

EPRU

Economic Policy Research Unit

Institute of Economics

University of Copenhagen

Studivstræde 6

DK-1455 Copenhagen K

DENMARK

Tel: (+45) 3532 4411

Fax: (+45) 3532 4444

E-mail: Grethe.Mark@econ.ku.dk

Homepage: <http://www.econ.ku.dk/epru/>

ECB Foreign Exchange Intervention and the Euro: Institutional Framework, News and Intervention

Rasmus Fatum and
Michael M. Hutchison

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Rasmus Fatum
Department of Marketing, Business
Economics and Law
University of Alberta School of Business
Edmonton, Alberta
Canada T6G 2R6
email: rasmus.fatum@ualberta.ca

Michael M. Hutchison*
Department of Economics
Social Sciences 1
University of California
Santa Cruz, CA 95064 USA
email: hutch@cats.ucsc.edu

Abstract

Using a unique intervention “news” data set, this paper investigates the impact of ECB intervention and intervention-related “news” (newswire reports) on the euro exchange rate. A time-series study of “news” generated by ECB officials and market participants regarding intervention and the value of the euro as well as an event study of firm reports of ECB intervention is conducted. Both studies find significant short-run effects on the euro value, while only “negative” statements (official statements denying past intervention or ruling out future intervention) appear to have persistent effects.

Key words: foreign exchange market intervention, the euro, central bank intervention

JEL codes: F31, F33, F42, G15

The weakness of the external value of the euro since its inception in January 1999 has been a source of concern among policymakers on both sides of the Atlantic. European Central Bank (ECB) officials have made numerous statements attempting to support the euro, pointing to such factors as growth potential, “fundamentals”, as well as the possibility of (coordinated) central bank intervention in the foreign exchange market. Confronted with particularly strong downward pressure on the euro in fall 2000, the European Central Bank (ECB) took direct action and intervened four times in the foreign exchange market, buying euros against dollars, in an attempt to support the currency.

There is no consensus, however, on whether intervention is effective in moving exchange rates or, in particular, whether ECB efforts to support the euro were successful. Empirical evidence on the effectiveness of sterilized intervention is mixed, attributable in part to the different methodologies employed in empirical studies of intervention, different exchange rate markets, different time-periods as well as fundamentally different types of intervention data. It is not clear how ECB intervention or, for that matter, rumors of intervention and other relevant intervention news affect the euro. How the market responds to intervention “news” is particularly ambiguous since the ECB is a new institution, with an independent status and an overriding aim of price stability.

Although empirical research often finds limited or no evidence in favor of a consistent link between sterilized intervention and associated movements of exchange rates, some research seems to point towards intervention as being “sometimes” or “occasionally” effective in moving exchange rates¹. Recent studies reconcile these seemingly contradictory findings by suggesting that central banks may at times possess private information about future fundamentals and target values of foreign currencies. Accordingly, intervention might reveal such information and, depending on the prevailing market sentiment, influence market expectations and affect current exchange

rates.² This “information signaling channel hypothesis” can be seen as nesting the “classical” signaling channel, through which sterilized intervention is effective in providing new information about monetary policy intentions and, if credible, information about future fundamentals.³ Further, the observation that intervention is occasionally successful may be consistent with the noise trader channel (Hung, 1997). That is, central bank interventions may work in the presence of so-called “chartists”, where positive feedback traders may support a bandwagon movement initially started by central bank intervention.

Empirical studies that are not confined to testing a specific channel through which intervention affects exchange rates are usually more supportive of its effectiveness. Within the literature using the profitability of intervention as one (perhaps controversial) measure of success, Sweeney (2000) finds that the Fed made, at times, substantial and significant risk-adjusted profits. Using an event study methodology, Fatum and Hutchison (2002) find evidence that intervention affects the exchange rate in the short run. Their findings are broadly consistent with the related work of Catte, Galli and Rebecchini (1994) and the time-series based study of Dominguez and Frankel (1993).

Although the ECB has only intervened in the exchange market on four occasions in late 2000, the financial press (newswire reports) has picked up numerous rumors of intervention, official statements expressing views regarding the value of the Euro as well as statements by the ECB on the usefulness of intervention. In this context, the objective of this paper is to broadly investigate ECB intervention-- the institutional context, the effects of rumors and official statements regarding intervention on daily euro exchange rate movements, and the impact on the markets from the cases where euro-support intervention was confirmed.

The main contributions of the paper consist of empirical analyses of a unique intervention “news” data set on daily USD/EUR rate movements and an event study on firm reports of ECB intervention. The first analysis is based on time-series study of “news” generated by ECB officials and market participants regarding intervention and the value of the euro. We separate newswire reports into four categories—including official statements, market rumors and firm reports of intervention-- and measure what type of news has systematically moved the exchange rate. We also undertake a detailed case study, using an event-study methodology, on the four occurrences of euro intervention acknowledged by the ECB. Consistent with the findings of Frenkel, Pierdzioch and Stadtman (2001), both analyses provide some support for the short-run efficacy of ECB intervention operations in support of the euro, but the effects are not long lasting. Interestingly, we find that “negative” statements by ECB officials questioning the efficacy of intervention, denying past intervention, and ruling out future intervention, have systematically depreciated the euro and the effect appears persistent.

The rest of the paper is organized as follows. The next section discusses the institutional framework within which ECB foreign exchange market intervention policy is formulated. Section 2 presents the empirical work linking USD/EUR exchange rate changes to “news” (newswire reports) relating to intervention and official statements about the euro. Section 3 presents the event study methodology applied to the USD/EUR intervention. Section 4 concludes the paper.

1 Institutional Framework and Intervention Policy in the EU

Since the inception of the Euro on January 1, 1999, the ECB intervened in the USD/EUR exchange market on only four occasions, all in late 2000: September 22, November 3,

November 6 and November 9. The September 22 intervention was undertaken together with other central banks and was immediately acknowledged in an official ECB press release. The ECB did not release details over the magnitude of intervention, but the Federal Reserve purchased 1.5 billion euros against the dollar on that date and noted that it was coordinated with the ECB and the monetary authorities of Japan, Canada, and the United Kingdom (Federal Reserve Bulletin, December 2000; p. 813). The early November interventions were not immediately acknowledged by the ECB (although press reports were widespread) and the operations were noted in the 2000 ECB Annual Report (p. 54).

The legal structure of the ECB provides it with great independence with the overriding objective of price stability in the Euro area (see, for example, Gros and Thygesen, 1998)⁴. This primary objective has been emphasized numerous times by ECB President Duisenberg (see, for example, speech on the occasion of the 2000 Spruce Meadows Round Table in Calgary, September 8, 2000) other officials of the ECB, and given support by national leaders in Europe. The EUR/USD exchange rate, in terms of the formulation of ECB policy, is mainly relegated to the role as an indicator variable (the “second pillar” of monetary policy; see, for example, ECB Monthly Bulletin, November 2000) for inflation.⁵

The ECB also has a great deal of discretion over intervention policy. Article 2 (“Objectives and Tasks of the ESCB”) of the Constitution of the European System of Central Banks states that “...the primary objective of the ESCB shall be to maintain price stability” and that, *without prejudice to price stability*, it shall support the general economic policies of the EU. Foreign exchange market intervention policy is addressed under “External Operations” (Article 23) where it is noted that the ECB and national central banks may:

- establish relations with central banks and financial institutions in other countries and, where appropriate, with international organizations;
- acquire and sell spot and forward all types of foreign exchange assets and precious metals; the term foreign exchange asset' shall include securities and all other assets in the currency of any country or units of account and in whatever form held;
- hold and manage the assets referred to in this Article;
- conduct all types of banking transactions in relations with third countries and international organizations, including borrowing and lending operations.

Formally, the Governing Council of the ECB (comprising the members of the ECB Executive Board and the governors of the national central banks) decides on intervention operations by a simple majority vote, where each member has one vote (in accordance with Article 10.1 and 10.2). In practice, of course, there is consultation between the ECB and other EU institutions and foreign government officials. The coordinated intervention operation on September 22, for example, followed a meeting on September 8-9 of the euro-group ministers (finance ministers of EU countries participating in EMU) in Versailles where support for a strong rather than stable euro was a key element in the official meeting statement.

2 News and the Euro

Applying the efficient markets hypothesis to foreign exchange, a large literature has investigated the impact of “news” on exchange rate changes. The basic idea is that “news”, by definition, must be unanticipated information—and this information, in turn, might have value in revising expectations over current or future exchange rate fundamentals. Early studies linking press reports (“news”) .and exchange rate movements

include Engel and Frankel (1984) and Ito and Roley (1987). A recent study investigating daily news reports on macroeconomic conditions (e.g. unemployment conditions, industrial production reports, consumer prices) and the Euro exchange rate is Galati and Ho (2001). They find that “bad” macroeconomic news tends to depreciate the euro but that “good” macroeconomic news is not similarly incorporated into euro appreciation.

No study to date, however, has investigated whether news reports of official statements, rumors of intervention and the like have had an impact on the value of the Euro exchange rate. Even though the ECB has only officially announced one intervention operation on the day same day it occurred (on September 22, 2000) and only on one occasion subsequently acknowledged a previous intervention episode (intervention in early November, acknowledged in the ECB Annual Report 2000), the financial press have reported numerous rumors of intervention, official statements expressing views regarding the value of the Euro as well as statements on the usefulness of intervention.

For example, on April 20th (Thursday) and 21st (Friday) of 2000 ECB officials stated that the ECB was not planning on intervening in the foreign exchange market (reported in *WSJ* on the following Friday and Monday, April 21 and 24, respectively), despite recent weakness of the euro. The euro dropped more than 3% over the subsequent 3 business days.

Our objective is to investigate whether statements and rumors of this nature reported in the press, either favorable or unfavorable to the Euro, are systematically related to USD/EUR exchange rate changes. Four types of news reports are extracted from the financial press and dated to the point they were reported over the newswires. The *Wall Street Journal* was searched in detail over the January 1, 1999 to February 8, 2002 period for every report mentioning ECB, Euro and/or (foreign exchange market)

intervention. From this large sample, relevant news reports were separated into four categories:

- A: Rumors and speculation of Euro support intervention by the ECB or other central banks;
- B: Statements by officials in support of the Euro (including suggestions that intervention is a possibility);
- C: Statements by officials *not* supportive of the Euro (e.g. denying rumors that intervention has occurred or is likely);
- D: Firm reports of intervention (i.e. four dates in fall 2000);

In our sample, there are 36 occurrences of category A news reports, 16 occurrences of category B news reports, 26 occurrences of category C news reports, and 4 occurrences of category D news reports. The complete listing of these news reports is available from the authors upon request.

To the extent that the categories A to D represent “news”, we would expect categories A, B and D to be associated with an appreciation of the Euro and category C to be associated with a depreciation of the Euro.

We test these hypotheses within the following framework:

$$(1) \quad \Delta \ln S_t = \alpha + \beta(L)\Delta \ln S_{t-1} + \gamma(L)X_t + \varepsilon_t$$

where $\Delta \ln S$ is the change in the natural logarithm of the USD/EUR exchange rate (daily noon quote in New York), and X is the vector of contemporaneous and lagged “news” variables A-D. (Lags are incorporated in order to capture the dynamic response of the exchange rate to the arrival of news). The equations are estimated over the sample period

1 January 1999 to February 8, 2002 (751 business day observations) with daily data using the White correction for heteroskedasticity.

The results from estimating equation (1) are reported in Table 1. The first column reports the baseline model. The second column reports results from estimating a dynamic model where the contemporaneous value and four lags of each of the focus variables are included (A, B, C and D). (Only the sum of the lagged coefficients on each of the focus variables is reported for brevity). The third column combines the favorable news variables (A, B and D) into a single (0, 1) dummy variable, to evaluate whether positive news generally is incorporated into the market value of the euro.

In the baseline model, shown in column 1, two of the focus variables (A and C) are statistically significant at the 95% level of confidence (or higher) and of the expected signs. Rumors of ECB intervention in support of the euro (variable A) are associated with an immediate 0.24 percent appreciation of the euro. Statements by ECB officials in support of the euro or implying the use of intervention to support the euro (variable B) are not statistically significant (and not of the expected sign). By contrast, statements by ECB officials *not* supportive of the euro, such as denying rumors that intervention has occurred (or is likely to occur) and questioning the efficacy of intervention (variable C), are statistically significant and associated with an immediate 0.47 depreciation of the euro. Firm reports of ECB intervention in support of the euro (variable D) are associated with an immediate 0.66 percent appreciation of the euro but are not significant.

The model estimates reported in column 2 (the dynamic model) show similar impact effects (contemporaneous values), but now firm reports of ECB intervention are significant and associated with euro appreciation. The table shows the sum of the contemporaneous and lagged values (termed the “dynamic effect”) for each of the focus variables. The F-statistics testing the hypothesis that this sum is equal to zero, and that

the individual values are jointly (contemporaneous and lagged values) equal to zero, are also reported. These dynamic effects measure whether the effect of news announcements persist for a full week (5 business days). Consistent with the results from the baseline model, the strongest and most persistent effect is associated with unfavorable news. No persistent effects are found for the other news variables.

The model estimates reported in column 3, using the combined measure of favorable news (ABD), again finds that unfavorable news (variable C) immediately depreciates the euro (with the same magnitude and significance level as in column 1). The combined measure of favorable news is positive and significant at just under the 90 percent level of confidence.

On balance, our results indicate that official statements denying ECB intervention (past, present or future) or the efficacy of intervention (variable C) have apparently been viewed as important “news” and worked to depreciate the value of the euro. This effect is persistent over a week at least⁶. Rumors and speculation of intervention in support of the euro (variable A) is associated with euro appreciation, but the effect is not persistent. By contrast, the market apparently ignored official statements in support of the euro (variable B). There is some evidence that firm reports of euro-support intervention (variable D) had an impact—the few instances of these reports, however, occurring on only 4 out of 751 business days, may explain why stronger support for the efficacy of official intervention was not found. This is the motivation for the event study of the next section.

3 An Event Study Methodology Applied to Euro Intervention

The foundation of an event study is the definition of the event of interest and the identification of the period over which – in this context - the exchange rate movements

are examined. This period is referred to as the event window and it is comprised of the pre-event days (sometimes referred to as the estimation window), the event day (or days), and the post-event days.⁷

A general consideration when defining events is that, if the event period is set too short, then what is actually one policy episode of intervention may be incorrectly identified as two (or more) events (and potentially leading to a number of overlapping event windows). On the other hand, if the event period is set too long, then what are actually two policy episodes – separate policy decisions to intervene in the foreign exchange market – may be incorrectly identified as a single event.

Following Fatum and Hutchison (2002) we define an event as a period of days with official intervention in the USD/EUR exchange rate market in one direction (in terms of purchases or sales), conducted by the ECB, the Fed, or both, and possibly including five consecutive days of no intervention.

We apply three criteria to determine or define what characterizes a successful event. The first criterion is simply based on whether the direction of the subsequent exchange rate movement is the same as the direction in which the central bank was intervening, e.g. does the value of the euro relative to the dollar increase after euros are purchased? The second criterion defines a successful event as one where intervention is associated with a smoothing of the exchange rate movement, i.e. an event is deemed successful if it is either successful according to the direction criterion or the subsequent exchange rate movement is smaller (“smoother”) than the exchange rate movement preceding the central bank intervention. Our third criterion distinguishes between “leaning with the wind” and “leaning against the wind” events by conditioning each event on the exchange rate movement of the associated pre-event window. This measure is denoted the “reversal” criteria.

In order to test if an observed number of successes is statistically significant, Fatum and Hutchison (2002) employ the non-parametric sign test for the median as well as a matched sample test for the “smoothing” criterion. Since there are only four firm reports of intervention in the euro, i.e. only four data points are available within the context of our daily data analysis, we are unable to perform any formal statistical tests regarding effectiveness. However, the event study methodology can still be applied and gives a more rigorous foundation for a case study approach. It allows for a thorough characterization of whether or not the events of intervention in the USD/EUR exchange rate appear successful or not.

Applying the event study methodology to the firm reports of euro intervention (variable D), two separate events emerge – a one-day event on September 22 and a 3-day event spanning from November 3 through 9 (both events in 2000). Table 2 shows the exchange rate movements around the two events for the associated pre- and post-event windows for window lengths of 2, 5, 10 and 15 days.

The first part of the case study of euro intervention focuses on the intervention policy of the central banks. With respect to the intervention policy pursued by the central banks participating in the first event, it is not surprising that for the longer window lengths it appears consistent with a “leaning against the wind” intervention policy, given the history of a sustained downward trend in the value of the euro vis-à-vis the dollar. However, it is interesting to notice that based on the shortest window length, the 2-day window, the intervention policy is described as “leaning with the wind”, thereby lending some anecdotal support to the view that central banks prefer to intervene “with” the market in the short run even if the purpose of intervention is to break or “lean against” a long run trend.⁸

The second event of euro intervention appears consistent with a “leaning with the wind” policy when looking at the 2, 5 and 10-day pre-event windows, while consistent with a “leaning against the wind” policy when looking at the 15-day pre-event window.⁹ Again, with reference to the sustained euro depreciation since its inception in January 1999, this suggests a central bank that is timing its intervention operations such that it intervenes “with” the market in the short run.

The second part of the euro intervention study employs the previously defined criteria – “direction”, “reversal”, and “smoothing” – in order to evaluate the successfulness of the two events.¹⁰ The evaluation of successfulness is summarized in table 3. Focusing on the first event, it appears successful according to all three criteria (when applicable) when the analysis is based on the shorter window lengths. When the analysis is based on the longer window lengths, the September 22 event appears unsuccessful with respect to maintaining an exchange rate level effect (the “direction” and the “reversal” criteria), while it remains successful with respect to the “smoothing” criterion. Although the analysis of intra-event exchange rate movements is beyond the scope of the applied event study methodology, it is worthwhile pointing out that the spike in the value of the euro on the day of the September 22 intervention was transitory. In fact, 16 business days after the first event of euro intervention, the exchange rate had reverted to a level below its level on September 21, the day immediately preceding the event. This observation further emphasizes that the effects of intervention appear short-term.¹¹

Turning to the second event (which is classified as a “leaning with the wind” event with respect to all but the 15-day window length, thus only the “direction” criterion is meaningful for the analysis based on the 2, 5, and 10-day windows) a similar pattern prevails, i.e. the November 3 through 9 event appears successful when the analysis is

based on the shorter window lengths. When the analysis is based on the 10-day window, the event appears unsuccessful. With respect to the 15-day window length, however, this event appears successful according to all three criteria.

Rather than concluding that the second event was associated with lasting level as well as smoothing effects on the exchange rate, it seems likely that the explanation lies elsewhere. The event study methodology implicitly assumes that intervention defines the event and the exchange rate movements during the pre- and post-event windows are unrelated to other economic news. In this case, the longer the window length, the more likely it seems that what drives the euro appreciation is the turmoil surrounding the US presidential election counts and recounts in Florida and the widespread selling of dollar assets in anticipation of a prolonged gridlock.

4 Conclusion

This paper makes two main contributions. The first contribution is a time-series analysis of “news” generated by ECB officials and market participants regarding intervention and the value of the euro. We find that either official statements denying ECB intervention (past, present or future) or questioning the efficacy of intervention have apparently been viewed as important “news” and worked to depreciate the value of the euro. This effect is persistent over a week at least. The contrary is not the case, however: the market apparently ignored official statements in support of the euro. Firm reports of intervention, as well as rumors and speculation of intervention in support of the euro, are associated with short-term euro appreciation.

The second contribution is a detailed case study, using an event study methodological approach, on the effects of the four confirmed cases of ECB intervention. Based on all three alternative criteria of success, the first event (September 22, 2000)

appears successful when the analysis is based on relatively short window lengths. However, the results are mixed when longer window lengths are considered. A similar pattern emerges in the analysis of the second event (three occurrences of intervention in November 2000).

On balance, both methodological approaches support the view that ECB intervention has been successful in the short run. Interestingly, only “negative” statements by ECB officials (questioning the efficacy of intervention and denying that they have intervened or will intervene) appear to both immediately depreciate the euro value and have a persistent effect.

Notes

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¹ See Sarno and Taylor (2001) for a recent survey.

² See, for example, Baillie, Humpage and Osterberg (2000) and Humpage (1999).

³ See Fatum and Hutchison (1999) for a direct test of the “classical” signaling channel. The theoretical justification offered by the “portfolio balance” channel, through which sterilized intervention changes the currency denomination of relative asset supplies and thereby the exchange risk premium if assets are imperfect substitutes, has received little empirical support (see, for example, Edison (1993)).

⁴ In terms of independence of instructions from government bodies, for example, the ECSB statute states: “...neither the ECB nor a national central bank nor any member of their decision-making bodies shall seek or take instructions from Community institutions or bodies, from any government or a member state or from any other body.” (Article 7). As Gros and Thygesen (1998) point out, this wording supporting independence of instructions is more explicit than even the Bundesbank.

⁵ However, the official press release associated with the September 22 coordinated intervention operation didn’t mention Euro zone price stability, stating only: “On the initiative of the European Central Bank, the monetary authorities of the United States and

Japan joined with the European Central Bank in concerted intervention in exchange markets because of their shared concern about the potential implications of recent movements in the euro exchange rate for the world economy.” (ECB Press Release, September 22, 2000).

⁶ The evidence that “bad” news has a strong and more persistent effect on the market is consistent with the results of Galati and Ho (2001) relating to macroeconomic news.

⁷ See MacKinlay (1997) for a survey on event study methodology.

⁸ Given that the market may have expected coordinated intervention and statements in support of the euro on the following day at the G7 Meeting, another explanation for the exact timing of the Sep. 22 event is that the central banks wanted to surprise the foreign exchange market (keeping in mind that no previous intervention in the USD/EUR exchange rate had been carried out).

⁹ The 15-day pre-event window associated with the second event overlaps with the 15-day post-event window associated with the first event, thus the characterization of the intervention policy for the second event based on the 15-day window length is only indicative.

¹⁰ If the exchange rate change during the associated pre-event window is an appreciation, i.e. the event appears consistent with a “leaning with the wind” policy, the “reversal” and “smoothing” criteria are not meaningful and the evaluation of successfulness not applicable.

¹¹ See Fatum (2000) for an overview of intra-event DEM/USD exchange rate movements during the post-Plaza period.

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Table 1 **Intervention News and Exchange Rate Changes**
(a)

Dependent Variable: $\Delta \ln S_t$	(1)	(2)	(3)
Constant	-0.035 (-1.45)	-0.034 (-1.32)	-0.033 (-1.37)
A News	0.241** (2.29)	0.197* (1.77)	
B News	-0.097 (-0.54)	-0.103 (-0.53)	
C News	-0.466*** (-3.23)	-0.469*** (-3.11)	-0.464*** (-3.22)
D News	0.658 (1.24)	0.775* (1.86)	
A, B or D			0.155 (1.56)
1 Dynamic effect of A		0.116	
F-test for week-long effect		0.33	
F-test for joint significance		0.64	
2 Dynamic effect of B		0.565	
F-test for week-long effect		2.23	
F-test for joint significance		1.07	
3 Dynamic effect of C		-0.666	
F-test for week-long effect		6.08***	
F-test for joint significance		2.78**	
4 Dynamic effect of D		0.523	
F-test for week-long effect		0.81	
F-test for joint significance		1.17	
Observations	751	749	751
R ²	0.03	0.05	0.02
Durbin-Watson stat	1.96	1.95	1.95

a) OLS regressions corrected for heteroskedasticity (using White's standard errors). Standard errors in parentheses; *** denotes significance at the 99% level, ** denotes significance at the 95% level, * denotes significance at the 90% level.

Table 2**Total Intervention in the EUR/USD Exchange Rate Market**

Date of event	Avg. daily % change in the EUR/USD exchange rate over pre-event window (a)	Firm reports of intervention (variable D) (b)	Number of days of intervention during event	Avg. daily % change in the EUR/USD exchange rate over post-event window (c)
<u>2-Day Windows</u>				
Sep 22, 00	-0.257	EURO PURCH	1	-0.125
Nov 3, 00 – Nov 9, 00	-0.628	EURO PURCH	3	-0.192
<u>5-Day Windows</u>				
Sep 22, 00	0.138	EURO PURCH	1	-0.100
Nov 3, 00 – Nov 9, 00	-0.752	EURO PURCH	3	-0.098
<u>10-Day Windows</u>				
Sep 22, 00	0.213	EURO PURCH	1	0.130
Nov 3, 00 – Nov 9, 00	-0.219	EURO PURCH	3	0.204
<u>15-Day Windows</u>				
Sep 22, 00	0.249	EURO PURCH	1	0.175
Nov 3, 00 – Nov 9, 00	0.039	EURO PURCH	3	-0.092

- a) Average daily percentage change in the EUR/USD exchange rate over the two, five, ten and fifteen business days, respectively, prior to first day of the event.
- b) Official data regarding the magnitude of ECB intervention operations is unavailable. Estimates found in the financial press suggest that central banks bought euros in the amount of 6 billion dollar on September 22 and that the ECB subsequently bought euros in a total amount of 3 billion dollar during the early November event.
- c) Average daily percentage change in the EUR/USD exchange rate over the two, five, ten and fifteen business days, respectively, succeeding the last day of the event.

Table 3

Successfulness of Intervention in the EUR/USD Exchange Rate Market

Window length	“Direction” criterion (a)	“Reversal” criterion (b)	“Smoothing” criterion (b)
<u>Event Sep 22, 2000</u>			
2-day	YES	N.A.	N.A.
5-day	YES	YES	YES
10-day	NO	NO	YES
15-day	NO	NO	YES
<u>Event Nov 3, 2000 – Nov 9, 2000</u>			
2-day	YES	N.A.	N.A.
5-day	YES	N.A.	N.A.
10-day	NO	N.A.	N.A.
15-day	YES	YES	YES

- a) Intervention is successful if the purchase of euro is associated with a subsequent appreciation of the euro.
- b) Intervention is successful if the purchase of euro is associated with a subsequent appreciation of the euro. If the exchange rate change during the associated pre-event window is an appreciation of the euro, i.e. the intervention policy appears as “leaning with the wind” for the given window length, this criterion is not meaningful and the evaluation of successfulness is denoted n.a.

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