<u>9:00 A.M. Announcement</u> NAPM				0.00029 (0.4977)	
Leading Indicator				0.001719 (2.6986)***	
New Home Sales				-0.000916 (-1.4342)*	
Wholesale Price Index				-0.000188 (-0.2722)	
<u>1:00 P.M. Announcement</u> Federal Budget					-0.000513 (-0.5788)
R ²	0.0540	0.08225	0.0638	0.1729	0.0313

Table VII

**The Impact of Canadian Announcements on the Immediate Five-Minute Interval
Return Volatility for Canadian Dollars Futures Contracts**

Dummy Variables Model

Coefficients α_{ij} of the $|R_{jt} - R_{jt-1}| = \alpha_{0j} + \sum_{k=1}^K \alpha_{kj} D_{kt} + \varepsilon_{jt}$, are reported. $R_{jt} = (P_{jt} / P_{j-1,t})$ is the log return over the five minute interval j where P_{jt} is the price at the end of interval j on day t . $D_{kt} = 1$ is announcement k released on day t . The regression is estimated for the interval j of 7:20 to 7:25 and 7:30 to 7:35. One, two, and three asterisks indicate significance at the 0.1, 0.05, 0.01 percent levels, respectively.

	<u>7:20 - 7:25</u> Regression Coefficient (T-Value)	<u>7:30 - 7:35</u> Regression Coefficient (T-Value)	<u>9:00 - 9:05</u> Regression Coefficient (T-Value)
Intercept	0.003387 (30.60714)***	0.003553 (26.7897)***	0.003671 (25.9997)***
<u>7:20 A.M. Announcement</u> Consumer Price Index	0.000713 (1.4056)*		
Canadian Unemployment Rate	0.000438 (0.9099)*		
<u>7:30 A.M. Announcement</u> Industrial Product Prices		0.002182 (0.7289)	
Canadian Building Permits		-0.000417 (-0.7015)	
New Motor Vehicle Sales		-0.000547 (-0.9715)	
International trade balance		-6.39E-05 (-0.1227)	
Manufacturing		0.000241 (0.4284)	
Wholesale Sales		0.000392 (0.7285)	
Retail Trade		-0.000336 (-0.6682)	
Composite Index		-0.000683 (-1.2872)*	
Raw Material Price Index		-0.002075 (-0.7016)	
<u>9:05 A.M. Announcement</u> Bank Rate			0.000962 (1.0656)
R ²	0.05888	0.0822	0.044592

Table VIII

Volatility Persistence Following Announcements

Five-minute return standard deviations are reported and compared for major US announcement days, minor US announcement days, and Canadian announcement days against non-announcement days. One, two, and three asterisks indicate significance at the 0.1, 0.05, 0.01 percent levels, respectively.

Vol Persistence Following Announcement	7:20-7:25	7:25-7:30	7:30-7:35	7:35-7:40	7:40-7:45	7:45-7:50	7:50-7:55
Panel A: Major US Announcements							
Major US announcement day	1.259001648	1.256878681	1.257329361	1.259029835	1.254891107	1.256308487	1.25699346
Non-announcement day	1.088658948	1.08665778	1.086656851	1.086641219	1.086641975	1.079284364	1.086641955
Standard deviation ratio	1.156470215	1.156646282	1.157062011	1.158643546	1.154834007	1.164019909	1.156768754
B-F-L ratio	3.3136	0.2651	6.9646	7.5823	6.492	2.7872	5.0242
Panel B: Minor US Announcements							
Minor US announcement day	1.509868707	1.50826057	1.512487153	1.508267394	1.509582472	1.508332302	1.508393886
Non-announcement day	1.088658948	1.08665778	1.086656851	1.086641219	1.086641975	1.079284364	1.086641955
Standard deviation ratio	1.386906992	1.387981201	1.391871915	1.388008634	1.38921789	1.397530023	1.388124101
B-F-L ratio	0.9802	1.4006	0.0273	2.501	2.3822	0.0029	3.4018
Panel C: Canadian Announcements							
Canadian announcement day	1.428081716	1.425980709	1.425974845	1.429184925	1.425978373	1.425968282	1.425971163
Non-announcement day	1.088658948	1.08665778	1.086656851	1.086641219	1.086641975	1.079284364	1.086641955
Standard deviation ratio	1.311780626	1.312262918	1.312258643	1.315231652	1.312279854	1.321216473	1.312273244
B-F-L ratio	0.1177	0.2689	1.8638	0.8757	5.623	0.9295	1.0595

Table VIII – Continued

7:55-8:00	8:00-8:05	8:05-8:10	8:10-8:15	8:15-8:20	8:20-8:25	8:25-8:30	8:30-8:35	8:35-8:40	8:40-8:45
Panel A: Major US Announcements									
1.256990492	1.257017403	1.257019164	1.259001146	1.256986048	1.256406493	1.257028746	1.259000418	1.259320913	1.256979836
1.086641025	1.07935909	1.078517337	1.087263418	1.086658962	1.08731716	1.086689776	1.079828275	1.086645458	1.086667618
1.156767012	1.164596115	1.165506684	1.157954112	1.156743828	1.155510589	1.15675032	1.165926516	1.158906894	1.156728898
3.1478	1.5701	0.5858	3.6401	0.002	5.2594	1.5179	1.0985	2.4962	0.3298
Panel B: Minor US Announcements									
1.50910812	1.508362085	1.5083633	1.509078543	1.508296974	1.50909878	1.508297094	1.508297005	1.511276517	1.509019802
1.086641025	1.07935909	1.078517337	1.087263418	1.086658962	1.08731716	1.086689776	1.079828275	1.086645458	1.086667618
1.388782574	1.397460862	1.398552669	1.387960377	1.388013192	1.387910387	1.387973944	1.396793397	1.390772405	1.388667315
0.6501	1.1993	0.3277	1.0962	4.9873	2.0685	0.7831	0.2058	3.0742	1.7694
Panel C: Canadian Announcements									
1.427549615	1.426015552	1.426017706	1.427666528	1.42755907	1.426049438	1.427561635	1.429207472	1.429205685	1.42746528
1.086641025	1.07935909	1.078517337	1.087263418	1.086658962	1.08731716	1.086689776	1.079828275	1.086645458	1.086667618
1.313726964	1.321168798	1.322201932	1.313082465	1.313713979	1.311530333	1.313679089	1.323550702	1.315245625	1.313617207
1.2334	1.6215	0.1037	2.3363	2.2059	1.0633	3.2526	0.2576	0.0669	1.8158

Table VIII – Continued

8:45-8:50	8:50-8:55	8:55-9:00	9:00-9:05	9:05-9:10	9:10-9:15	9:15-9:20	9:20-9:25	9:25-9:30	9:30-9:35
Panel A: Major US Announcements									
1.259294184	1.255166986	1.259112063	1.256973445	1.260306084	1.260831809	1.26082663	1.257110041	1.256930741	1.261705157
1.086662274	1.077911723	1.078604182	1.078658452	1.078666314	1.087316106	1.087328334	1.089643445	1.080985012	1.086796019
1.158864363	1.164443209	1.167353219	1.16531182	1.16839292	1.159581654	1.15956385	1.153689353	1.162764263	1.160940172
0.0722	0.8147	0.1306	0.8265	0.2164	0.48947	0.2007	0.001	0.0665	0.2743
Panel B: Minor US Announcements									
1.509709484	1.513283664	1.509064345	1.509064558	1.508479306	1.511555638	1.508302317	1.511182178	1.509116793	1.515634505
1.086662274	1.077911723	1.078604182	1.078658452	1.078666314	1.087316106	1.087328334	1.089643445	1.080985012	1.086796019
1.389308823	1.403903151	1.399090019	1.399019824	1.398467057	1.390171294	1.387163628	1.38685933	1.396057093	1.394589673
0.0953	0.0428	0.4543	2.7789	0.0554	0.02964	0.0388	0.2949	0.2547	0.0084
Panel C: Canadian Announcements									
1.427885426	1.4306613	1.427932018	1.427410788	1.427977284	1.427977264	1.427973284	1.427326256	1.426047152	1.433795606
1.086662274	1.077911723	1.078604182	1.078658452	1.078666314	1.087316106	1.087328334	1.089643445	1.080985012	1.086796019
1.314010305	1.327252751	1.323870278	1.32332045	1.323835987	1.313304619	1.313286189	1.309902118	1.319210847	1.319286767
0.0007	0.8577	0.0989	2.6128	0.4957	2.2148	1.1521	0.0107	1.0639	0.1325

Table VIII – Continued

9:35-9:40	9:40-9:45	9:45-9:50	9:50-9:55	9:55-10:00	10:00-10:05	10:05-10:10	10:10-10:15	10:15-10:20	10:20-10:25
Panel A: Major US Announcements									
1.259281562	1.256940377	1.256486679	1.256980234	1.256589627	1.259003794	1.256982759	1.25664456	1.257032352	1.260701827
1.086801427	1.065042154	1.078262012	1.086817668	1.086831861	1.086844922	1.086865395	1.086859523	1.087616009	1.082851261
1.15870437	1.180178993	1.165288831	1.156569562	1.156195058	1.158402425	1.156521097	1.156216175	1.155768527	1.16424284
0.9752	0.6858	1.6772	0.1335	6.5903	0.3562	0.2548	1.1788	0.0454	0.6645
Panel B: Minor US Announcements									
1.514339167	1.508310087	1.509400256	1.508308072	1.508568504	1.509178366	1.508282762	1.508584772	1.508318045	1.512086738
1.086801427	1.065042154	1.078262012	1.086817668	1.086831861	1.086844922	1.086865395	1.086859523	1.087616009	1.082851261
1.393390853	1.416197549	1.399845528	1.387820714	1.388042215	1.388586666	1.387736484	1.388021855	1.386811184	1.396393755
0.0027	0.1748	0.873	0.1558	4.0766	4.2945	0.0228	1.215	0.0454	1.1931
Panel C: Canadian Announcements									
1.431374862	1.42605217	1.431778773	1.429400242	1.426155603	1.437620962	1.426157855	1.427462773	1.429899361	1.429538817
1.086801427	1.065042154	1.078262012	1.086817668	1.086831861	1.086844922	1.086865395	1.086859523	1.087616009	1.082851261
1.3170528	1.338963125	1.327857939	1.315216236	1.312213649	1.322747094	1.312175234	1.313382956	1.31470974	1.320161752
0.3458	0.435	2.3212	0.0028	1.0796	3.4042	0.8697	0.0017	1.1544	1.6671

Table VIII – Continued

10:25-10:30	10:30-10:35	10:35-10:40	10:40-10:45	10:45-10:50	10:50-10:55	10:55-11:00	11:00-11:05	11:05-11:10	11:10-11:15
Panel A: Major US Announcements									
1.25862056	1.262568389	1.260703148	1.259270916	1.257057979	1.25704831	1.257048187	1.257049516	1.257051103	1.256752153
1.078917199	1.080019411	1.086098225	1.088628776	1.087279875	1.08954638	1.087679581	1.07901607	1.089592299	1.08768317
1.166558992	1.169023794	1.160763474	1.156749613	1.156149404	1.153735474	1.155715533	1.164996102	1.153689416	1.15543955
1.1781	1.1141	0.4457	0.9919	0.1415	0.5635	0.0015	0.3969	1.9853	0.8183
Panel B: Minor US Announcements									
1.512087216	1.513416313	1.51208776	1.510665847	1.516057692	1.509037079	1.509037053	1.508230308	1.509020258	1.509369504
1.078917199	1.080019411	1.086098225	1.088628776	1.087279875	1.08954638	1.087679581	1.07901607	1.089592299	1.08768317
1.401485876	1.401286215	1.392220082	1.387677673	1.394358276	1.385014082	1.367391176	1.397782989	1.384940275	1.387692249
0.0389	0.2131	0.8091	0.0122	0.8288	0.0621	1.035	0.2515	0.4067	3.6878
Panel C: Canadian Announcements									
1.431659651	1.433540184	1.432971699	1.42841975	1.427417468	1.429400839	1.426299131	1.426301115	1.429452435	1.426348958
1.078917199	1.080019411	1.086098225	1.088628776	1.087279875	1.08954638	1.087679581	1.07901607	1.089592299	1.08768317
1.32694117	1.327328166	1.319375786	1.312127496	1.312833522	1.311922893	1.311322889	1.321853449	1.311914958	1.311364372
1.6872	0.4616	0.5127	0.6571	1.9881	1.5207	0.0259	0.4769	0.3749	0.9923

Table VIII – Continued

11:15-11:20	11:20-11:25	11:25-11:30	11:30-11:35	11:35-11:40	11:40-11:45	11:45-11:50	11:50-11:55	11:55-12:00	12:00-12:05
Panel A: Major US Announcements									
1.26448147	1.258224981	1.259296423	1.263441815	1.264579117	1.259044965	1.255669394	1.257067266	1.257284745	1.257786271
1.088880112	1.087722915	1.088876783	1.087596852	1.078830261	1.08754398	1.082851733	1.084015629	1.069634984	1.087869901
1.161267853	1.156751378	1.156509572	1.161682119	1.172176164	1.157695678	1.159594944	1.15963943	1.175433455	1.156191811
0.1149	0.1381	0.8922	0.1057	1.2024	3.0061	0.6385	1.1669	0.3554	0.1986
Panel B: Minor US Announcements									
1.508460537	1.514223272	1.514736982	1.509119194	1.509393602	1.513711152	1.514253537	1.509159186	1.518388625	1.513151945
1.088880112	1.087722915	1.088876783	1.087596852	1.078830261	1.08754398	1.082851733	1.084015629	1.069634984	1.087869901
1.385332067	1.392103862	1.391100449	1.387572235	1.399102024	1.391862011	1.398394158	1.392193199	1.419539046	1.390930978
0.0083	0.0827	5.4521	1.0047	0.451	0.2603	0.2789	2.3391	0.0399	0.3389
Panel C: Canadian Announcements									
1.431568466	1.433533872	1.429540172	1.43496376	1.439170042	1.435376267	1.429407688	1.429414688	1.431020809	1.431412037
1.088880112	1.087722915	1.088876783	1.087596852	1.078830261	1.08754398	1.082851733	1.084015629	1.069634984	1.087869901
1.314716331	1.317921919	1.312857611	1.319389402	1.334009708	1.319832847	1.32004008	1.318629224	1.337859018	1.315793401
0.777	0.0006	0.3227	0.0457	0.0054	0.9244	0.0645	2.8943	0.0154	1.0914

Table VIII – Continued

12:05-12:10	12:10-12:15	12:15-12:20	12:20-12:25	12:25-12:30	12:30-12:35	12:35-12:40	12:40-12:45	12:45-12:50	12:50-12:55
Panel A: Major US Announcements									
1.260442332	1.256792936	1.259190076	1.269003059	1.260017893	1.260013168	1.255885019	1.257576231	1.259486718	1.261236272
1.087910785	1.075820249	1.088975378	1.083156734	1.069569159	1.079125663	1.072237066	1.078208824	1.089023556	1.069820693
1.158589793	1.168218331	1.156307206	1.171578423	1.178061169	1.167624134	1.171275512	1.166356835	1.156528443	1.178923048
0.038	0.01365	0.1507	0.5326	0.1988	0.1195	1.1362	9.5585	2.4096	0.6287
Panel B: Minor US Announcements									
1.52718815	1.509541581	1.508173309	1.512320745	1.521819052	1.518595137	1.5110384	1.518245761	1.512372929	1.509516388
1.087910785	1.075820249	1.088975378	1.083156734	1.069569159	1.079125663	1.072237066	1.078208824	1.089023556	1.069820693
1.403780688	1.403154088	1.384947116	1.396215984	1.422833708	1.407245874	1.409239102	1.408118471	1.388742164	1.41099943
1.4111	0.1499	0.3766	1.0218	1.5386	5.9718	0.1977	1.9975	0.0608	0.0028
Panel C: Canadian Announcements									
1.436918834	1.426544513	1.428526649	1.433230804	1.433849843	1.43696376	1.426586209	1.42778615	1.440488278	1.433709881
1.087910785	1.075820249	1.088975378	1.083156734	1.069569159	1.079125663	1.072237066	1.078208824	1.089023556	1.069820693
1.320805763	1.326006379	1.311808034	1.323197981	1.340586377	1.331600025	1.33047649	1.324220427	1.322733811	1.340140353
0.6635	0.0001	0.013	0.0266	3.3911	2.3353	0.787	2.2223	1.385	0.0003

Table VIII – Continued

12:55-13:00	13:00-13:05	13:05-13:10	13:10-13:15	13:15-13:20	13:20-13:25	13:25-13:30	13:30-13:35	13:35-13:40	13:40-13:45
Panel A: Major US Announcements									
1.257527094	1.264064758	1.261465796	1.258666833	1.26685334	1.265620563	1.262438229	1.257414788	1.257416658	1.257457602
1.081840213	1.067471115	1.083247321	1.076980427	1.067316254	1.073162956	1.068126273	1.075816259	1.066894668	1.0673304
1.162396331	1.184167646	1.164522424	1.168699821	1.186952167	1.179336796	1.181918524	1.168800692	1.178576194	1.178133408
0.0576	1.1497	0.1325	1.8889	0.2004	0.1105	2.5618	0.0188	0.0005	0.0206
Panel B: Minor US Announcements									
1.512423287	1.528066968	1.514513883	1.513680684	1.531992742	1.515599871	1.513050476	1.512239088	1.512247546	1.509602457
1.081840213	1.067471115	1.083247321	1.076980427	1.067316254	1.073162956	1.068126273	1.075816259	1.066894668	1.0673304
1.398009862	1.431483201	1.398123821	1.405485787	1.435369073	1.412273748	1.416546446	1.405666697	1.417429097	1.41437221
0.5972	0.4373	0.0555	0.7822	0.0009	0.6478	1.309	0.8192	0.5616	0.3233
Panel C: Canadian Announcements									
1.427738263	1.439030331	1.431559618	1.436113981	1.43972597	1.432393605	1.431560246	1.431687826	1.430500227	1.426724024
1.081840213	1.067471115	1.083247321	1.076980427	1.067316254	1.073162956	1.068126273	1.075816259	1.066894668	1.0673304
1.319731182	1.348074258	1.321544573	1.333463399	1.34892162	1.334740075	1.340253753	1.330792144	1.340807363	1.336721996
0.0003	0.0296	0.1566	0.5545	0.1061	1.503	1.8107	0.7225	0.0059	0.0538

Table VIII – Continued

13:45-13:50	13:50-13:55	13:55-14:00	Panel A: Major US Announcements	
1.25746355	1.25746239	1.257169807		
1.080246857	1.088099144	1.088085724		
1.164052033	1.155650565	1.155395921		
0.0126	3.0505	0.1115		
			Panel B: Minor US Announcements	
1.508169598	1.509538887	1.512688485		
1.080246857	1.088099144	1.088085724		
1.396134215	1.387317411	1.390229145		
0.2925	0.0311	2.2021		
			Panel C: Canadian Announcements	
1.429597211	1.429595813	1.426818675		
1.080246857	1.088099144	1.088085724		
1.32339863	1.313847016	1.311310905		
2.7092	0.0002	0.5326		

Appendix 1

U.S. Macroeconomic Announcements

Eastern Time	Central Time	S.	Var	Title of Report
<u>Major Announcement</u>				
8:30:00 AM	7:30:00 AM		CPI	Consumer Price Index
8:30:00 AM	7:30:00 AM		UR	Unemployment Rate
8:30:00 AM	7:30:00 AM		GDP	Gross Domestic Product
8:30:00 AM	7:30:00 AM		DGO	Durable Goods Orders
8:30:00 AM	7:30:00 AM		MTD	Merchandise Trade Deficit
8:30:00 AM	7:30:00 AM		PPI	Producer Price Index
8:30:00 AM	7:30:00 AM		RS	Retail Sales
<u>Minor Announcement</u>				
8:20:00 AM	7:20:00 AM		FFR	Federal Funds Rate
8:30:00 AM	7:30:00 AM		BI	Business Inventories
8:30:00 AM	7:30:00 AM		HS	Housing Starts
8:30:00 AM	7:30:00 AM		PI	Personal Income
8:30:00 AM	7:30:00 AM		CS	Consumer Spending
9:15:00 AM	8:15:00 AM		IP	Industrial Production
10:00:00 AM	9:00:00 AM		NAPM	NAPM Survey
10:00:00 AM	9:00:00 AM		LI	Leading Indicator
10:00:00 AM	9:00:00 AM		NHS	New Home Sales
10:00:00 AM	9:00:00 AM		WPI	Wholesale Price Index
2:00:00 PM	1:00:00 PM		FB	Federal Budget

Appendix 2

Canadian Macroeconomic Announcements

Eastern Time	Central S. Time	Var	Title of Report
8:20:00 AM	7:20:00 AM	CPI	Consumer Price Index
8:20:00 AM	7:20:00 AM	CUR	Canadian Unemployment Rate
8:30:00 AM	7:30:00 AM	IPP	Industrial Product Prices
8:30:00 AM	7:30:00 AM	CBP	Canadian Building Permits
8:30:00 AM	7:30:00 AM	NMVS	New Motor Vehicles Sales
8:30:00 AM	7:30:00 AM	ITB	International Trade Balance
8:30:00 AM	7:30:00 AM	M	Manufacturing
8:30:00 AM	7:30:00 AM	RT	Retail Trade
8:30:00 AM	7:30:00 AM	CI	Composite Index
8:30:00 AM	7:30:00 AM	RMPI	Raw Material Price Index
10:05:00 AM	9:05:00 AM	BR	Official Bank Rate

Appendix 3

Trading Days (Sample Sizes)

<u>Group</u>	<u>Sample Size</u>
Total Days	1005 Days
US Major Announcements	296 Days
US Minor Announcements	333 Days
Canadian Announcements	354 Days
Non-Announcement Days	290 Days

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