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ABSTRACT

Reuters News Reports versus Official Interventions: The Inaccuracy of Reuters Reports for Swiss Interventions*

Reuters news reports have become an accepted tool for empirical studies analysing informational asymmetries in FX markets. This Paper tests the accuracy of the Reuters announcements against Swiss interventions. The evidence finds that the Reuters announcements are not tightly clustered just after the first intervention transaction as is commonly assumed in empirical studies. The variance of the prediction error is measured in hours and not in minutes. A further assumption that the Reuters announcement always follows after the first intervention transaction is found to be violated. These and other empirical results question the accuracy of Reuters reports for Swiss interventions.

JEL Classification: F31 and F33
Keywords: central bank interventions, intra-daily data and Reuters news reports

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I. Introduction

Reuters news reports have become an accepted tool for market microstructure studies of foreign exchange interventions. A key attribute of the electronic media reports is their time stamp. In the absence of actual intervention data, Reuters news reports allow researchers to define a narrow reaction window that is measured in minutes rather than in hours or days (see Goodhart and Hesse, 1993 for event windows defined in hours and Fatum and Hutchison, 2003 in days). Dominguez (2003a, b) and Goodhart and Hesse (1993) use Reuters news reports together with intra-daily data to test the signaling hypothesis. Chari (2002), Chang and Taylor (1998), and Melvin and Peiers (1995) rely on the same information source to determine if central bank interventions dampen exchange rate volatility. In a similar spirit, Peiers (1997) and Sapp (2002) work with Reuters intervention announcements to examine issues of price leadership. The key assumption in each of these empirical studies is that Reuters news reports are released shortly after a central bank has intervened. This conjecture implies that the electronic archives of Reuters offer researchers a high degree of precision in the absence of actual transactions data. One drawback of this empirical approach is that the qualitative accuracy of the Reuters news reports for exchange rate interventions has never been tested. I set out to do this.

The accuracy tests of Reuters intervention reports are carried out against transactions data from the Swiss National Bank (SNB).[1] The use of Swiss transactions data is interesting because, unlike many central banks, the SNB has an open communication strategy. This together with the observation that almost all SNB interventions were coordinated with a G3 country guarantees a high level of market presence by the electronic media.[2] Against this backdrop, issues of timing and whether the Reuters reports are able to capture the number of intervention transactions or trading volume are examined. Tests examining microstructure issues are also conducted. More

[1] Osterberg and Wetmore Humes' (1993) and Klein's (1993) analysis of the accuracy of newspaper reports for central bank interventions may be regarded in many ways as a precursor to this study.
[2] To build on past studies, it would have been preferable to conduct the analysis for a G-3 country. This, however, is not possible due to problems of data availability.

specifically, I examine whether the frequency of the Reuters reports is able to replicate the price-volatility correlation observed in the transactions data.

The paper is organized as follows. The next section discusses the SNB's intervention strategy and how the interventions are communicated. The same section explains the qualitative information of Reuters news reports. The section thereafter presents the empirical results. The main findings are Reuters news reports are accurate in announcing SNB interventions when indeed an intervention takes place but are deficient in capturing the timing of the intervention rounds. The last section considers the implications of the Swiss results for other intervention studies using Reuters news reports.

II. SNB Interventions and Reuters News Reports

This section first outlines the SNB's intervention strategy and how the intervention activity is communicated to financial markets. Thereafter, the transactions data and Reuters news reports are discussed.

A. Institutional Considerations

The SNB intervenes to influence the trend of the exchange rate or to counteract market disturbances. Solidarity with other central banks has also been an important motive in the past because almost all interventions were coordinated. This motive is further underscored by the observation that the scale of the SNB interventions tended to be small and SNB Board members have expressed skepticism on several occasions about the effectiveness of such operations. This however does not imply that the SNB has always followed the lead of the G-3 central banks. The Federal Reserve and the Bundesbank have intervened more frequently than the SNB during the same period.

SNB interventions are conducted in the dealer market directly with foreign and domestic commercial banks operating in several Swiss cities.[3] The SNB's activity in the dealer market is limited and should not to be treated as a market maker. SNB interventions are thus based on market exchange rates. It is not uncommon for the SNB's trading desk to gather *binding* quotes from commercial banks before executing an intervention transaction.

The SNB communicates its interventions directly with the counterparty. After the intervention transaction has been completed, the SNB informs the trader of the commercial bank that the transaction was a SNB intervention. According to SNB officials, the intervention announcement spreads swiftly across the dealer market. The SNB makes no formal declaration to news agencies that it is intervening. The SNB instead will be asked by Reuters if it has intervened in which case an SNB spokesman will confirm or refute the intervention claim. This unique communication strategy for SNB interventions is valid for the entire sample considered in the next section.

The SNB's intervention strategy may be described as following a shotgun tactic. Intervention sessions are characterized by numerous transactions of small volume in a short time span. The sessions are generally completed within 10 to 30 minutes. This implies that the intervention's news is disseminated broadly in the dealer market. Figure 1 shows that the size of the individual transaction measured in US dollars from 1989 to 1995. The trading volume per transaction is most often either $5 or $10 million. Only on rare occasions was the size of the transaction's size over $20 million.

B. SNB Transactions Data, Reuters News Reports, and Data Properties

The intervention data used in this study are SNB spot transactions. They cover the Swiss franc/U.S. dollar, the Japanese Yen/U.S. dollar, the German mark/U.S. dollar, and the Swiss

[3] To intervene only in the domestic market is not standard practice for central banks. For instance, information from Reuters news reports state that the Federal Reserve intervened in different international markets (i.e., London, Tokyo, and Sydney).

franc/German mark spot markets for the period from October 1989 to August 1995.[4] The availability of the Reuters news reports determines the starting date, whereas the last SNB intervention in August 1995 marks the terminal date. There are three dates when the SNB intervened alone: 27 December 1989, 6 March 1992, and 11 March 1992. The remaining 66 intervention days are coordinated in the sense that the SNB intervened on the same day and in the same direction as the Bundesbank and/or the Federal Reserve.[5]

Table 1 shows the currency breakdown of SNB intervention transactions that were conducted on 69 intervention days. From 1989 to 1995, the SNB intervened primarily in the Swiss franc/US dollar currency market, followed by the German mark/US dollar, and then the Japanese Yen/US dollar currency market. Only on two intervention days did the SNB purchase Swiss francs against German marks.

Before discussing the properties of the Reuters news reports, it is important to review several uncertainties surrounding the use of this data source to capture Swiss intervention activity. At the first level, there is no consensus among empirical practitioners on how much time passes between the time stamp of the central bank intervention and that of the Reuters intervention announcement. Goodhart and Hesse (1993), on the one hand, write 'reliable sources confirm that in most cases interventions intended to be visible tend to appear on the Reuters screen with a delay no longer 15 to 30 minutes.' Sapp (2002), on the other hand, claims it is less than 15 minutes. As a consequence, the intervention studies do not work with a single event window. Goodhart and Hesse (1993) measure the difference in terms of one hour. Chang and Taylor (1998) examine a 10 minute frequency, whereas Dominguez (2003a) and Sapp (2002) operate with a 5 minute interval.

[4] Earlier studies using SNB transactions data are by Fischer (2003), Fischer and Zurlinden (1999), Pasquariello (2002), and Payne and Vitale (2003).

[5] During this sample, coordinated interventions are defined in the following manner: the SNB and other European central banks were informed in advance when the Bundesbank or the Federal Reserve would intervene. It was then up to the SNB if it wanted to participate or not in the coordinated intervention.

A second form of uncertainty is that Reuters does not always mention in which market the SNB intervenes and never its intervention volume.[6] Most central banks intervene in one or two currency markets. In the case of the SNB, there are four and on several occasions it intervened in different markets on the same day.

A third form of uncertainty concerns the proper filtering of the news reports. This is an important issue because no common approach prevails in the literature. Several studies such as Dominguez (2003a), Sapp (2002), and Chang and Taylor (1998) use the frequency of media reports as an indirect proxy for the number of intervention transactions or the number of intervention sessions during a trading session. Chang and Taylor (1998) use a filtering rule that excludes announcements two hours after the first announcement, whereas Sapp (2002) excludes reports that are within the first two hours.

Table 2 and Figure 2 present comparative information between the SNB transactions and the reported interventions.[7] The main observations are the following. There are only six days where Reuters failed to report an intervention when the SNB did intervene, however there were no cases of false reporting; i.e., where Reuters announces an SNB intervention but no intervention took place. This latter issue of false reporting did arise in the accuracy studies of newspaper accounts by Klein (1993) and Osterberg and Wetmore Humes (1993).

Next, the volatility of the number of SNB transactions is three times higher than the number of intervention reports. This difference in the standard deviations also holds for interventions in the Swiss franc/US dollar currency market. A further striking feature of the data is that simple statistics show that the Reuters announcements do not reflect the true intervention activity. The correlation between the number of SNB transactions and Reuters reports is 0.21 for the full sample and 0.33 for the days when the SNB intervened in the Swiss franc/US dollar currency market. This information is also underpinned by the results from the (non parametric)

[6] Several studies examining the reaction to U.S. or Japanese interventions mention that Reuters' headlines give information on the volume or the exchange rate.
[7] The Appendix provides examples of the Reuters headlines of the SNB interventions.

sign test, which strongly rejects the null hypothesis that the distribution of the actual and the reported series are the same.

III. Actual and Reported Interventions

The analysis on the accuracy of Reuters news reports considers four issues: the timing of the first reports, the relationship between the frequency of the actual transactions and the frequency of the reports, the relationship between the trading volume and the frequency of the reports, and the relationship between the exchange rate volatility and the trading volume. In each case, the empirical regressions show that the Reuters reports do not accurately capture information from the intervention activity.

A. The Timing of the First Intervention

Many intervention studies report that the first intervention is the most important.[8] Figure 3 plots the time difference between the first SNB intervention and the first (time stamped) Reuters announcement during Zurich trading hours. The 13 dates defined in Figure 3 are uniform in their information content and guarantee a high level of media attention. First, each of the Reuters reports mention that the SNB confirmed that it had intervened. Second, the SNB interventions are coordinated with Federal Reserve and/or Bundesbank interventions.[9]

The limited number of first reported Reuters announcements stem from several factors. Reuters news reports falling outside the Zurich trading hours were dropped from Figure 3. Many had a time stamp around 23:00 Zurich time (i.e., corresponding to the market's close in New York). These announcements focus on the US interventions and mention only in passing that other European central banks including the SNB had intervened. Three observations were dropped on

[8] See Fischer and Zurlinden (1999) and Payne and Vitale (2003) for Swiss evidence.
[9] For each of the 13 observations, Reuters reported either the Federal Reserve or the Bundebank interventions preceded the SNB intervention except for 22 July 1989. On this date, Reuters reported that the Bundesbank did not intervene and that the Federal Reserve had intervened after other European central banks. Hence, it is unlikely that the intervention announcements of the other central banks is responsible for the results in Figure 3.

the account that they were not confirmed. Lastly, no reported announcements and announcements without a time stamp accounted for 26% of the missing observations.

The evidence from Figure 3 shows that the Reuters time stamp does not accurately capture the timing of SNB behavior. The prior that Reuters announcements follow shortly (i.e., within 15 minutes) after the first intervention transaction does not hold. Only one (three) of the 13 reported interventions falls within the first 15 (30) minutes after the actual interventions. While the average difference between actual and reported interventions is 34 minutes (with a standard deviation of 1 hour and 2 minutes), the absolute average difference is 44 minutes (with a standard deviation of 53 minutes). The time differences are thus frequently larger than the 30 minutes quoted in Goodhart and Hesse (1993).

A more puzzling feature arising from Figure 3 is that 5 of the 13 reported interventions were before the first SNB intervention transaction. This result is severe because the SNB confirmation process is certainly more cumbersome and time consuming for Reuters than if it reports the FX dealers as the source for the intervention news. This suggests that coordination problems existed within the SNB; i.e., between the trading room and the press room.[10]

The level of intervention activity may be a possible explanation for Figure 3's profile. Previous studies by Klein (1993) and Osterberg and Wetmore Humes (1993), which investigated the accuracy of daily newspaper reports of central bank interventions, suggest that the inaccuracies of these reports are related to intervention volume and whether the intervention was coordinated or not. While not much can be said about the latter issue, because the interventions in Figure 3 were coordinated interventions, correlations reported in Table 3 between the SNB intervention volume and the reported time difference (i.e., between the first SNB intervention and Reuters report) are positive. Although it is only based on 13 observations at best, the positive correlations contradict the prior that greater intervention activity should be negatively correlated with inaccurate media reporting.

[10] The issue of communication design and its influence on Reuters reporting will discussed in the next section.

B. The Frequency of SNB Interventions and of Reuters News Reports

The frequency of Reuters news reports is used in numerous studies as a proxy for the number of central bank interventions.[11] The accuracy of the reports can be tested by regressing the number of the interventions on the number of reported interventions. Under the null hypothesis of unbiasedness, the constant should be equal to zero and the coefficient on the reported interventions should be equal to unity.

Table 4 summarizes the regressions on the frequency of SNB interventions and Reuters reports. The results find that the unbiasedness hypothesis is rejected and that there is only weak evidence that the Reuters reports are able to capture the intensity of SNB transactions. The first regression considers the number of SNB intervention transactions on day *t*, defined as $ACTUAL_t$ in Table 4, on the number of reported interventions for the same day, $REPORTED_t$. The estimated coefficient for $REPORTED_t$ is 0.8 and is significant at the 10% level. An F-test(2, 65) = 23.2 however rejects the null hypothesis of unbiasedness. This result arises because of the large constant. The next regressions are logit regressions that consider whether the number of reported interventions is positively correlated with SNB transactions above its medium and its average. The dependent variables are dummies, where $MEDIUM(ACTUAL_t)$ is +1 if $ACTUAL_t$ > the medium of $ACTUAL_t$, otherwise zero. The dummy, $AVERAGE(ACTUAL_t)$, is defined in the same manner. These regressions yield the same information as in the OLS regressions; the variable $REPORTED_t$ is significant at the 10% level.

C. The Number of Reuters News Reports and Intervention Volume

A further issue worth considering is whether more frequent reporting reflects more information about trading volume. Although no study uses the number of Reuters reports as a proxy for trading volume, the prior is that these two variables should be positively correlated with

[11] The studies following this strategy are Chang and Taylor (1998), Chari (2003), Dominguez (2003a), Goodhart and Hesse (1993), Peiers (1997), and Sapp (2002).

each other. This is in part motivated by microstructure tests that examine the intensity of trading, in this case measured by the transaction's volume, and the informativeness of trades. Lyons (1996), for example, seeks to discriminate between two views of trading intensity. The first is the event-uncertainty view, which says that trades are more informative when trading intensity is high, whereas the second is the hot potato view, which says that trades are more informative when trading intensity is low.

In the same context, the relation of trading intensity and price information under the event-uncertainty view can be examined by regressing the SNB trading volume on the number of reported interventions. Two types of variables are considered: the aggregate trading volume for intervention day *t* and the size of the individual transaction. The aggregated volume provides information regarding the intensity of the intervention for day *t*, whereas the size of the transaction can give insights about the SNB's intervention strategy.

Three transformations were considered for the aggregate variables. The first is VOL_t, which is the (absolute) aggregate trading volume, is measured in dollars. Next, VOL_50_t is a dummy variable +1 if VOL_t is greater than $50 million, otherwise 0. Similarly, VOL_100_t considers whether only the reported announcements respond to the large trading volumes, but for $100 million instead of $50 million.

Three dummies capturing the size of the SNB transactions are also constructed to determine whether the number of Reuters reports are able to identify changes in SNB intervention tactics. The variable $SIZE_10_t$ is +1 if all the intervention transactions for day *t* are $10 million, 0 otherwise. The variable $LESS_10_t$ is +1 if a single intervention transaction is less than $10 million for day *t* and is 0 otherwise. Similarly, the variable $PLUS_10_t$ is +1 if a single intervention transaction is greater than $10 million, otherwise 0.

The regressions in Table 5 show that the frequency of the intervention reports has no significant relationship with trading volume. The variable, $REPORTED_t$, is insignificant in each of the regressions. This result holds for the aggregate and the individual SNB transactions. In other

words, the evidence finds that announcement intensity says nothing about intervention intensity or intervention tactics. The results are consistent with the correlations for the first announcements presented in Table 3.

D. Exchange Rate Volatility and Reuters Reports

Several studies in the microstructure literature have reported a strong contemporaneous correlation between trading volume and exchange rate volatility.[12] Jorion (1996) motivates the importance of the price-volume correlation as follows. The price-volume correlation offers an alternative prospective on the structure of financial markets by relating information arrival with market prices. The correlation also has implications about the probable success of new derivative contracts, which rely on sufficient price uncertainty of the underlying asset that cannot be fully cross-hedged through existing products. Lastly, the correlation is important for understanding the empirical distribution of speculative prices. For the purposes of whether Reuters reports reveal intervention activity, the first and third reasons apply.

Table 6 presents regression results between exchange rate volatility and intervention volume. The former variable is defined in two ways: $V1_t = [\max(s_t) - \min(s_t)]^2$, where $\max(s_t)$ and $\min(s_t)$ are the maximum and minimum values of the Swiss franc/US dollar exchange rate for intervention day t and $V2_t = [\max(s^*_{it}) - \min(s^*_{it})]^2$, where s^*_{it} is the ith transactions price for intervention day t. The volume variable is defined either to be the number of SNB transactions for intervention day t (i.e., denoted as $ACTUAL_t$ in Table 6) or the number of the Reuters' intervention announcements (i.e., $REPORTED_t$). Of interest is to determine how the Reuters series match up with the constructed volatility series.

The OLS regressions in Table 6 show that exchange rate volatility is positively correlated with the trading volume at least at the 10% level, however the strength of the correlations is not the same across all regressions. $V1_t$ is found to be more strongly correlated with the number of Reuters

[12] See the discussion in Sarno and Taylor (2001) on page 28 and the references therein.

reports, whereas $V2_t$ is more strongly correlated with the number of SNB transactions. In other words, an asymmetric relationship is observed where the number of the Reuters news reports is more highly correlated with the volatility generated from the market data available to the public, whereas the frequency of the SNB transactions is more highly correlated with the volatility generated from non public information. Moreover, I interpret the high explanatory power of the transactions based information (R^2 of 0.59 in the regression of $V2_t$ on $ACTUAL_t$) over the market information (R^2 of 0.17 in the regression of $V1_t$ on $REPORTED_t$) as further evidence that Reuters is unable to capture fully the intervention activity.

IV. Is it Possible to Extrapolate the Swiss Results to the other Studies?

The empirical results in the previous section stress the importance of working with transactions data as opposed to the proxy data generated from Reuters news reports. The evidence finds that the time stamp of Reuters news reports does not closely match the timing of SNB transactions. Additional regressions find that the information content of Reuters news reports is inconsistent with the attributes of the SNB interventions. Can these negative results be generalized for intervention studies using Reuters news reports for other currencies?

The short answer is no. Important institutional features, which differ strongly across countries, do not allow the practitioner to determine the direction of the reporting bias for other countries. However, the Swiss results do raise issues that have not been addressed in Reuters studies by Chang and Taylor (1998), Dominguez (2003), Peiers (1997), Sapp (2003) and others. The issues concern the observation that Reuters' coverage of foreign exchange interventions is not uniform across countries and that different disclosure practices among the central banks has changed over time and considerable diversity exists. These two issues are discussed next.

To gain an understanding that Reuters' coverage is not equal across countries comparisons are made with the Federal Reserve, the Bundesbank, and the Swiss National Bank intervention reports. On the 66 days when the SNB conducted coordinated interventions

between 1989 and 1995, Reuters reported 158 times that the SNB was intervening as opposed to 1465 reported Bundesbank interventions and 1637 reported Federal Reserve interventions. The large difference in the number of reports between the Swiss reports and the reports of the other two central banks suggests that financial markets and Reuters place greater weight on news of G-3 interventions than of Swiss interventions.[13] Under the assumption that greater Reuters' coverage leads to greater timing accuracy, this would bias the Swiss results toward inaccuracy.[14]

A further consideration for Reuters news reports to be successful in capturing the timing of confirmed interventions is that the level of central bank transparency should to be high. The standard deviations of the time differences between actual and reported intervention should be lower for central banks with a high level of intervention disclosure as opposed to a low level of transparency. Chiu (2003) notes there is considerable diversity regarding the visibility and disclosure of central bank intervention operations. Her central bank survey on intervention practices classifies Canada and Hong Kong as having the highest level of transparency, because these countries disclose their interventions on a real time basis. At the opposite extreme are Australia, Korea, and Singapore that offer no regular channels to disclose their foreign exchange interventions. If visibility and transparency is important for Reuters reporting, then it would be safe to assume that Reuters news reports of Canadian interventions are more accurate than say Australian or Korean interventions.

Next, consider the transparency of the U.S. and Japanese interventions with respect to Swiss interventions.[15] This is more interesting because the two G-3 countries have been studied by Chang and Taylor (1998), Chari (2002), Dominguez (2003) and Sapp (2002). Chiu (2002) writes that although the Swiss policy of announced interventions through the dealer market has been

[13] Although Goodhart and Hesse (1993) do not explicitly mention it, their study shows that the frequency of Reuters news reports for similar intervention dates varies considerably across European countries.
[14] At the same time it must be recognized that greater Reuters' coverage requires the researcher to make stronger assumptions for the intervention flow, making the empirical results more sensitive to the filtering assumptions.
[15] Chiu's (2003) survey does not consider Bundesbank practices.

consistent since 1986, the communication policy of the two G-3 central banks has varied considerably over the last fifteen years. While the U.S. and Japanese monetary authorities have engaged in secret interventions on a case by case basis particularly in the early 1990s, the intervention operations in recent years have been conducted in a very visible manner. Again if the results from Figure 3 are to be a yardstick for other studies, then the transparency factor would predict that the timing error for US and Japanese should not be smaller than the Swiss estimates for the early 1990 period. Obviously, just these two factors, i.e., reporting intensity and intervention visibility, show it is not possible from the Swiss results to make claims regarding the directional bias in the timing error for other studies.

V. Conclusions

Reuters news reports have become an important tool for testing informational issues in the microstructure literature on foreign exchange interventions. Although the accuracy of the Reuters news reports for intervention announcements have never been formally tested, the combination of high frequency data and the time stamp from news reports gives researchers the illusion they are operating with a certain precision that is credible for microstructure studies. As such, these studies make important assumptions, which have implications as to how the testing framework is designed and how the empirical results are interpreted. The objective of this paper is to fill this void by examining the accuracy of Reuters news reports against SNB transactions data.

The empirical tests show that Reuters' intervention quotes do not match up closely with the SNB transactions and do not capture key correlations defined by price volatility or volume. More importantly, key assumptions made in the microstructure literature for foreign exchange interventions are not supported. The standard assumption is that the Reuters announcements are concentrated 5 to 15 minutes after the first actual intervention. The Swiss evidence, however, finds the opposite result holds such that the variance of the prediction error can be measured in hours

and not in minutes. A further assumption is that the Reuters intervention announcement always falls after the first actual transaction is found to be frequently violated.

These discrepancies in reporting Swiss interventions raise new questions for future studies. Although it cannot be shown that the empirical results for Switzerland apply for G-3 intervention studies using Reuters news reports, they do suggest that researchers need to recognize that the quality of the Reuters' coverage may be country dependent and that the accuracy of the Reuters reports may also depend on the disclosure practices of central banks. These issues should motive future studies to define properly the event window to intervention news and in justifying the filtering of news reports.

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Appendix Samples of Reuters News Headlines about SNB Interventions

09-01-89	12:23 GMT	‘SWISS NATIONAL BANK SELLS DLRS IN CONCERTED ACTION’
16-03-89	13:03 GMT	‘NATIONAL BANK SELLS DOLLARS FOR SWISS FRANCS’
22-05-89	16:08 GMT	‘DOLLAR ENDS HIGHER IN ZURICH AFTER INTERVENTION’
21-08-92	13:23 GMT	‘SWISS FRANC ENDS GENERALLY FIRMER AFTER DLR ACTION’
24-08-92	09:39 GMT	‘SWISS NATIONAL BANK BUYS DLRS FOR MARKS’
24-06-94	10:05 GMT	‘Swiss, Belgian National Banks Confirm Joining Intervention’
03-03-95	09:39 GMT	‘Swiss Nat’l Bank/Intervention -2: They’re Serious’
03-03-95	14:31 GMT	‘Swiss Nat’l Bank -2: Dealers Cite 1.2280 CHF Level’
31-05-95	14:50 GMT	‘Swiss franc slips in dollar intervention’
15-08-95	14:22 GMT	‘Switzerland Central Bank -2: Continuous Intervention’

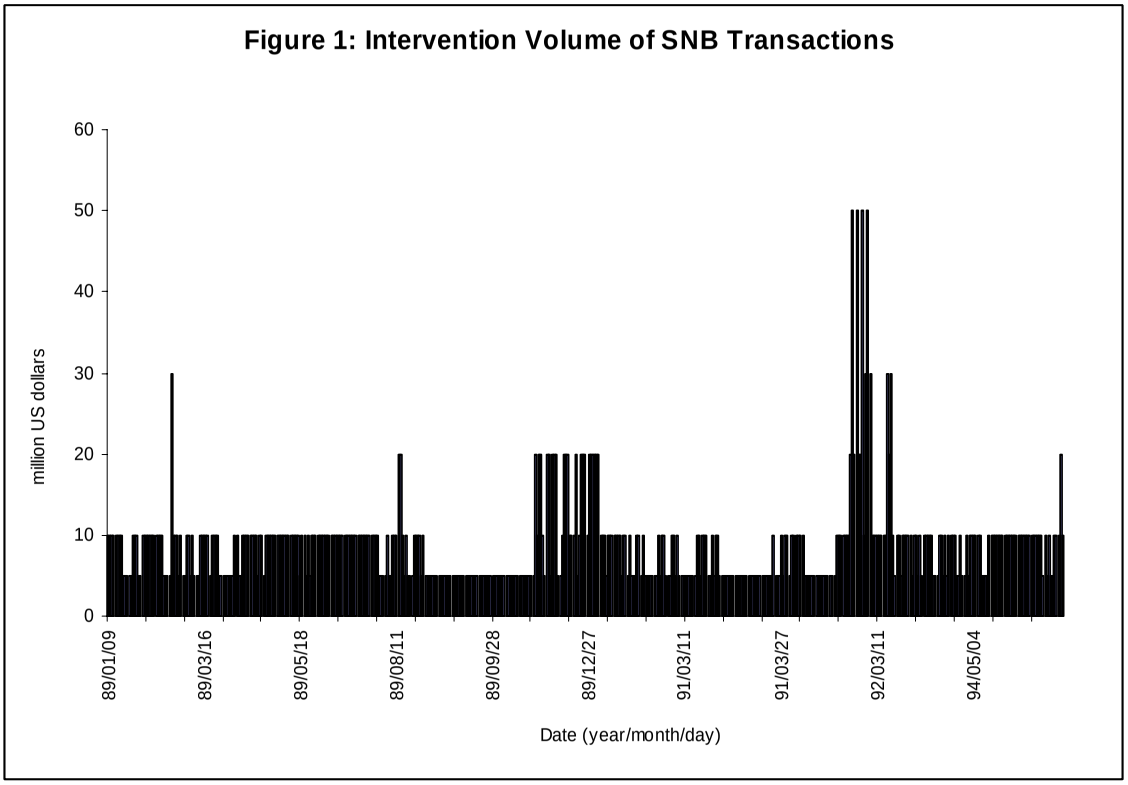
Figure 1: Intervention Volume of SNB Transactions
million US dollars
60
50
40
30
20
10
0
89/01/09
89/03/16
89/05/18
89/08/11
89/09/28
89/12/27
91/03/11
91/03/27
92/03/11
94/05/04
Date (year/month/day)

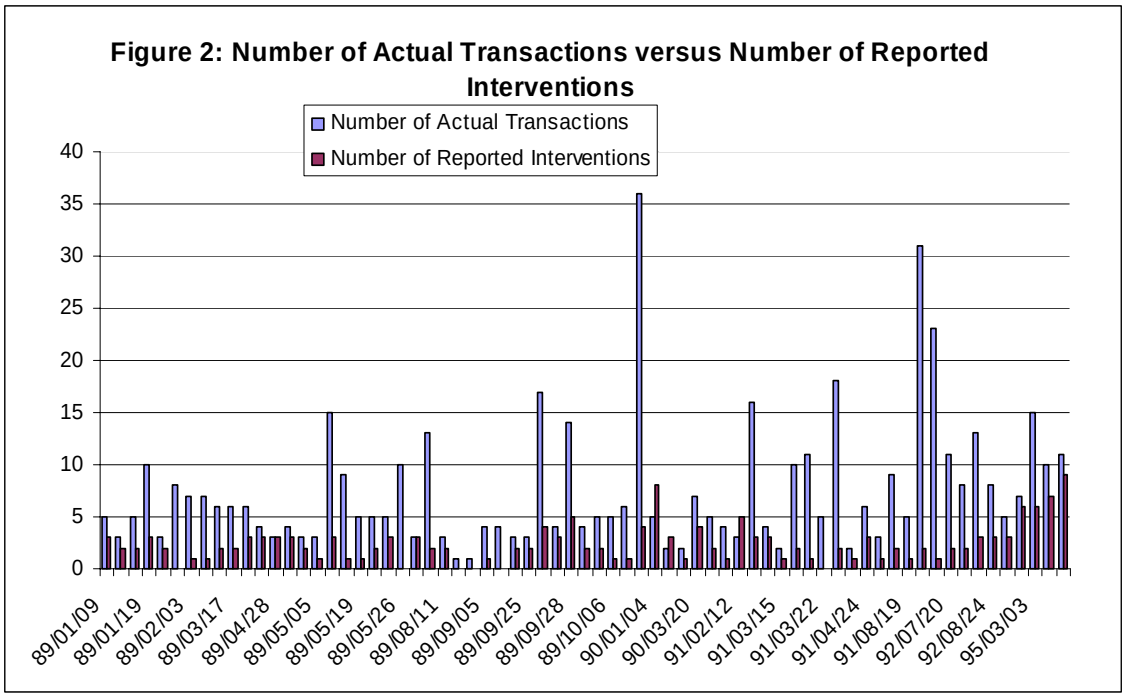
Figure 2: Number of Actual Transactions versus Number of Reported Interventions
Number of Actual Transactions
Number of Reported Interventions
40
35
30
25
20
15
10
5
0
89/01/09
89/01/19
89/02/03
89/03/17
89/04/28
89/05/05
89/05/19
89/05/26
89/08/11
89/09/05
89/09/25
89/09/28
89/10/06
90/01/04
90/03/20
91/02/12
91/03/15
91/03/22
91/04/24
91/08/19
92/07/20
92/08/24
95/03/03

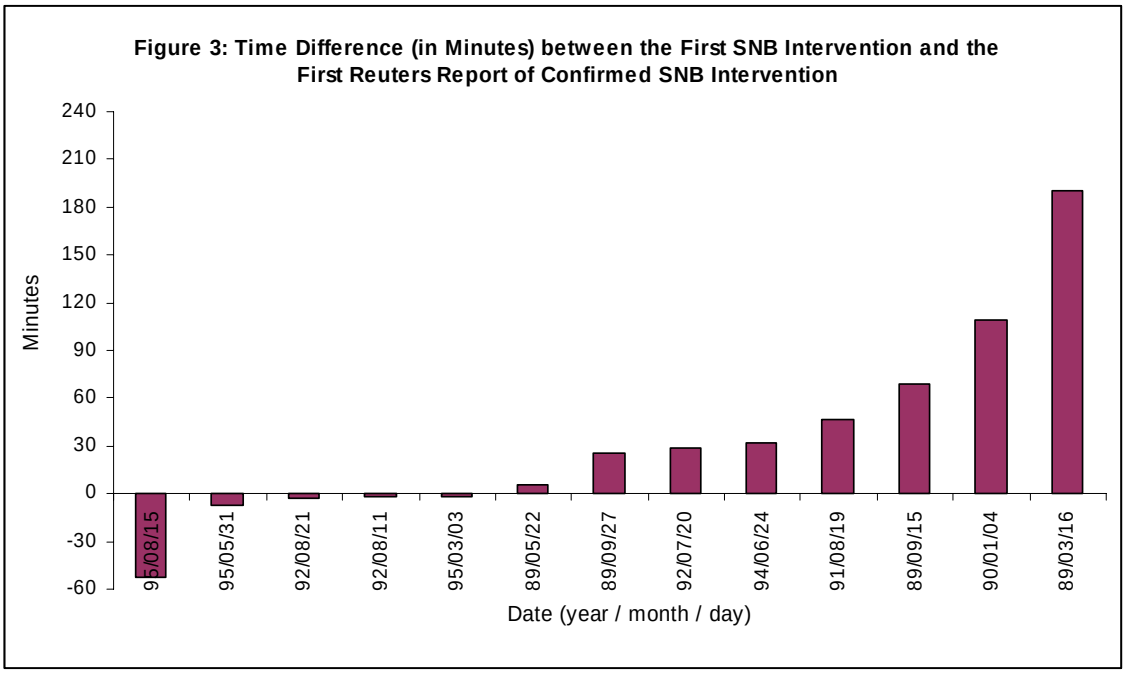
Figure 3: Time Difference (in Minutes) between the First SNB Intervention and the First Reuters Report of Confirmed SNB Intervention
Minutes
240
210
180
150
120
90
60
30
0
-30
-60
95/08/15
95/05/31
92/08/21
92/08/11
95/03/03
89/05/22
89/09/27
92/07/20
94/06/24
91/08/19
89/09/15
90/01/04
89/03/16
Date (year / month / day)

Table 1: Number of Actual SNB Transactions 1989 to 1995

	Dollar sales				Dollar purchases			
	total	CHF	YEN	DM	total	CHF	YEN	DM
Number of transactions	405	389	16	0	91	59	0	32
Number of days	58	55	3	0	10	6	0	4

	DM sales			DM purchases		
	total	CHF	YEN	total	CHF	YEN
Number of transactions	23	23	0	0	0	0
Number of days	2	2	0	0	0	0

Table 2: Statistical Properties of SNB Transactions and Reported Interventions

	Total SNB Transactions	Total Reported interventions	Only US/CHF SNB Coor-inter	Only US/CHF Reported Coor-Inter
Total Observations	519	165	496	138
Number of days	69	63	59	53
Number of transactions or reports per day				
average	7.52	2.39	6.67	2.33
median	5	2	5	2
max	36	9	18	9
min	1	0	1	0
std. deviation	6.38	1.79	4.22	1.86
skewness	2.39*	1.53*	1.14*	1.63*
kurtosis	7.18*	3.18*	0.52	3.37*
corr(Actual, reported)	0.21		0.33	
Sign Test(Actual, Reported)	31.5		27.5	
Sign Test(Actual*, Reported*)	12.5		10.5	

Notes: The sign test considers whether the distribution of the actual transactions per day and the reported interventions are the same. The variables, Actual* and Reported*, are detrended series of Actual and Reported.

Table 3: Correlations of Time Difference versus Intervention Size and Number of Transactions

Time Difference	*Size of First SNB Transaction*	*Size of SNB Transactions during the first minute*	*Size of SNB Transactions during first five minutes*	*Number of SNB Transactions during first five minutes*
SNB Transaction – Reuters Report 13 observations	0.23	-0.06	0.13	0.00
Abs(SNB Transaction – Reuters Report) 13 observations	0.16	0.00	0.04	0.00
Positive time difference i.e., if SNB Transaction – Reuters Report > 0 8 observations	0.34	0.23	0.70	0.69

Table 4: Regressions of SNB Transactions on News Reports

Dependent Variable:	$ACTUAL_t$	median($ACTUAL_t$)	ave($ACTUAL_t$)
CONSTANT	5.662**	-0.781*	-1.299**
	(1.266)	(0.434)	(0.453)
$REPORTED_t$	0.779*	0.267*	0.242*
	(0.425)	(0.153)	(0.147)
R^2 or *Pseudo* R^2	0.03	0.05	0.04
Estimation	OLS	Logit	Logit
Correct Cases		40	47
Degress of Freedom	67	67	67

Notes: $ACTUAL_t$ is the number of SNB transactions on intervention day *t*; median(*ACTUAL*) is +1 if $INT_t > 5$, otherwise 0; ave($ACTUAL_t$) is + 1 if $ACTUAL_t > 7$, otherwise 0; and $REPORTED_t$ is the number of Reuters reports for intervention day *t*. ** and * denote significance at the 5% and 10% level.

Table 5: Transactions Volume and Reported Interventions

Dependent Variable:	VOL_t	VOL_50_t	VOL_100_t	$SIZE_10$	$LESS_10_t$	$PLUS_10_t$
CONSTANT	44.678**	-1.146**	-2.705**	-0.625	0.763*	-1.566*
	(16.407)	(0.442)	(0.661)	(0.434)	(0.439)	(0.844)
$REPORTED_t$	8.953	0.210	0.248	-0.057	0.027	-0.701
	(5.505)	(0.144)	(0.178)	(0.150)	(0.149)	(0.506)
R^2 or *Pseudo* R^2	0.02	0.03	0.03	0.00	0.00	0.04
Estimation	OLS	Logit	Logit	Logit	Logit	Logit
Correct Cases		46	61	47	48	65
Degress of Freedom	67	67	67	67	67	67

Notes: VOL_t is the total intervention volume when the SNB intervened on day t; VOL_50_t is +1 if Vol_t > mil. $50, otherwise 0; VOL_100_t is + 1 if Vol_t > mil. $100, otherwise 0; $SIZE_10_t$ is + 1 if all the intervention transactions were greater than or equal to mil $10, otherwise 0; $LESS_10_t$ is + 1 if at least one of the intervention transactions is less than mil $10, otherwise 0; $PLUS_10_t$ is + 1 if at least one of the intervention transactions is greater than mil $10, otherwise 0; and $REPORTED_t$ is the number of Reuters announcements on an intervention day. ** and * denote significance at the 5% and 10% level.

Table 6: Exchange Rate Volatility and Trading Volume

Dependent Variable:	$V1_t$	$V1_t$	$V2_t$	$V2_t$
CONSTANT	8.786** (3.405)	3.340 (3.431)	-25.685** (8.437)	18.421 (13.870)
$ACTUAL_t$	0.631* (0.346)		8.357** (0.858)	
$REPORTED_t$		4.261** (1.151)		7.841* (4.653)
R^2	0.05	0.17	0.59	0.02
Degress of Freedom	67	67	67	67

Notes: $V1_t = [\max(s_t) - \min(s_t)]^2$, where s_t is the CHF/USD on the days of an SNB intervention and $V2_t = [\max(s^*_{it}) - \min(s^*_{it})]^2$, where s^*_{it} is the *i*th transactions price of a SNB intervention for day *t*. $ACTUAL_t$ is the number of SNB transactions and $REPORTED_t$ is the number of Reuters announcements intervention day *t* . ** and * denote significance at the 5% and 10% level.