

# Do Central Banks Interventions Bring Noise on the Market?

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## Abstract

The relevance of central bank interventions (CBI) is still an open issue. Up to a recent period, empirical results remained rather inconclusive on both the ability of central banks (CBs) to 'calm the disorderly market' as well as to readjust the exchange rate with the fundamentals. More recently, however, some studies have shown that transparent policies may have virtuous effects by moving the exchange rate level in the desired direction and by reducing the volatility. If both criteria should undoubtedly be taken into account to judge the success (or failure) of CBs activities others aspect merit also some attention.

In this paper, we propose to focus on a new aspect of the subject by introducing the possibility of indirect effects of CBI policies. Following Chiu(2003) and Enoch (1998) we try (i) to disentangle some intervention strategies, i.e. actual interventions as well as statements, (ii) to see whether a more or less transparent policy favor the dissemination of noise in the market. We also complete our model by different measure of uncertainty as the continuous volatility and the jumps. Our dynamic-Probit estimations suggest that a transparent policy provides targets for speculators to challenge with an increase of anticipative rumors , i.e. rumors on possible intervention on the near future. On the other hand, an ambiguous policy leads the market to perceive a signal where none was send with more false reports of intervention.

## 1 Introduction

With the end of the Bretton Woods system and the shift to a floating exchange rate regime, misalignment or excessive volatility have become well known features of financial markets. It is then not surprising that central banks have regularly attempted to regulate their currency trough actual or oral interventions to 'calm the disorderly market' and to limit adverse effects on their international competitiveness.

In parallel, an abundant literature has grown to assess the pertinence of these policies by matching their theoretical targets, i.e. to move the exchange rate level and to reduce the volatility with the facts. Unfortunately, empirical studies remains rather mixed on their conclusions. During a long time, the consensus view was that actual interventions were ineffective or had undesired

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effects<sup>1</sup> (Edison, 1993; Sarno and Taylor, 2002; Dominguez, 1998; Beine and al., 2002). More recently, the disclosing of further data and the introduction of different central bank intervention objectives (King, 2003) have tempered previous findings (Hutchison and Fatum, 2002; Hung, 1997) inducing a glimmer of hope for further examinations. At the current state of the art, intervention is advocated to be willing to succeed if the policy is highly transparent (Beine and al., 2004).

Departing from the previous literature, Chiu (2003) widened the traditional framework to discuss advantages and drawbacks of central bank intervention strategies. In her paper called 'transparency versus constructive ambiguity,' she suggested that the degree of transparency may also favor or reduce the speculation and the dissemination of rumors on the market. More precisely, she noticed that an ambiguous policy is likely to increase market guess on past and future actions of central banks (Chiu, 2003). On the other hand, a too transparent policy on central bank target is likely to favor speculative (anticipative rumors) attacks from market participants<sup>2</sup>.

This reflexion suggests that it is probably necessary to rely on a larger set of criteria to judge the effectiveness of policies. As before, it is certainly relevant to measure the impact of intervention the same day or few days after. That is what we call direct effects. But now it seems also important to take into account what we call indirect effects which are all the noises induced by the degree of transparency of the exchange rate policy. In this context, noise means the false or uncertain information related to central bank interventions. It can be the false reports of intervention when the market mistakenly perceives a signal (an actual intervention) where none was sent or the anticipative rumors announcing an intervention in the near future.

Both are important features of the exchange rate market. Gnabo and Lecourt (2005), for example, have shown that they were false reports on the Yen/Dollar market on 7% of working days during the pre Sakakibara period (1991 June 1995)<sup>3</sup>. Dealing with others currencies Klein (1993), Frenkel and al. (2004), Chang (2004), and Fischer (2004) also stress the recurrent inaccuracy of news. Anticipative rumors have received less attention from the literature. Recently, however, Dominguez and Panthaki (2005) have estimated their impact on the exchange rate at an intra daily level. Their conclusions suggest that these 'unrequited interventions', i.e. anticipative rumors influence significantly the exchange rate.

This study is in line with theoretical studies from Enoch (1998) and Chiu (2003) and the descriptive study from Gnabo and Lecourt (2005). It aims at testing empirically whether central bank bring noise (rather than a signal) on the market or in others words, if central bank interventions could have indirect effects.

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<sup>1</sup> We talk about undesire direction when for example a purchase of domestic currency led to a depreciation or when the volatility is increased

<sup>2</sup> Without disclosure, the market keeps guessing when and how the central bank will intervene. Will such market guesses add to market volatility, or will some degree of uncertainty be helpful in deterring destabilising speculation?

<sup>3</sup> These results correspond to the pre-Skakibara period (1991-June 1995) for days with newswires reporting an intervention from the Bank of Japan

## 2 Central Bank intervention policies and exchange rate market

### 2.1 Intervention Policies

In a broad sense foreign exchange intervention is defined in the literature as 'any transaction or announcement by an official agent of a government that is intended to influence the value of an exchange rate' (Dominguez, 1998). In practice, monetary authorities have two main types of instruments at their disposal.

#### 2.1.1 Actual Interventions

The most usual form of action remains the actual (sterilised) intervention which corresponds to the narrow definition of central bank interventions. In this way, the money supply remains unchanged and only the composition of monetary reserve is affected.

Besides mechanical effects, different strategies may be implemented to maximize the direct effect on the exchange rate. In practice, the authorities play mainly with the degree of visibility and the timing of the operations. Hence, if they want to prevent long-term misalignment ('policy' objectives (King, 2003)) macroeconomics news are released to underline the policy's coherency. They may also act in a transparent way by conducting visible interventions. For example they may deal directly with several commercial banks (not sworn to secrecy) on the market with large amount in spite of using brokers or recent Electronic Brokerage System (EBS) which allow to trade anonymously. By doing so, they issue a credible and clear signal to the market and, according to Dominguez (1998), increase the likelihood of success. The timing is also import. Hence, by acting repeatedly at the same level, authorities may draw a so-called 'line in the sand' and then signal to the market their objective in terms of exchange rate levels. On the other hand, a clustering of interventions may erode the element of surprise thereby decreasing the effectiveness of the operations. Furthermore, making intervention rules explicit is likely to favour anticipating rumors and, if authorities are not fully credible, it will 'create a target for speculators to challenge' (Chiu, 2003).

When the authorities' credibility is low (Dominguez, 1993; Chiu 2003; Enoch 1998) or speculation is strong, i.e. one-way trends, they may prefer to adopt a more discreet approach to reach "tactical" objectives (King, 2003). In practice, secrecy may be difficult to achieve. Hence, if they use a very limited number of commercial banks sworn to secrecy, such banks must be discover up to a certain point in time. Then, each of their large trades would be examined and suspected. Consequently, the search for the secrecy may turn to a 'cat and mouse' game where authorities should use sophisticated strategies in order to avoid being perceived and, on the other hand, where market participants may speculate on the occurrence of an intervention, with probably false or uncertain reports.

#### 2.1.2 Communication policy

Official speeches can either be considered either to complement actual interventions by improving the visibility and the quality of the signal (Beine and al., 2004) or they may be considered as an autonomous instrument to influence the exchange rate (Fratzscher, 2004; Jansen and De Haan, 2003; Fatum and Hutchison, 2002) . In the first assertion, official "confirming speeches" help to convey a clearer signal to the market by confirming an operation or explaining the motivation. In

that sense, it is also a means to enhance *ex post* transparency (Enoch, 1998)<sup>4</sup> and probably to reduce false reports, by removing all ambiguity about the occurrence .

On the other hand, statements may be used to inform the market about the authorities' point of view. Hence Fratzscher (2003) considers 'Oral intervention' to be when authorities express their view on the level of exchange rate as compared to the fundamentals . In this way, they provide inside information to the market and improve the transparency on their targets. But statements may also aim to lessen or strengthen the likelihood of an operation on the foreign exchange market (Fatun and Hutchison, 2002) . If these 'Threats' are taken seriously, they may enhance anticipative rumors. If not, they are simply disregarded. As suggest by Dauchy (2001) it can be a way of introducing doubt in a one-way trend market without challenging authority's credibility.

## 2.2 Market participants and microstructure factors

Others factors as the misalignment of the exchange rate with short run trend or market factors may also influence the dissemination of rumors in the market. We review here briefly the main elements that we consider in our model.

### 2.2.1 Agents mimic the central bank reaction functions

In general, the real motivation for central bank intervention remains unknown to the public. If officials do not confirm and explain explicitly their target, it has to be inferred by the market. As it is a key issue, many studies have tried to deduct central bank objectives through survey data or reaction functions. In the first case, Neely (2000) and Lecourt and Raymond (2003) identified the long run exchange rate misalignments from the fundamentals as the primary motivation for intervening. To a lesser extend the volatility is also quoted to play a role. Both results, however, are only partially confirmed by empirical studies on reaction functions(Dominguez, 1998; Ito, 2002; Ito and Yabu, 2004). Hence, the short, medium and long term misalignment are often identified as significant determinants(Ito and Yabu, 2004). On the other hand, the volatility is often proved to be insignificant.

Relying on that features agents are likely to mimic the central bank reaction function to anticipate further interventions.

### 2.2.2 Market uncertainty

The market uncertainty plays obviously a key role in the dissemination of rumors. All things equal, market participants are more likely to miss perceived a signal in periods of high uncertainty. Up to now, the financial literature has used different proxies to measure market uncertainty. The most common is probably the spot exchange rate volatility. As volatility cannot be directly observed many researches have proposed numerous sophisticated statistical models to capture the usual characteristics of financial data. Recently, the availability of intra-daily time-series data has revived interest in non-parametric realised-volatility models. In this study, we decide to rely on this approach. According to Andersen *et al.* (2000) and under the assumption of a continuous time-diffusion process for the underling asset price, the realised volatility computed from high-frequency

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<sup>4</sup>*ex post* transparency is when the authorities explain afterward what they have done.

data provides an unbiased and consistent estimate of latent notional or integrated volatility. If we introduce a jump component in the diffusion process then the realized volatility could be separated in continuous volatility and jumps. The first part represents the deterministic part of the volatility and the jumps the random part.

### 3 Data

To perform the empirical analysis, we rely on a dataset capturing newswire (i)for the BoJs intervention strategies and (ii) different types of noise. We also have intra daily data on the yen/dollar between 1991-2004.

In our framework noise refers to news report that announces that a central bank might have intervened or is likely to intervene in the foreign exchange market. We talk about 'Anticipative rumors' when markets speculate about an intervention in the near future. Once the central bank intervenes, the newswires may report the event. Nevertheless, such reports are sometimes uncertain or wrong and in this case do not provide any information. Then, we talk about 'False reports' when a news wrongly reports an intervention.

We choose to collect rumors from newswires reports, Reuters and Dow Jones rather than from other financial press. This is both a way of capturing those widespread in the market on a specific day and a guaranty that they touch all the market and are not marginal. The newswire reports are available via the online data base Factiva. This data base offers the possibility to conduct a research with key words on the headline or the whole text. In line with Gnabo and Lecourt (2005), we chose to take the following combination of key words: 'BOJ or Bank of Japan or intervention' for every type of noise on the overall period. For the communication policy, we select the name of main Japanese policymakers.

At least, time series data are provided by Olsen & Associates at 5 minutes frequency.

## 4 Model

### 4.1 General model

As we are in a binary choice framework, we select a Probit model to perform our estimations. Interestingly, we introduce some dynamics to take into account possible inertia in the occurrence of the event and also in the overall explanatory variables. To do so, we follow Kauppi and Saikkonen(2005). Formally their model is written as follow:

$$\pi_t = \omega\pi_{t-1} + \delta y_{t-1} + \sum_{j=1}^q x'_{jt} \gamma_j \quad (1)$$

$$y_t = 1(\pi_t > U_t) \text{ with } U \mapsto Normal(0,1) \quad (2)$$

with  $y_t$  the dependent variable at time  $t$ ,  $\sum_{j=1}^q x_{jt}$  the set of  $q$  explanatory variables at time  $t$  and  $1(\cdot)$  the indicator function with 1 if  $\pi_t > U_t$  and 0 otherwise. Robust Standard error are computed according to Kauppi and Saikkonen(2005).

## 4.2 Anticipative rumors

Dependant variable (noise):

- *AR*: Anticipative rumors.<sup>5</sup>

$$\begin{aligned}\pi_t = & \alpha + \omega\pi_{t-1} + \gamma_1Threats_t + \gamma_2IOL_t + \gamma_3IOV_t \\ & + \gamma_4Out - Cluster_t + \gamma_5Cluster_t + \beta_1Rvol_{t-1} \\ & + \beta_2(s_{t-1} - s_{t-2}) + \beta_3(s_{t-1} - s_{t-21}) + \beta_4(s_{t-1} - s_{t-MA}) \\ & + \delta_1AR_{t-1}\end{aligned}\tag{3}$$

Independent variables capturing the exchange rate intervention policy:

- *Threats*: Are the statements from officials telling that the central bank is likely to intervene. If authorities are credible, this kind of statements is the most likely to trigger anticipative rumors on the market.<sup>6</sup>
- *IOL*: Are statements from officials telling that they are unconformable with the current level of the exchange rate.<sup>7</sup>
- *IOV*: Are statements from official telling that the exchange rate is too volatile.<sup>8</sup>
- *Out - Cluster*: Are reported interventions, isolated from other interventions. This means that they are not preceded by a set of interventions.
- *Cluster*: Are reported intervention in a cluster, i.e. preceded by at least two interventions in the 4 previous days. By this way, the authority are drawing a 'line in the sand'<sup>9</sup>

Independent variables capturing the reaction function variables:

- *Rvol*: Is the daily realized volatility at 23h55 GMT. The volatility is traditionally taken into account in the reaction function of the central bank (Almekinders and Eijffinger, 1996).<sup>10</sup>
- $s_{t-1} - s_{t-2}$ : Is the short term deviation.
- $s_{t-1} - s_{t-21}$ : Is the medium term deviation.
- $s_{t-1} - s_{t-MA}$ : Is the long term deviation with MA a moving average on the previous year.<sup>11</sup>

<sup>5</sup> "BOJ May intervene In Asian Forex Market Wednesday" (Dow Jones, 20/07/1999)

<sup>6</sup> Example: "MOF Sakakibara: Ready To Intervene To Bolster Yen Further" (Dow Jones, 4/09/1998)

<sup>7</sup> Example: "Kuroda: Yen Rise Excessive, Doesn't Reflect Fundamentals" (Dow Jones, 23/03/1999 )

<sup>8</sup> Example: "Japan MOF Vice Min Kato: Excessive Forex Volatility Undesirable" (Dow Jones, 9/06/1997)

<sup>9</sup> Example: "Recent form suggests the Bank of Japan will continue to intervene. "I think we will see more intervention," said one U.K. bank trader. " Bank of Japan intervention is an everyday occurrence these days."(Reuters, 2/03/1995)

<sup>10</sup> Almekinders and Eijffinger (1996) find that the central bank steps in the market to "calm the disorderly market". However, they take into account a volatility estimated through a GARCH model. This approach may suffer from statistical problems. That is why we prefer to take the realized volatility.

<sup>11</sup> Ito (2004) proposes to take into account the short, medium and long term deviation in the reaction function of the central bank.

Independent variables capturing inertia:

- $AR_{t-1}$ : Is an anticipative rumors the day before.
- $\pi_{t-1}$ : Is the sum of explanatory variable the day before.

### 4.3 False reports

Dependant variable (noise):

- $FR$ : False report.<sup>12</sup>

$$\begin{aligned}\pi_t = & \alpha + \omega\pi_{t-1} + \gamma_1 Coord_t + \gamma_2 Amount_t \\ & + \gamma_3 Conf_t + \beta_1 Jumps_{t-1} + \beta_2 Cvol_{t-1} + \beta_3 Jumps_{t-2} + \beta_4 Cvol_{t-2} + \delta_1 FR_{t-1}\end{aligned}$$

(4)

Independent variables capturing the degree of transparency of the central bank policy:

- $Coord$ : Is the percentage of coordinated interventions on the last interventions.<sup>13</sup>
- $Amount$ : Is the average of the amount invested on the last interventions.
- $Conf$ : Is the part of confirmed intervention on the last interventions.

Independent variables capturing the uncertainty on the market:

- $Cvol$ : Is the continuous volatility (Bi power variation).<sup>14</sup>
- $Jumps$ : Is equal to 1 if there is one significant jump at 0.999 and 0 otherwise.

Independent variable capturing the persistence:<sup>15</sup>

- $FR_{t-1}$ : Is a false reports the day before.
- $\pi_{t-1}$ : Is the sum of explanatory variable the day before.

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<sup>12</sup> "BOJ buys dlrs at around 103.95-104.00 yen in Tokyo." (Reuters, 23/05/1994)

<sup>13</sup> The average is calculated on the 4 last interventions

<sup>14</sup> The continuous volatility and the jumps are computed at 23h55 GMT. For furthers detail see Andersen and al. 2002

<sup>15</sup> The clustering of intervention during several days in a row is a well known feature of central bank interventions. Then, if market participants mistakenly detect an intervention, they are more likely to detect other false interventions in the following days.

## 5 Preliminary results

At the current state of the study, the most interesting results are obtained with some persistence in the dependent variable but none in  $\pi$ .

### False rumors

Periods with more or less transparency are approximated by three variables: (i) Conf, (ii) Amount, (iii) Coord. They should reflect whether the central bank leads an ambiguous or a transparent policy. For example, if the actual interventions are regularly confirmed by an official speech we consider the period as transparent. The three variables are highly significant (at 5%). Periods with large amounts and confirmation speeches decrease the likelihood to have false reports on the market. These results conform with our primary intuition. On the other hand, period with coordinated interventions are accompanied by more false reports. This last result is quite surprising since coordination is generally viewed as an element of transparency. One explanation could be that this type of intervention is known to be effective to move the exchange rate level. Therefore, market participants could be more sensitive to intervention signs during this period to jump rapidly on the 'bandwagon'.

Statements on fundamentals are not significant. 'Threats' of intervention, on the other hand, introduce noise with more false reports. This confirms previous findings from Gnabo and Lecourt (2005) who describe this type of statements as a way to introduce a two way risk and to disturb the market.

At least, variables on uncertainty provide mixed results. The volatility measured by the bi power variation in medium term (21 days) increases the likelihood to have false reports. Jumps the same day are also positively significant. One interpretation is that market participants associate a jump to a large trade initiated by the central bank. Results on lag jumps (1 day) remain puzzling as they reduce the probability to have a false report.

### Anticipative rumors

Elements of transparency (statements and actual interventions in a cluster) increase significantly the number of anticipative rumors. Isolated reported interventions increase also the speculation but to a lesser extent. This confirms the theoretical literature (Chiu, 2003; Gnabo and Lecourt, 2005). Results on reaction functions are highly significant. Agents react strongly to short run misalignment and to a lesser extent to medium and long term misalignment. Along with the theoretical literature, we do not find any effect of the lag realized volatility. At least, there is a strong persistence.

## 6 Conclusion

Monetary authorities try to achieve exchange rate objectives by intervening whether through actual intervention or statements. According to their objectives broadly divided by King (2002) in 'policy' and 'tactical', they may implement respectively a transparent or ambiguous intervention policy. By doing so, they attempt to have a direct effect on the exchange rate. However, these policies may, also, have indirect effect by inducing rumors, broadly 'market guesses' or 'speculation' (Chiu, 2003). Our preliminary empirical results confirm that to the extent that market participants do not have clear information about what is done or has been done, formally 'real time' and 'ex post transparency' (Enoch, 1998), they speculate on authorities activities. In that sense, false reports emerge in the market. On the other hand, providing information to the market on exchange rate target or future interventions, 'ex ante transparency' (Enoch, 1998), through intervention frequency

or statements induce anticipative rumors. The above findings underline also that a part of them are intentionally provoke by authorities as the 'Threats' when another may be just a consequence.

## References

- [1] Andersen, T. G., Bollerslev, T., Diebold, F. X. and Labys, P. 2000. 'The Distribution of Exchange Rate Volatility.' *Journal of the American Statistical Association*, 96, 42-55.
- [2] Beine, M., Benassy-Quere, A. and Lecourt, C. 2002. 'The Impact of Central Bank Interventions: New Evidence from Figarch Estimations.' *Journal of International Money and Finance*, 21: 115-144.
- [3] Beine, M., Janssen, G. and Lecourt, C. 2004b. 'Should Central Bankers Talk to the FX Market?' Working Paper.
- [4] Chang, Y. 2004. 'The Accuracy of Reports of Foreign Exchange Intervention by the Bank of Japan: Does Tokyo Know More?' Working Paper.
- [5] Chiu, P. 2003. 'Transparency Versus Constructive Ambiguity in Foreign Exchange Intervention.' BIS Working Papers No. 144.
- [6] Dauchy, E. 2001. 'The effect of Official Speeches and Central Bank Intervention Rumors on Foreign Exchange Market Forecasts.' TEAM Working Paper No 1502
- [7] Dominguez, K. 1998. 'Central Bank Intervention and Exchange Rate Volatility'. *Journal of International Money and Finance*, 17: 161-190.
- [8] Dominguez, K. and Panthaki, F. 2005. 'The influence of actual and unrequited interventions.' Mimeo University of Michigan.
- [9] Edison, H. 1993. 'The Effectiveness of Central Bank Intervention: A Survey of the Literature after 1982'. Princeton University, Special Papers in International Economics No. 18.
- [10] Enoch, C. 1998. 'Transparency in Central Bank Operations in the Foreign Exchange Market'. IMF Working Paper.
- [11] Fatum, R. and Hutchinson, M. 2002. 'ECB Foreign Exchange Intervention and the Euro: Institutional Framework, News and Intervention'. *Open Economies Review*, 13: 413-425.
- [12] Fischer, A. M. 2004. 'Reuters News Reports versus Official Interventions A Cautionary Warning.' Working Paper No. 03.06.
- [13] Fratzscher, M. 2004. 'Communication and Exchange Rate Policy.' ECB Working Papers No. 363.
- [14] Frenkel, M., Pierdzioch, C. and Stadtmann, G. 2003. 'The accuracy of press reports regarding the foreign exchange interventions of the Bank of Japan.' *Journal of International Financial Market Institutions and Money*

- [15] Gnabo, J.Y. and Lecourt, C. 2005. 'How Transparent is the Exchange Rate Policy of the Bank of Japan?' Working Paper.
- [16] Hung, J. H. 1997. 'Intervention Strategies and Exchange Rate Volatility: A Noise Trading Perspective.' *Journal of International Money and Finance* 16 (5): 779-793.
- [17] Ito, T. 2002. 'Is Foreign Exchange Intervention Effective? The Japanese Experience in the 1990's.' NBER Working Paper No. 8914.
- [18] Ito, H. and Yabu, T. 2004. 'What Prompts Japan to Intervene in the Forex Market? A New Approach to a Reaction Function.' NBER Working Paper No. 10456.
- [19] Jansen, D. and de Haan, J . 2003. 'Statements of ECB Officials and their Effect on the Level and Volatility of the Euro/Dollar Exchange Rate.' DNB Working Paper.
- [20] Kauppi, H. and Saikkonen, P. 2005.'Predicting U.S. Recession with Dynamic Binary Response Models'. Working Paper.
- [21] King, M. R. 2003. 'Effective Foreign Exchange Intervention: Matching Strategies with Objectives.' *International Finance* 6: 249-271.
- [22] Klein, M.W., 1993. 'The accuracy of reports of foreign exchange intervention.' *Journal of International Money and Finance* 12: 644-653.
- [23] Lecourt, C. and Raymond-Feingold, H. 2005. 'Central bank interventions in industrialized countries: a characterization based on survey results'. *International Journal of Finance and Economics* (forthcoming).
- [24] Neely, C. J., 2001.' The Practice of Central Bank Intervention: Looking under the Hood.' *Federal Reserve Bank of Saint-Louis Review*, 83(3).
- [25] Sarno, L. and Taylor, M. 2001. 'Official Intervention in the Foreign Exchange Market: Is it Effective and, if so, How does it Work?' *Journal of Economic Literature* 39: 839-868.