Effects of Oral Intervention on Fluctuations in Exchange Rates: Evidence from Japan 1995-2011[+]

Shun Sakata[1] and Fumiko Takeda[2*]

[1]*Economic and Social Research Institute, Cabinet Office, Government of Japan, Japan*

[2]*Department of Technology Management for Innovation, University of Tokyo, Japan*

Abstract: This paper studies the effects of oral interventions on the JPY/USD rate between 1995 and 2011. Traditionally, monetary authorities have intervened directly in foreign exchange markets. In recent years, however, actual interventions have been supplemented or supplanted by "oral interventions" to influence market expectations. In the Japanese case, monetary authorities did not directly intervene in the market from 2005 to August 2010. They conducted actual interventions only five times between 2010 and 2012, though Japan has been noted for ongoing oral intervention in recent years. Prior studies examining the impact of oral interventions provide mixed results regarding their effectiveness. Our study attempts to contribute to the literature by focusing not only on the speaker of oral interventions, but also on the content of the statements released. Using the event study methodology, we find that market participants give great credence to announcements by monetary authorities that strike a decidedly positive or negative tone about current exchange rates. In addition, market participants give great credence to statements by speakers who actually conduct exchange rate policy, including staff from the Ministry of Finance and people affiliated with the Bank of Japan.

Keywords: Exchange rate, intervention, event study, yen-dollar exchange rate, communication.

1. INTRODUCTION

Monetary authorities intervene in the foreign exchange (Forex) markets as a policy tool, aiming at influencing exchange rates to stabilize market speculation by controlling sharp fluctuations in exchange rates and assure that exchange rates move within the desired target levels. Traditionally, monetary authorities have intervened directly in Forex markets, influencing exchange rate fluctuations by actually trading currencies. In recent years, however, the actual intervention has been supplemented or supplanted by "oral intervention," in attempts to mitigate exchange rate trends by influencing market expectations through announcements by authorities (Fratzescher 2006, 2008a, 2008b; Beine *et al*. 2009). Regarding the current situation of Forex intervention in major countries, the U.S. and EU member nations have engaged in almost no market intervention since August 1995 (Figure **1**), whereas the frequency of oral interventions has risen (Figure **2**).

In contrast, Japanese authorities intervened directly in Forex markets each year from 1996 to 2004; however, from 2005 to August 2010, Japanese authorities did not directly intervene in the market. Thereafter, they performed actual interventions on September 15, 2010, March 18, 2011, August 4, 2011, October 31, 2011, and November 1-4, 2011. This frequency of intervention is considerably low compared to the interventions in the years 2003 and 2004, that is, the years immediately preceding the period of no market interventions.[1] In recent years, Japan has been noted for ongoing oral intervention (Figure **3**).

Prior studies examining the impact of oral interventions provided mixed results regarding whether the oral intervention is an effective policy tool. Recent studies employed the event study methodology, which is considered to be better at capturing the clustered nature of interventions than time-series econometric analysis, and these studies have provided mixed results on the effectiveness of oral intervention (Fratzcher 2008a; Gnabo and Teiletche 2009).

In the present study we also employed the event study methodology, and attempted to contribute to the literature in two ways. First, we focused not only on the speaker of oral interventions, but also on the content of the statement released. Prior studies have not analyzed how the effects of oral interventions may change across various information contents and titles of speakers. Our sample included a greater variety of speakers and informational content, which enabled us

*Address correspondence to this author at the Department of Technology Management for Innovation, University of Tokyo, 7-3-1, Hongo, Bunkyo-ku, Tokyo 113-8656, Japan; Tel/Fax: +81-3-3830-3614;
E-mail: takeda@tmi.t.u-tokyo.ac.jp

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JEL classification: E58; F31.

[1]Data are based on actual direct market interventions up to September 2011, as published by the Ministry of Finance on January 25, 2012.

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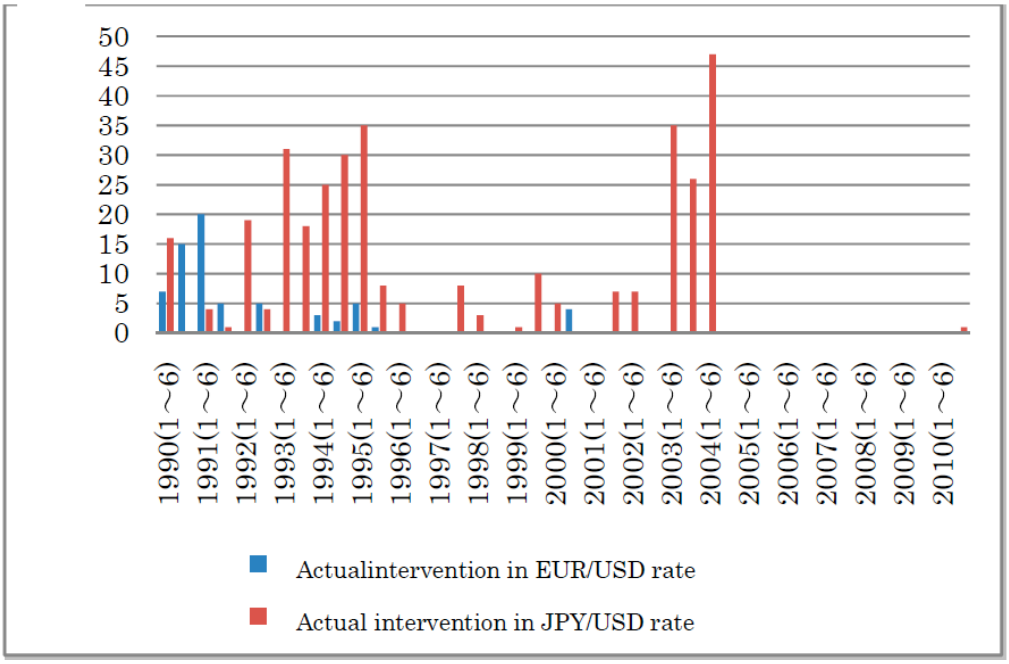

Figure 1: The number of actual interventions in JPY/USD and EUR/USD rates for Jan.-Jun. in 1990–2011.[#]

Note: This figure was compiled by the authors by taking data from Fratzscher (2008a), the U.S. FRB NY's HP, and the Japanese MoF's HP.

[#]The euro was introduced in 1999. Data before 1999 is taken from market intervention figures for the DEM/USD rate.

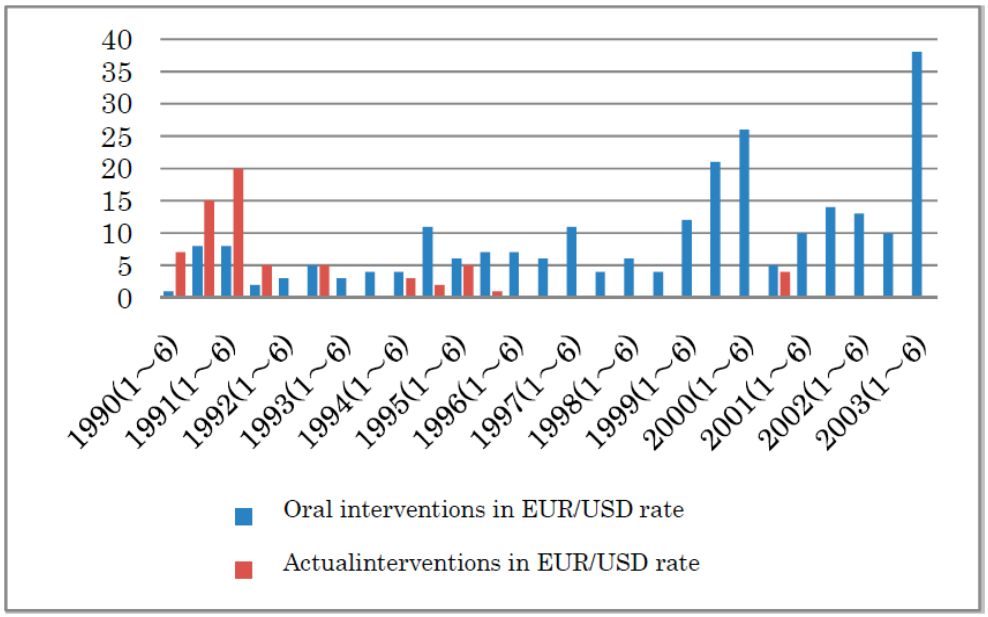

Figure 2: The number of oral and actual interventions in EUR/USD rate for Jan.-Jun. in 1990–2003.

Note: This figure was compiled by the authors by taking data from Fratzscher (2008a), the U.S. FRB NY's HP, and the Japanese MoF's HP.

to clarify what kinds of speakers and information were effective in influencing exchange rate fluctuations. Second, our sample included the period after 2004 that remains largely unanalyzed by prior studies. As explained in Section 2, Japan's intervention policy appears to have been changing over time. The inclusion of the recent period helped us to examine how the impact of oral interventions developed over time.

Specifically, we analyzed the effects of oral interventions on the Japanese yen/US dollar (JPY/USD) rate from January 1, 1995, to May 31,

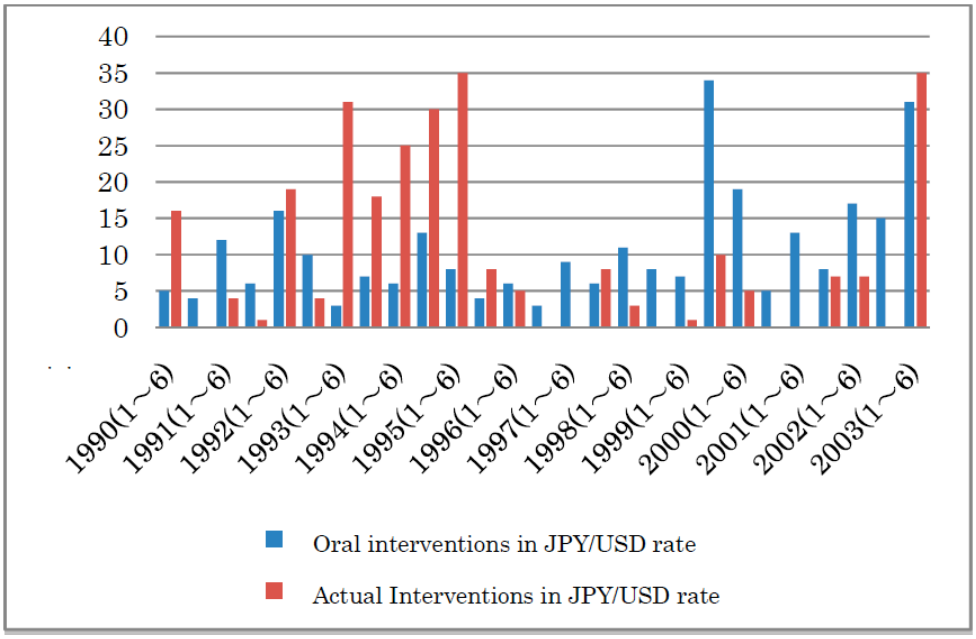

Figure 3: The number of oral and actual interventions in JPY/USD for Jan.-Jun. in 1990–2003.
Note: This figure was compiled by the authors by taking data from Fratzscher (2008a), the U.S. FRB NY's HP, and the Japanese MoF's HP.

2011. We found that market participants gave high credence to announcements by monetary authorities that struck a decidedly positive or negative tone about current exchange rates. This result is a new finding of our study, as we included a new variable regarding the speakers' attitude toward the current trend of the exchange rate, which was not examined in the prior studies. In addition, market participants appeared to give great credence to statements by speakers who actually conduct exchange rate policy, including staff from the Ministry of Finance (MoF) such as the Vice Minister of Finance for International Affairs and people affiliated with the Bank of Japan (BoJ). This result complements the result of Fratzscher (2008a), which examined the effect of announcements made only by main monetary authorities and thus did not exclude the possibility that other speakers may also have influenced the market. Our result did not support this possibility by showing that the inclusion of other speakers did not increase the effectiveness of oral interventions.

In sum, our study provides policy implication that the effect of oral interventions depend on speakers and contents. In particular, our results are consistent with the notion that oral interventions are the most effective when main monetary authorities clearly state their evaluation of the current exchange rate movements. The rest of this article is organized as follows. Section 2 provides a literature review and background information, and presents research questions. Section 3 explains the methodology and data. Section 4 discusses the empirical results. Concluding remarks are provided in Section 5.

2. LITERATURE REVIEW, BACKGROUND, AND HYPOTHESES DEVELOPMENT

2.1. Literature Review

Given the increase in the use of oral intervention in major countries, the effects of such intervention on exchange rate fluctuations have become an important research topic in the field of international finance. Theoretically, two channels connect oral interventions to the exchange rate development, the signaling channel and the coordination channel.[2] The signaling channel indicates that monetary authorities can signal private information about monetary policy through oral interventions, changing investors' expectations and behavior (Kaminsky and Lewis 1996). The coordination channel implies that oral interventions may work as a coordination device by reducing information asymmetry among investors (Sarno and Taylor 2001; Evans and Lyons 2002, 2005). Fratzscher (2008a) found that this

[2]These two channels are also associated with actual interventions. Another channel to link actual interventions to the exchange rate development is a portfolio balance channel, though this channel is not relevant in a discussion of oral interventions.

channel appears to be most relevant for oral interventions.

Among the board members of the U.S. Fed, Blinder (1998) and Bernanke (2004) supported the theoretical argument that oral intervention is an effective policy tool. The authors of many empirical studies investigated the effect of oral interventions on exchange rates, providing mixed results about whether oral intervention is an effective policy tool in favorably influencing exchange rates.

Initially, several empirical studies provided evidence to support the effectiveness of oral intervention by conducting time-series econometric analysis (Fratzscher 2006, 2008b; Beine *et al*. 2009a).[3] Fratzscher (2006) investigated the impact of oral interventions of the G3 economies based on the EGARCH model, reporting that oral intervention is effective for moving exchange rates in the desired direction for up to six months. He also found that oral interventions tend to reduce exchange rate volatility, while actual interventions are likely to increase it.

More recently, Fratzscher (2008b) examined the effects of oral interventions on JPY/USD rates and euro/US dollar (EUR/USD) rates from January 1990 to June 2003 using the EGARCH model. He showed that oral interventions influence exchange rates even without actual interventions accompanying them, and that actual interventions increased the exchange rate volatility, whereas oral interventions decreased it. He concluded that the oral intervention is an effective means of stabilizing Forex fluctuations. In addition, Beine *et al*. (2009a) investigated the impact of announcements on actual interventions in the JPY/USD rates and EUR/USD markets between 1991/1989 and 2003 based on the GARCH model. They reported that public announcements about an actual intervention to clarify its purpose and nature can have marginally favorable effects, both in terms of exchange rate level and volatility. 4

In contrast to prior studies using time-series econometric analysis, the authors of several recent studies employed the event study methodology to examine the effect of oral intervention (Fratzcher 2008a; Gnabo and Teiletche 2009). This methodology is considered to be better at capturing the clustered nature of interventions. Fratzcher (2008a) investigated the effects of oral intervention on JPY/USD and EUR/USD rates[4] from January 1990 to June 2003 by using the event study methodology.[5] Reviewing statements from Japan's Minister of Finance and Vice Minister of Finance for International Affairs, and the Governor and Deputy Governors of the BoJ, he concluded that the probability of successful intervention is more than 90% in terms of controlling exchange rate fluctuations, thus regarding oral interventions as an effective means of manipulating exchange rates in the desired direction.

In addition, Gnabo and Teiletche (2009) compared the effectiveness of several instruments for interventions by estimating the JPD/USD market responses to different types of intervention by the BoJ between 1992 and 2004. They found that transparent policies in both actual and oral interventions appeared to be the most effective.

Although the above studies supported the effectiveness of oral intervention, Jansen and de Hann (2007) provided little evidence that oral interventions can manipulate exchange rates as expected by monetary authorities. By using the event study methodology, they reported that oral interventions made by European monetary authorities during the period between 1999 and 2003 produced small and short-lived effects.

2.2. Forex Intervention in Japan

In this subsection, we explain the development of actual and oral interventions by the Japanese monetary authorities from January 1995 to June 2011. Detailed data about actual interventions is obtained from the MoF's home page (HP),[6] while data concerning oral interventions were constructed for this research, as explained in Section 3.

Figure **4** shows the number of actual interventions per year, while Figure **5** presents the value of actual interventions per year. Interventions during this period primarily involved selling JPY and buying USD, with a few exceptions. The dates and amounts of these exceptions were December 17, 18, and 19, 1996

[3]Time-series econometric analysis is also used to investigate the effectiveness of actual interventions (Fatum and Hutchison 1999; Watanabe and Harada 2006).

[4]Data for the period preceding the introduction of the euro are substituted using the DEM/USD rates.

[5]The event study methodology is also used to investigate the effectiveness of actual interventions (Fatum and Hutchison 2003, 2006; Morel and Teiletche 2008).

[6]http://www.mof.go.jp/international_policy/reference/feio/index.htm.

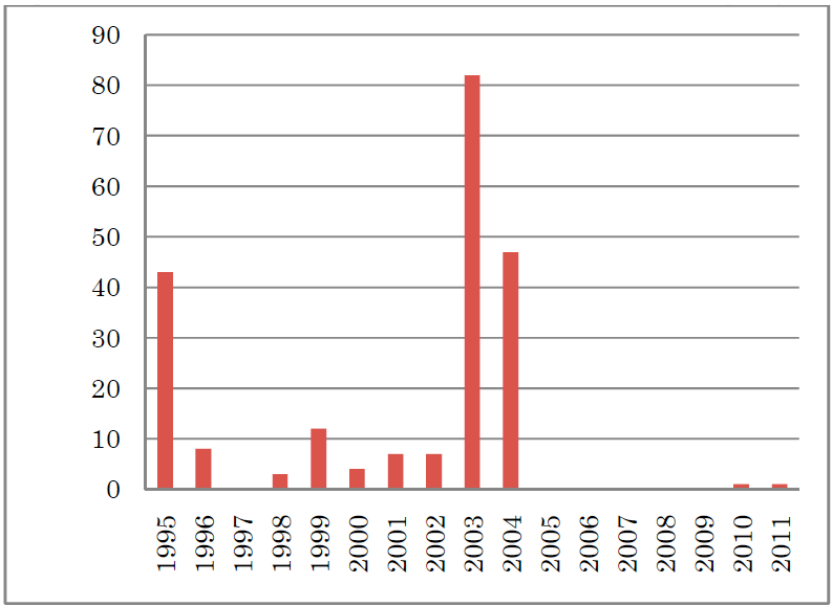

Figure 4: The number of actual interventions in JPY/USD per year.
Note: This figure was compiled by the authors by taking data from the Japanese MoF's HP.

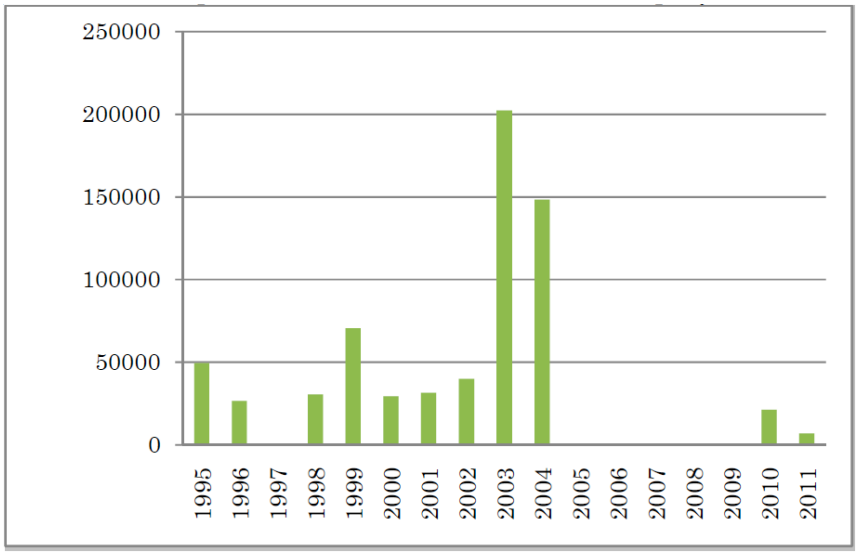

Figure 5: Amounts spent on actual interventions in JPY/USD per year (Y 100 mil).
Note: This figure was compiled by the authors by taking data from the MoF's HP.

(¥1,059.1 billion); April 9 and 10, 1998 (¥2,815.8 billion); and June 17, 1998 (¥231.2 billion).

The implementation of actual interventions is considered to be largely influenced by the attitude of the International Finance Bureau at the MoF, the position responsible for the execution of Forex interventions, in particular, the proactive attitudes of Eisuke Sakakibara, who was appointed to head the International Finance Bureau in 1995 (Ito 2002). From January 15, 2003, to March 16, 2004, the Japanese monetary authorities intermittently intervened in the market. Compared to other years, the frequency of implementation and the amounts involved were on a grand scale, which caused people to name this time the "Great Intervention in Heisei period" (Taylor 2006).

For approximately the next 6 years, the Japanese monetary authorities did not conduct actual interventions. Thereafter, they performed actual interventions on September 15, 2010, March 18, 2011, August 4, 2011, October 31, 2011, and November 1-4, 2011. The second intervention was conducted as part of the first globally coordinated attempt after ten and a

half years to counteract the appreciation of the yen following the Great East Japan Earthquake on March 11, 2011.

2.3. Research Questions

As discussed in subsection 2.1., prior studies provided mixed results about the efficacy of oral intervention on exchange rate developments. In the present study, we examined the most recent evidence on the effect of oral interventions to clarify whether, in reality, it is an effective policy tool, and, if so, what content of information communicated to markets is effective. Accordingly, we set the following two research questions (RQ):

RQ 1: Can oral intervention influence exchange rate fluctuations?

RQ 2: What type of information enhances the effect of oral intervention?

To investigate these questions, we focused on oral interventions regarding JPY/USD rates from January 1, 1995, to May 31, 2011. We used the event study approach, which is considered to be better for capturing the clustered nature of interventions, because oral interventions are conducted when monetary authorities recognize exchange rate problems (Fratzcher 2006, 2008a).

Our analysis contributes to the related literature in two ways. First, we focused not only on the speakers of oral interventions, but also on the content of the statements released. Prior studies have not analyzed how the effects of oral interventions may change across various information contents and titles of speakers. In fact, many previous studies restricted their definition of oral interventions to statements by a limited group of authorities. For example, Fratzscher (2008a), who used the same analytical approach as ours, examined only five speakers as instigators of oral interventions in Japan—the Minister of Finance, the Vice Minister of Finance for International Affairs, the Governor of the BoJ, and two Deputy Governors of the BoJ. In contrast, our sample included other speakers who were considered to have the ability to influence exchange rates. These speakers included the Minister of Finance as well as other Japanese officials, foreign officials, and representatives of international institutions.

We also attempted to examine what type of information makes oral interventions more effective. Our sample included a greater variety of intervention texts than did prior studies, ranging from expressions such as “watch the market closely” to statements enumerating specific values for exchange rates. We then examined how the effects of oral interventions varied across different information content to clarify effective information content that influenced exchange rate fluctuations.

Another difference between the present study and previous studies was that we drew on data from a period that remained largely unanalyzed. Many studies have investigated the effect of oral interventions using the data that ended with the first half of 2004, which corresponds to the period of the so-called Great Intervention. Instead, we examined the period after the Great Intervention, when Japanese monetary authorities withdrew from intervening directly in markets and relied solely on oral intervention for six years. However, Japan resumed actual interventions on September 15, 2010, though the number of interventions has been lower than in previous years.

Our examination showed that the attitudes of the Japanese monetary authorities appeared to be changing over time from the Great Intervention period, when authorities conducted aggressive actual intervention, to the in-between period, when they conducted only oral interventions, and the current period in which they conduct oral intervention alongside market intervention. By analyzing post-2004 data, we can compare attitudes of Japanese monetary authorities toward exchange rate policy.

3. METHODOLOGY AND DATA

Following Fratzscher (2008a) and Gnabo and Teiletche (2009), we employed the event study methodology for two reasons. First, an oral intervention can be identified easily as an “event.” Oral interventions are generally clustered, and therefore if a problem related to the Forex market arises, this clustering makes it easy to differentiate periods when oral intervention occurs from periods when it does not (Fratzscher 2008a). By comparing the periods, we analyzed the effect of oral intervention. Second, Forex rates are influenced by numerous factors. By specifying a brief event window of a few days following each oral intervention, we can minimize the effects of other news on exchange rate actions. For example, when analyzing the effect of oral intervention, if we observe Forex fluctuations over a ten-day window, it is difficult to filter the effects that events other than oral

intervention have on the exchange rate. However, in event study, it is possible to analyze by filtering out as many effects on events as possible other than those that are the subjects of analysis.

On the other hand, we acknowledge the possibility that the event study approach presents drawbacks in the study of oral interventions. For example, multiple statements during an oral intervention period are conjoined as a single event, rendering us unable to analyze the effect of an individual statement on exchange rates. Furthermore, an intervention period may include statements of substantially different natures. In such a case, their respective effects may neutralize one another, giving the impression that there are no oral intervention effects.[7]

Following Fratzscher (2008a), we regarded the oral intervention as an event, and compared the impact on exchange rates during periods of intervention with that during periods of no intervention. To do so, we conducted two analyses, explained in subsections 3.2 and 3.3. In the first analysis (Analysis 1) we defined the success or failure of oral intervention by measuring whether it met certain criteria. Here we were unconcerned about the degree of success or failure, or the extent of its success or failure compared to the criteria, but instead we were interested only in whether the oral intervention succeeded or failed. Based on these settings, we conducted sign testing. In the second analysis (Analysis 2) we constructed a dummy variable, which took 1 if the oral intervention was successful, and 0 otherwise. Using this variable as a dependent variable, we introduced a binary choice model and conducted a logit analysis.

3.1. Sample Selection

To obtain data and construct our sample regarding oral interventions, we followed Fratzscher (2008a). Oral interventions consist of statements about the exchange rate made by monetary authorities, mainly reported to market participants through media such as newswire services on the internet, articles in newspapers, and so on. In the present study, we chose the newswire services on the internet, for which the time lag between the moment the speaker made statements and the moment these statements were delivered to market participants is considered to be short. Therefore, the statement is likely to affect the exchange rate on the day the statement is reported.

We chose the newswire service *Reuters Japanese News* as a source of statements by monetary authorities. This service has been used by many market participants and researchers studying oral interventions (Fratzscher 2008a; Gnabo and Teiletche 2009). We extracted the *Reuters Japanese News* from *Factiva.com*, a web database about economics and business. We collected statements by monetary authorities as well as those that can influence the exchange rate, by using two kinds of keyword, those related to exchange rates, such as exchange rate, strengthening the yen or dollar, and weakening the yen or dollar, and those relevant to people who make intervention statements. In particular, we selected statements including the following keywords: Vice Minister of Finance for International Affairs, Administrative Vice Minister of Finance, Minister of Finance, the MoF, the BoJ, Governor of the BoJ, Executive Director of the BoJ, Prime Minister, Federal Reserve Board (FRB), Secretary of Treasury, and the U.S. Department of Treasury.

Monetary authorities make intervention statements when they are concerned about the trend of the exchange rate, and so they tend to repeat the announcements until they think that the exchange rate has moved within a satisfactory range. This means that these statements are made within a few consecutive days, followed by days when no monetary authorities make any announcements. Therefore, oral interventions should be defined as groups of statements made within a few days. A detail of the definition is that the statements announced within a 5-day period are considered as a part of the same oral intervention, expressed as IO_i in Figure **6**. Based on this definition, every statement was classified as a part of an oral intervention. We named the sample constructed through the above process '5days.' Likewise, the sample named '3days,' whose interval between statements was 3 days, was constructed to guarantee robustness of this research.

We classified statements by their information content and speakers, based on the following 14 points. The description of dummy variables corresponding to these points is presented in subsection 3.3.

[7]Although this is an important issue, we assumed that oral intervention involves a cluster of statements that reflect similar intentions, following Fratzscher (2008a). By doing so, we emphasized their collective nature rather than the nature of individual statements.

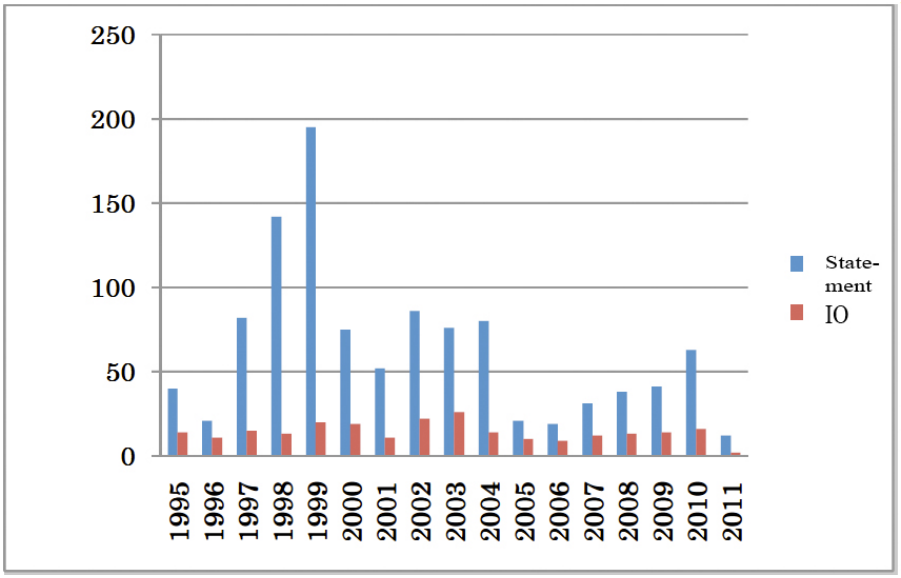

Figure 6: The number of statements and oral interventions in JPY/USD by monetary authorities.
Notes: 1. This figure was compiled by the authors.
2. "IO" denotes oral intervention as defined in Section 3.

Point 1: Direction

This point is related to the direction of oral interventions, i.e., whether the speaker announced the statement with the goal of appreciating yen (depreciate dollar) or depreciating yen (appreciating the dollar). If the speaker's intention cannot be determined, the statement is labeled as an ambiguous one. We set the dummy variable *direction* to investigate whether the statements with a clear direction of the exchange rate are likely to affect the exchange rate movement.

Point 2: Specific Rate

This point is associated with the target rate, i.e., whether the statement includes specific information about the exchange rate. For example, on July 14, 2002, the Minister of Finance, Masajyuro Shiokawa, stated that the desirable JPN/USD rate was 125-130. We set the dummy variable *specific_rate* to examine whether the statement with a target rate tends to influence the exchange rate development.

Point 3: IA-Announcement

Oral interventions are sometimes accompanied by actual interventions. We set the dummy variable *IA-announcement* to examine whether announcements on actual interventions can influence the expectations of market participants.

Point 4: Suggestion

The monetary authorities sometimes bring pressure on market participants by suggesting the possibility of actual interventions in the future. We set the dummy variable *suggestion* to investigate whether such threatening really affects the exchange rate.

Point 5: No-Comment

When monetary authorities are asked for their comments about the possibility of future actual interventions, they often just answer "no comment" and do not send any meaningful message. We set the dummy variable *no-comment* to analyze whether the expression 'no comment' affects the exchange rate.

Point 6: Watching

Similar to Points 4 and 5, we set the dummy variable *watching* to examine whether the typical expression in oral interventions, 'watching the trend of the exchange rate carefully,' affects the exchange rate development.

Point 7: Attitude

The monetary authorities' attitude toward the current trend or the value of the exchange rate can be important information for market participants to predict a prospective exchange policy. We set the dummy variable *attitude* to investigate whether the policy maker's attitude toward the current exchange rate affects the exchange rate fluctuations.

Point 8: Coordination

In general, a coordinated intervention is considered to be more effective than a unilateral one. In other

words, oral intervention is more effective when it is carried out under international cooperation. We set the dummy variable *coordination* to analyze whether a suggestion about future international cooperation affects the exchange rate development.

Points 9~14: Speakers

To examine whether the speaker's position affects the exchange rate movement, we set the following dummy variables: *vice_minister*, *minister*, *MoF_members*, *BoJ*, *Japanese*, and *International* for the Vice Minister of Finance for International Affairs, the Minister of Finance, the other members of the MoF, members of the BoJ, the other Japanese officials, and foreigners or international institutions, respectively.

By checking the above 14 points, we were able to classify the characteristics of each statement and each speaker. Based on these classifications, we determined the nature of each oral intervention, which is a group of several statements in a couple of days. For Points 1, 4, 5, 6, and 7, the nature of oral interventions was determined by the majority of characteristics within 5 or 3 days. For instance, if IO_i includes 10 statements, of which 6 statements have '1' for Point 1 and the other 4 have '-1,' we regarded Point 1 of IO_i as '1.' Likewise, for Points 2, 3, 8, 9, 10, 11, 12, 13, and 14, if at least one statement contains '1' for any of these points, we regarded the statement as containing '1' for those points of this oral intervention, and if no statement contained a '1,' we regarded the statement as containing '0' for those point.

In addition to the data regarding oral interventions, we needed a daily exchange rate for analysis. We used the daily yen-dollar rate at 17:00 in the Tokyo market, which was collected from the *Nikkei NEEDS Financial Quest*. If the Tokyo market was closed on the event day, we used the rate of the previous day.

3.2. Analysis1: Univariate Analysis

In the present study we analyzed whether oral interventions can influence the exchange rate as the monetary authorities hope. First, we set a standard for the success/failure of oral interventions. Fratzscher (2008a) compared the direction of the oral intervention hoped for by the speaker to the actual exchange rate movement before/during/after the oral intervention. In the present study, we employed *direction* as the variable representing the direction of the oral intervention hoped for by the speaker (Figure **7**).

Let IO_i be the oral intervention *i*. We denoted R_{-0} as the exchange rate of the day when the first statement was announced among other statements that belong to IO_i and R_{+0} as the exchange rate of the day when the last statement in IO_i was made. If only one statement was found in IO_i for R_{-0}, we employed the exchange rate of the day before IO_i. We also denoted R_{-5} as the exchange rate of the 5th day before the first statement was announced, and R_{+5} as the exchange rate of the 5th day after the last statement was announced. Thus, the change of the exchange rate before/during/after IO_i is expressed as follows:

$$\begin{aligned} \Delta S_{before} &= R_{-0} - R_{-5}, \\ \Delta S_{during} &= R_{\pm 0} - R_{-0}, \\ \Delta S_{post} &= R_{+5} - R_{+0}. \end{aligned} \tag{1}$$

Note that the positive (negative) difference Δ means depreciation (appreciation) of the yen.

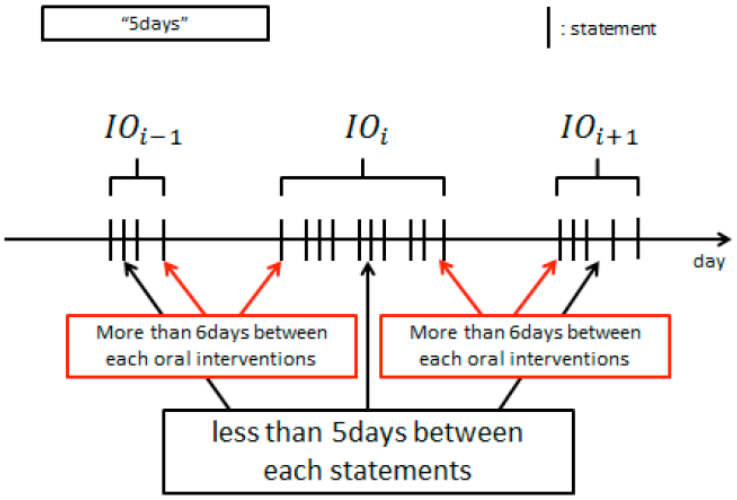

Figure 6: The structure of oral interventions.

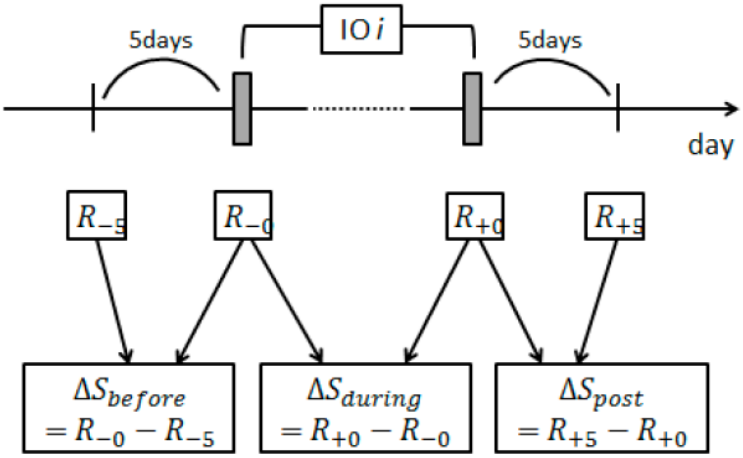

Figure 7: The exchange rate before/during/after oral interventions.

Using the above indices, we next set 4 standards of success/failure of oral interventions based on the four questions (Q1-Q4) described below. The success/failure of IO_i is expressed as a dummy variable Q_j (j=1, 2, 3, 4), as follows:

$$\mathrm{Q_j}\begin{cases}1:\text{'success' if } IO_i \text{ fulfilles } \mathrm{Q_j}\\ 0:\text{'failure' otherwise}\end{cases} \quad (2)$$

The details of four standards/questions (Q1-Q4) are as follows:

Q1: Did oral interventions move the exchange rate toward the direction the speaker hoped for during the interventions?

$$\left(\Delta S_{during} > 0, \text{direction} = 1\right) \text{ or } (\Delta S_{during} < 0, \text{direction} = -1) \quad (3)$$

Q2: Did oral interventions move the exchange rate toward the direction the speaker hoped for after the interventions?

$$\left(\Delta S_{post} > 0, \text{direction} = 1\right) \text{ or } (\Delta S_{post} < 0, \text{direction} = -1) \quad (4)$$

Q3: Did oral interventions reverse the direction of the exchange rate after the interventions?

$$\begin{aligned}&(\Delta S_{post} > 0, \text{direction} = 1 \; iff \; \Delta S_{before} < 0)\\ &\quad or(\Delta S_{post} < 0, \text{direction} = -1 \; iff \; \Delta S_{before} > 0)\end{aligned} \quad (5)$$

Q4: Did oral interventions manage to smooth the change of the exchange rate?

$$\begin{aligned}&(\Delta S_{post} > \Delta S_{before}, \text{direction} = 1 \; iff \; \Delta S_{before} < 0)\\ &\quad or(\Delta S_{post} < \Delta S_{before}, \text{direction} = -1 \; iff \; \Delta S_{before} > 0)\end{aligned} \quad (6)$$

Note that *direction* includes the category 'ambiguous.' To handle this category, we constructed two samples: the first one excludes 'ambiguous' intervention; and the other one regards 'ambiguous' intervention as 'depreciating the yen,' because the number of oral interventions against the rising of yen value appears to exceed the number of oral interventions for the other reasons.

We then conducted a statistical test. Denoting n_+ as the total number of 'successful' oral interventions, the probability of the successful oral intervention can be expressed as

$$P_{success} = n_+ / N \quad (7)$$

We then conducted a sign test to examine whether oral interventions fulfilled each standard, as follows:

n_+ ~ binominal (n, P=0.5) (8)

3.3. Analysis 2: Logit Analysis

In the second analysis we investigated what forms of oral intervention are most effective by using logit analysis. The variables used to capture the forms of oral interventions correspond to the dummy variables capturing Points 1~14. Specifically, we estimated the following logit model. For the oral intervention i and each standard, Q-j. (j=1, 2, 3, 4),

$$\begin{aligned}y_i = {} & \alpha + \beta \times \frac{IO_i}{DAY_i} + \beta_2 \times \log(amount)_i + \beta_3 \times PPP_i + \beta_4 \times volatility(level)_i\\ & + \beta_5 \times direction_i + \beta_6 \times specific_{rate\,i} + \beta_7 \times IA_{announcement\,i} + \beta_8 \times suggestion_i\\ & + \beta_9 \times no_{comment\,i} + \beta_{10} \times watching_i + \beta_{11} \times attitude_i + \beta_{12} \times coordination_i\\ & + \beta_{13} \times vice_{minister\,i} + \beta_{14} \times minister_i + \beta_{15} \times MoF_{member\,i}\\ & + \beta_{16} \times BoJ_i + \beta_{17} \times Japanese_i + \beta_{18} \times International_i + \varepsilon_i\end{aligned} \quad (9)$$

where y_i is an indicator variable that takes 1 if IO_i fulfills the standard Q_j, and 0 otherwise. α_i is a constant term,

β_k is a coefficient for each explanatory variable, and ε_i is an error term.

Independent variables contain both target and control variables. The descriptions of control variables are as follows:

IO/DAY = the number of statements announced during IO_i per the number of days of IO_i.

log(amount) = the logarithm of the total amount of actual interventions implemented during IO_i if actual interventions were carried out during IO_i. If there were no actual interventions, this variable takes zero.

PPP = the medium of the absolute values of the difference between the daily exchange rate in IO_i and the monthly purchasing power parity based on export price indices of Japan and the U.S.[8]

volatility(level) = the medium of the absolute values of the difference between the daily exchange rate in IO_i and the medium of the exchange rates over 14 days prior to the oral intervention.

The descriptions of variables representing information content and speakers of the oral interventions are as follows:

direction = a dummy variable corresponding to Point 1, which takes 1 if the speaker wanted to depreciate yen, 0 if the speaker's intention is ambiguous, and -1 if the speaker wanted to appreciate the yen.

specific_rate = a dummy variable corresponding to Point 2, which takes 1 if the statement included specific information about the exchange rate, and 0 otherwise.

IA_announcement = a dummy variable corresponding to Point 3, which takes 1 if the statement included information about actual interventions, and 0 otherwise.

suggestion = a dummy variable corresponding to Point 4, which takes 1 if the statement included a suggestion about a future actual intervention, and 0 otherwise.

no_comment = a dummy variable corresponding to Point 5, which takes 1 if the statement included the expression 'no comment,' and 0 otherwise.

watching = a dummy variable corresponding to Point 6, which takes 1 if the statement included the expression 'watching the exchange rate movement,' and 0 otherwise.

attitude = a dummy variable corresponding to Point 7, which takes 1 if the statement was positive about the current exchange rate, 0 if it was ambiguous, and -1 if it was negative.

coordination = a dummy variable corresponding to Point 8, which takes 1 if international coordination was suggested, and 0 otherwise.

vice minister = a dummy variable corresponding to Point 9, which takes 1 if the statement was announced by the Vice Minister of Finance for International Affairs, and 0 otherwise.

minister = a dummy variable corresponding to Point 10, which takes 1 if the statement was announced by the Minister of Finance, and 0 otherwise.

MoF_member = a dummy variable corresponding to Point 11, which takes 1 if the statement was announced by members of the MoF except the Vice Minister of Finance for International Affairs and the Minister of Finance, and 0 otherwise.

BoJ = a dummy variable corresponding to Point 12, which takes 1 if the statement was announced by members of the BoJ, and 0 otherwise.

Japanese = a dummy variable corresponding to Point 13, which takes 1 if the statement was announced by the Japanese official other than the MoF and BoJ members, and 0 otherwise.

International = a dummy variable corresponding to Point 14, which takes 1 if the statement was announced by a foreigner or international institution, and 0 otherwise.

4. EMPIRICAL RESULTS

4.1. Analysis1: Success/Failure of Oral Interventions

Table **1** and Figure **8** present the number of statements and oral interventions about the JPN/USD rate implemented from Jan 1, 1995, to May 31, 2011.[9] Panels A and B provide the results for the '5days' sample, while Panels C and D show the '3days' sample. With regard to handling with the item 'ambiguous' for direction, Panels A and C classify 'ambiguous' as 'weakening yen,' while Panels B and D exclude 'ambiguous.'

The total number of statements was 1,074. Among them, the number of statements with 'ambiguous' direction in Point 1 was 318, which corresponds to the difference in total number between Panels A & C and Panels B & D. The number of statements was the

[8]To calculate this variable, we needed monthly export price indexes in Japan and the U.S. The Japanese export price index was obtained from the BoJ, and the American export price index was obtained from the U.S. Department of Labor. Because PPP_i is a monthly variable, when the IO_i was carried across two months, we took the weighted average of the PPP_i based on the number of days for the oral intervention between two months.

[9]As explained in Section 3, the difference between the number of statements and the number of oral interventions indicates that a single oral intervention involved numerous statements to the market.

Table 1: The Number of Statements and Oral Interventions

year	Panel A: Sample based on '5days' intervals with 'ambiguous' direction				
	No. statements	IO (5days)			w/ IA
	of statements	Total	Depreciation	Appreciation	
1995	40	14	14	0	7
1996	21	11	11	0	0
1997	82	15	6	9	0
1998	142	13	0	13	2
1999	195	20	18	2	5
2000	75	19	18	1	2
2001	52	11	7	4	2
2002	86	22	20	2	2
2003	76	26	26	0	16
2004	80	14	14	0	3
2005	21	10	10	0	0
2006	19	9	7	2	0
2007	31	12	12	0	0
2008	38	13	13	0	0
2009	41	14	12	2	0
2010	63	16	16	0	1
2011	12	2	2	0	1
total	1,074	241	206	35	41
Panel B: Sample based on '5days' intervals without 'ambiguous' direction					
year	No. statements	IO (5days)			w/ IA
	of statements	Total	Depreciation	Appreciation	
1995	24	13	13	0	9
1996	11	6	5	1	0
1997	50	13	2	11	0
1998	119	15	0	15	2
1999	152	21	20	1	6
2000	67	19	17	2	3
2001	45	13	8	5	2
2002	71	21	19	2	3
2003	59	23	23	0	14
2004	44	16	14	2	6
2005	6	4	4	0	0
2006	5	3	0	3	0
2007	17	9	9	0	0
2008	20	9	9	0	0
2009	22	11	9	2	0
2010	34	16	16	0	1
2011	10	2	2	0	1
total	756	214	170	44	47

(Table 1). Continued.

Panel C: Sample based on '3days' intervals with 'ambiguous' direction					
year	No. statements	IO (3days)			w/ IA
	of statements	Total	Depreciation	Appreciation	
1995	40	20	20	0	9
1996	21	16	15	1	0
1997	82	21	7	14	0
1998	142	25	0	25	2
1999	195	33	31	2	6
2000	75	25	22	3	4
2001	52	21	17	4	2
2002	86	30	28	2	3
2003	76	29	29	0	16
2004	80	24	22	2	9
2005	21	11	11	0	0
2006	19	10	8	2	0
2007	31	15	15	0	0
2008	38	13	13	0	0
2009	41	18	16	2	0
2010	63	26	26	0	1
2011	12	3	3	0	1
total	1,074	340	283	57	53
Panel D: Sample based on '3days' intervals without 'ambiguous' direction					
year	No. statements	IO (3days)			w/ IA
	of statements	Total	Depreciation	Appreciation	
1995	24	17	17	0	11
1996	11	10	9	1	0
1997	50	19	4	15	0
1998	119	26	0	26	2
1999	152	34	33	1	7
2000	67	23	21	2	3
2001	45	21	16	5	2
2002	71	28	26	2	3
2003	59	28	28	0	15
2004	44	20	18	2	9
2005	6	4	4	0	0
2006	5	3	1	2	0
2007	17	10	10	0	0
2008	20	9	9	0	0
2009	22	14	11	3	0
2010	34	20	20	0	1
2011	10	3	3	0	1
total	756	289	230	59	54

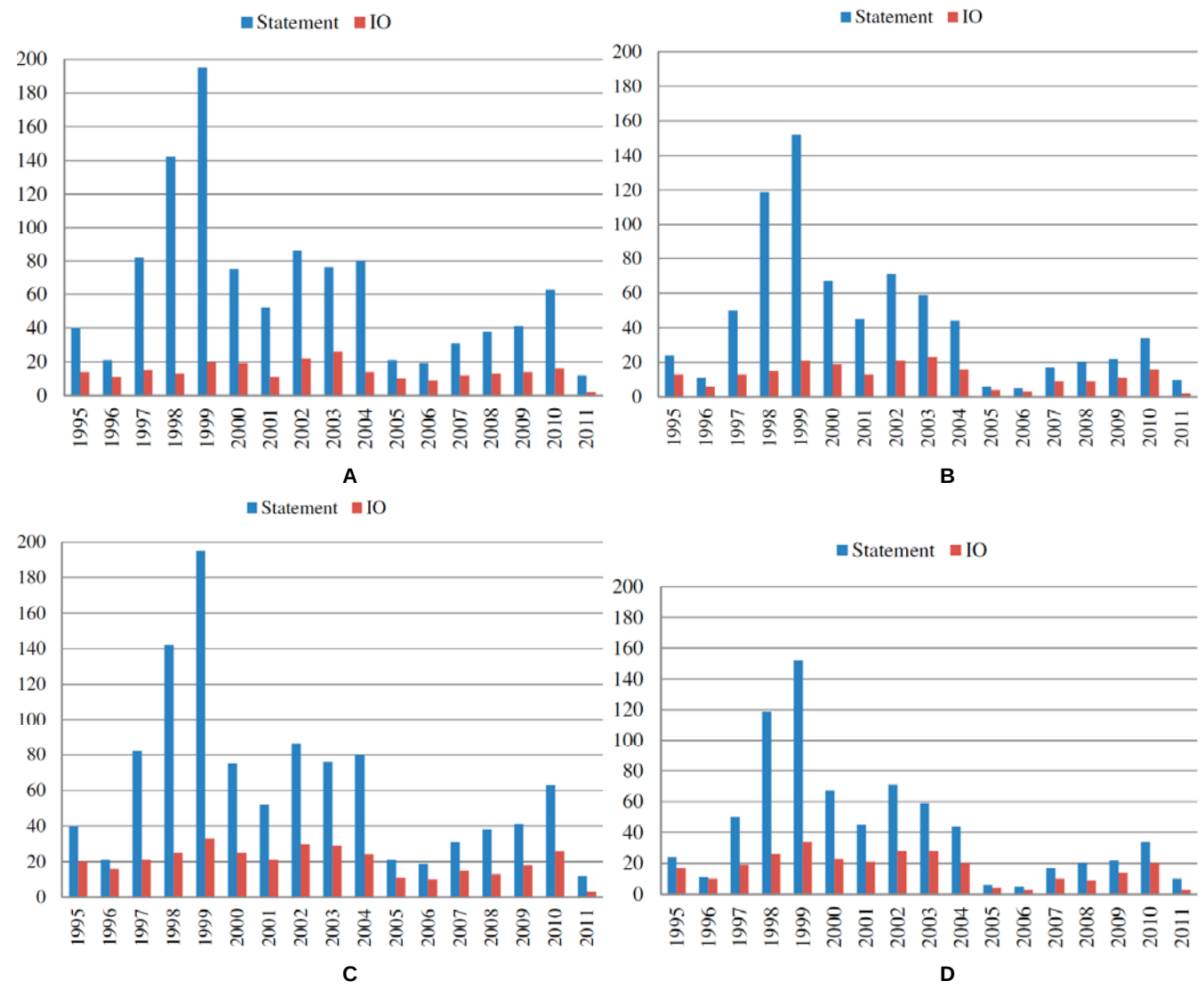

Figure 8: A: The number of statements and oral interventions for Panel **A**.
Notes: 1. This figure was compiled by the authors.
2. "IO" denotes oral intervention as defined in Section 3.
B: The number of statements and oral interventions for Panel **B**.
Notes: 1. This figure was compiled by the authors.
2. "IO" denotes oral intervention as defined in Section 3.
C: The number of statements and oral interventions for Panel **C**.
Notes: 1. This figure was compiled by the authors.
2. "IO" denotes oral intervention as defined in Section 3.
D: The number of statements and oral interventions for Panel **D**.
Notes: 1. This figure was compiled by the authors.
2. "IO" denotes oral intervention as defined in Section 3.

largest in 1998-1999. In particular, the number of statements in 1999 was twice as many as in other years. The number of statements decreased after 2004 but increased again from 2006 to 2010.

After taking 5-day intervals or 3-day intervals between oral interventions, the total numbers of oral interventions were 241, 214, 340, and 289 in Panels A to D, respectively. We noted that for all tables the number of oral interventions aiming for depreciation of the yen was more than four times as many as that aiming for appreciation of the yen. By years, there were more oral interventions for depreciating yen than ones for appreciating yen for all years except 1997 and 1998. In addition, there were no oral interventions with actual interventions in 1996, 1997, and 2005-2009. We

noted that there were also many oral interventions in 2003, the period of the so-called Great Intervention.

Table **2** presents the results of the sign test in Analysis 1. For all panels, without actual interventions (Q1-Q4), the probability of success in oral interventions was not different from zero for any standards except Q1 in Panel D. With actual interventions (w/IA), the probability of success became significant for Q4 in all panels but remained insignificant for the other standards (Q1 to Q3). These results were consistent with the notion that the oral interventions alone on JPN/USD rates tended to fail to change the rates as the monetary authorities had hoped they would, while they were likely to smooth the change of the rates when they were accompanied by actual interventions.

Table **3** compares our results in Panel A to those in Fraztscher (2008a), which shows significantly positive probabilities of success for three standards (Q2 to Q4). In addition, the probability of successful intervention (P_success) was lower in Panel A than that in Fraztscher (2008a). What made this difference? One possible answer is the fact that our sample included more varieties of statements than did Fratzscher's sample. Fratzscher (2008a) considered the statements announced by only 5 speakers, including the Vice Minister of Finance for Foreign Affairs, the Minister of Finance, the Governor of the BoJ, and the two Deputy Governors of the BoJ. In contrast, we considered statements by those speakers as well as statements by other members of the MoF and the BoJ, such as the Director-General of the International Bureau of the MoF. This may have caused non-trivial differences in the results, because there were many statements announced by speakers other than the 5 examined by Fratzscher. For example, the total number of oral interventions in Panel A of Table **1** is 241. Among them, 122 oral interventions were conducted by members of the MoF other than the Minister or the Vice Minister of Finance for Foreign Affairs, and 47 were by Japanese officials other than the members in the MoF or the BoJ. In other words, because our sample may have included statements by officials in less important positions, the probability of successful intervention became lower in the present study than in Fratzscher (2008a).

Furthermore, our sample included unclear statements such as 67 statements including the phrase "watching the trend of the rate carefully" as well as 72 statements in which the direction the speaker hoped to

Table 2: The Probability of Success/Failure of Oral Interventions

Panel A	Psuccess	p-value	Panel C	Psuccess	p-value
Q1	44.8	0.953	Q1	47.6	0.822
Q2	51.5	0.350	Q2	53.2	0.127
Q3	29.0	1.000	Q3	30.6	1.000
Q4	50.6	0.449	Q4	52.1	0.240
Q1(w/IA)	46.3	0.734	Q1(w/IA)	39.6	0.951
Q2(w/IA)	53.7	0.378	Q2(w/IA)	49.1	0.608
Q3(w/IA)	36.6	0.970	Q3(w/IA)	26.4	1.000
Q4(w/IA)	73.2	0.002***	Q4(w/IA)	62.3	0.049**
Panel B	**Psuccess**	**p-value**	**Panel D**	**Psuccess**	**p-value**
Q1	47.2	0.813	Q1	55.7	0.030**
Q2	53.3	0.187	Q2	51.9	0.278
Q3	32.2	1.000	Q3	30.4	1.000
Q4	52.3	0.269	Q4	51.2	0.362
Q1(w/IA)	41.3	0.908	Q1(w/IA)	56.9	0.201
Q2(w/IA)	50.0	0.559	Q2(w/IA)	39.2	0.954
Q3(w/IA)	32.6	0.994	Q3(w/IA)	27.5	1.000
Q4(w/IA)	60.9	0.092	Q4(w/IA)	62.7	0.046**

Note: ***, **, *: the significance at the 1%, 5%, and 10% levels, respectively.

Table 3: Comparison between Panel A of Table 2 and Fratzscher (2008a)

Panel A of Table 2	**Q1**	**Q2**	**Q3**	**Q4**
Psucccess [%]	44.8	51.5	29.0	50.6
p-value	0.953	0.350	1.000	0.449
Fratzscher (2008a)	**Q1**	**Q2**	**Q3**	**Q4**
Psucccess [%]	56.5	65.2	65.9	90.9
p-value	0.168	0.010	0.030	0.001

move the exchange rate was ambiguous, in Panels 2 and 4. Although it is not known whether these unclear statements were included or excluded in Fratzscher (2008a), if they were excluded, our inclusion of these statements may have decreased the probability of successful intervention.

4.2. Analysis 2: Logit Analysis

Table **4** presents the results of Analysis 2, the object of which was to examine what kind of information and speakers enhance the effectiveness of oral interventions. We examined only Q1 and Q4 by using the sample including 'ambiguous' for *direction*, because Q2 and Q3 did not provide significant results in Analysis 1.

For Q1, *attitude* had significantly positive coefficients at the 1% level for both '5days' and '3day' samples. This result was consistent with the notion that positive comments on the current exchange rate by monetary authorities tended to increase the probability

Table 4: Logit Regression Results for Determinants of the Probability of Successful Intervention

	Q1				**Q4**			
	5days		**3days**		**5days**		**3days**	
	coefficient	**t-value**	**coefficient**	**t-value**	**coefficient**	**t-value**	**coefficient**	**t-value**
Constant	-0.137	-0.226	0.674	1.448	-1.080	-1.716*	-1.209	-2.418**
IO/DAY	0.030	0.082	-0.092	-0.338	-0.212	-0.580	0.568	1.873*
log(amount)	0.076	0.634	-0.051	-0.533	0.239	1.967**	0.079	0.787
PPP	-0.037	-2.042**	-0.030	-2.091**	0.032	1.752*	0.023	1.559
volatility(level)	0.076	0.473	0.034	0.292	0.463	2.669***	0.234	1.794*
direction	-0.040	-0.176	-0.153	-0.866	0.016	0.070	-0.201	-1.117
specific_rate	1.575	1.313	0.137	0.163	-1.255	-1.156	-1.232	-1.326
IA_announcement	-0.257	-0.256	-0.495	-0.729	-1.009	-0.969	0.536	0.778
suggestion	-0.160	-0.477	-0.141	-0.550	0.247	0.744	0.307	1.178
no_comment	0.734	0.723	0.705	1.159	1.077	1.048	-0.451	-0.714
watching	-0.092	-0.257	-0.227	-0.827	-0.158	-0.447	-0.073	-0.259
attitude	0.747	3.802***	0.471	3.102***	-0.671	-3.381***	-0.707	-4.430***
international_cooperation	0.487	1.146	-0.320	-1.015	0.078	0.180	-0.248	-0.766
vice_minister	0.522	1.685*	0.305	1.211	-0.400	-1.305	-0.551	-2.114**
minister_of_finance	0.157	0.508	0.030	0.122	0.472	1.552	0.193	0.763
MoF_member	0.627	1.990**	-0.020	-0.078	-0.068	-0.220	-0.095	-0.355
BoJ	-1.089	-2.349**	-0.139	-0.379	-0.247	-0.563	0.147	0.383
Japan	0.122	0.311	0.375	1.116	-0.324	-0.816	0.111	0.316
Inter	-0.258	-0.652	-0.429	-1.289	0.058	0.146	0.218	0.644
LR statistic	26.706				48.922			
Prob (LR statistic)	***				***			

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

of successful intervention to change the exchange rate toward the direction the speaker hopes for. Among various kinds of speakers, for only the '5days' sample, *vice_minister* and *MoF members* had significantly positive coefficients at the 10% and 5% levels, respectively. In contrast, *BoJ* had a significantly negative coefficient at the 5% level. These results were consistent with the notion that oral interventions by the Vice Minister of Finance for International Affairs and the other MoF members tended to be successful, while those by the BoJ members were likely to be less effective.

For Q4, *attitude* had significantly negative coefficients at the 1% level for both samples. This result was consistent with the notion that positive comments by monetary authorities tended to reduce the probability of success in smoothing the change in exchange rates. With regard to speakers, for only the '3days' sample, *vice_minister* had a significantly negative coefficient at the 5% level. This result was consistent with the notion that the oral intervention by the Vice Minister of Finance for International Affairs tends to decrease the probability of success in smoothing the change in exchange rates.

Although the signs were opposite, both Q1 and Q4 showed significant coefficients on *attitude* (Point 7). In contrast, none of the coefficients for Points 1~6 and 8 were significant. The fact that only *attitude* was significant was consistent with the notion that market participants regard the attitude the monetary authorities had toward the current rate as important but not so other information. In other words, to enhance the effectiveness of oral interventions, it is important for monetary authorities to show their attitudes toward the current rate rather than release other information.

The reason why *attitude* alone was significant may be that the way monetary authorities think of the current trend of the exchange rate is information related to the future policy they will implement. If the authorities regard the current trend positively, market participants anticipate that monetary authorities will not intervene in the foreign exchange market and then the current trend will continue at least for a while. Instead, if the authorities comment on the current trend negatively, market participants predict that the possibility of future oral or actual interventions becomes higher and the current trend will change. Thus, the attitude the monetary authorities have toward the current trend of the rate is useful for market participants to predict the future trend of the exchange rate, and the market participants therefore consider it as important information.

Why is the other information content not significantly associated with the probability of successful intervention? Recall that we selected the six variables *direction*, *specific_rate*, *suggestion*, *watching*, *no_comment*, and *coordination* as well as *attitude* as variables for information content of oral interventions. Among the other six variables, *direction*, *specific_rate*, and *suggestion* appear to be predicted from the attitude of the authorities and may be regarded as less important information. For instance, when the yen is appreciating against the dollar, if the authorities show a negative attitude toward the current rate, investors are likely to predict that the direction of the rate they are hoping for is toward depreciation of the yen. Similarly, if they show a positive attitude, market participants may predict that the authorities will not actively intervene in the market to change the current trend of the rate. Therefore, if the attitude of the authorities toward the current trend of the rate is clear, *direction*, *specific_rate*, and *suggestion* are likely to be less important for investors.

We also need to consider why Q1 brought a positive sign for *attitude*. The positive result for Q1 is consistent with the notion that the oral intervention showing the acceptance of the current trend of the exchange rate moves the rate in the same direction as that of the current trend. This indicates that the attitude of monetary authorities toward the current trend is conformable with the foreign exchange rate trading market participants are practicing. In other words, market participants can trade currencies as they like with the acceptance from the authorities, and the authorities expect to continue the current trend of the exchange rate with market participants' trading. Therefore, an oral intervention showing the attitude the speaker has toward the current exchange rate trend is likely to enhance its effectiveness because of the conformation of the attitudes of both the authorities and market participants toward the current rate trend. We should note, however, that this may not lead to the reduction of the volatility in exchange rates but rather increase it, as shown by a negative sign for *attitude* in Q4.

Next, the results based on the '5days' sample in Q1 showed that the probability of successful intervention tends to increase (decrease) when the speakers are the Vice Minister of Finance for International Affairs or the other members of the MoF (members of the BoJ),

who were considered to be practically responsible for intervention policies. Oral interventions by the other speakers (the Minister of Finance, other Japanese, foreigners, and international institutions) were not significantly associated with the probability of successful intervention, perhaps because they were not directly responsible for intervention policies. The fact that only the speakers practically responsible for intervention policies had a strong probability of making effective oral interventions is consistent with the notion that market participants value their statements more than they do statements by other speakers.

Recall that the comparison between the results of Analysis 1 and those by Fratzscher (2008a) indicated that monetary authorities appeared to have decreased effectiveness of oral interventions, except in the case of the Minister of Finance, the Vice Minister of Finance for International affairs, the Governor of the BoJ, and the two Deputy Governors of the BoJ. The results for Analysis 2 showed that the oral intervention by the BoJ members, whose sample size was quite small, was likely to reduce the probability of successful intervention, but not that by the other speakers. Thus, we regarded that our evidence for the speakers who tended to reduce the probability of successful intervention was quite limited.

We also noted that coefficients on *IA_announcement* were not significantly different from zero for any regressions. This result contradicted the results of Analysis 1, which showed that oral intervention alone had no discernible effects on manipulating exchange rates in a desired direction during or after oral intervention, while it seemed to be effective only when market intervention was accompanied by actual interventions. Thus, further research is needed to examine the impact of actual intervention on the effectiveness of oral intervention.

5. CONCLUDING REMARKS

In this study we analyzed the effects of oral intervention as one of the important policies of intervention in Forex markets by examining the JPY/USD rate from January 1, 1995, to May 31, 2011. We found that market participants appeared to give high credence to announcements by monetary authorities that struck a decidedly positive or negative tone about current exchange rates. In addition, market participants seemed to give high credence to statements by speakers directly involved in the actual conduct of exchange rate policy, including officials such as staff from the MoF including Vice Minister of Finance for International Affairs and people affiliated with the BoJ.

Although the present study provided new findings to add to the literature on the exchange rate intervention, by showing how the effects of oral intervention varied across various kinds of information content and speakers, several issues need future discussion. The comparison between our results and those by Fratzscher (2008a) showed that the probability of successful intervention was lower in the present study than in Fratzscher (2008a), although these two studies employed the same approach. This difference might be attributable to our inclusion of a wider assortment of speakers and information content.

In other words, compared to Fratzscher (2008a), contributions of the present study can be summarized as follows. First, our results are consistent with the notion that the market only responded to the statements made by main monetary authorities. This result complements the result of Fratzscher (2008a), which examined the effect of announcements made only by main monetary authorities and thus did not exclude the possibility that other speakers may also have influenced the market. Our result did not support this possibility by showing that the inclusion of other speakers did not increase the effectiveness of oral interventions. Second, we found that market participants gave high credence to announcements that struck a decidedly positive or negative tone about current exchange rates. This result is a new finding of our paper, as it was shown by the significant coefficients on the variable named *attitude*, which was not included in the prior studies. Third, our study provides policy implication that the effect of oral interventions depend on speakers and contents. In particular, our results are consistent with the notion that oral interventions are the most effective when main monetary authorities clearly state their evaluation of the current exchange rate movements.

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