

# Were verbal efforts to support the euro effective? A high-frequency analysis of ECB statements

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## Abstract

This paper studies the effects of verbal interventions by European central bankers on high-frequency euro-dollar exchange rates. We find that ECB verbal interventions have had only small and short-lived effects. Verbal interventions which are reported in news report headlines are more likely to be successful, whereas verbal interventions on days with releases of macroeconomic data are less successful. There is no difference in the effects of comments by members of the ECB Executive Board and presidents of national central banks.

**JEL classifications:** E58, F31, C14

**Keywords:** verbal intervention, high-frequency exchange rates, European Central Bank, sign test

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# 1 Introduction

To what extent can central bankers influence financial markets by making policy statements in, amongst others, speeches and interviews? This issue has received increasing attention in the literature recently (see Kohn and Sack (2003), Ehrmann and Fratzscher (2004) or Rosa and Verga (2004)). One important issue is the effect of verbal interventions by central bankers on the level and volatility of exchange rates. Can central bankers influence the exchange rate by indicating, for instance, that a currency has potential to appreciate? Similarly, can they calm markets during times of high volatility?

Recent papers on this issue come to different conclusions. Fratzscher (2004) concludes that verbal interventions can effect both the level and volatility of the exchange rate. However, Jansen and De Haan (2005) find that efforts by the ECB to talk up the euro against the dollar only led to increased volatility, without influencing the level of the currency. Finally, Beine, Janssen and Lecourt (2004) provide evidence that explanatory comments by central bankers during periods of *official* exchange rate intervention can be effective.

This paper studies effects of verbal interventions by European central bankers during the first years of the European Economic and Monetary Union (EMU). In this period, the euro depreciated sharply against the US dollar. This worried European central bankers for two reasons. Firstly, the exchange rate was increasingly considered to be out of line with fundamentals. Secondly, there was an increasing worry that the weaker euro would lead to a higher rate of inflation in the Euro area. Therefore, European central bankers were interested in a stronger euro and, as we will show, frequently stated that the euro was undervalued and was likely to appreciate. This paper test to what extent currency traders perceived these assertions as credible.

We extend the existing literature in two directions. Firstly, in contrast to Jansen and De Haan (2005) or Fratzscher (2004), we use high-frequency exchange rate data to study the effectiveness of verbal interventions. Secondly, we examine whether verbal interventions are more effective under some conditions than other. We consider releases of Euro area macroeconomic data, the structure of ECB communication itself and the way in which the verbal intervention is reported.

We use statements by European central bankers as reported by the Bloomberg

news service. We analyse 146 instances in which ECB officials, both Executive Board members and presidents of national central banks (NCBs), stress the likelihood of an appreciation of the euro against the dollar for the period January 1999 to mid-May 2002<sup>1</sup>. We study the effects of these statements on 5-minute exchange rate data, provided by Olsen Financial Technologies. Following Fatum and Hutchison (2003), who study *official* exchange rate interventions by the US Federal Reserve and the Bundesbank, we use an event-study approach based on the non-parametric sign test to examine the effectiveness of verbal interventions.

We find that, in general, the effects of verbal interventions are small and short-lived. The single most important determinant of effectiveness is whether or not the verbal intervention is captured in the news report headline. Releases of macroeconomic data diminish the effectiveness of verbal interventions. Concerning the structure of central bank communication, it turns out to be of importance to make the verbal intervention in conjunction with comments on other policy variables, like inflation and growth. There is no clear evidence that statements by Executive Board members were more effective than statements by national central bank presidents.

The remainder of this paper is structured as follows. Section 2 discusses why and under what conditions verbal interventions may be effective. Section 3 discusses our methodology and the data used, while section 4 gives our results. Section 5 offers our conclusions.

## 2 Money versus mouth in currency interventions

### 2.1 Related literature

Central banks have, over the course of many years, spent impressive financial resources on official exchange rate intervention. Whether or not interventions are successful continues to be a matter of debate (see Sarno and Taylor (2001) for a survey). As an alternative to official intervention, central bankers may revert to a less costlier strategy by attempting to steer exchange rate movements through communication. This strategy of verbal intervention, or talking up/down the currency, is aimed at influencing the level and/or the volatility of

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<sup>1</sup>We exclude days with Governing Council (GC) meetings or official exchange rate interventions from our sample as these are discussed in, respectively, Sager and Taylor (2004) and Frenkel, Pierdzioch and Stadtmann (2001).

exchange rates.

The potential usefulness of this strategy may best be understood by the so-called *signalling* channel, first discussed by Mussa (1981) which is often used to explain the potential effectiveness of official exchange rate interventions. According to this view, interventions provide currency markets with new information about future monetary policy. As a result, agents adjust their expectations and thereby the exchange rate (see also Sarno and Taylor (2002), pp. 226-230). Likewise, verbal interventions may be seen as performing this function. Through comments on the future exchange rate, central bankers may give signals about future policy intentions. Admittedly, as with official exchange rate interventions, the effectiveness of verbal interventions is determined by the extent to which financial markets perceive them as credible.

In general, central banks do not intervene in currency markets on a regular basis. Verbal interventions are, in contrast, quite common. In recent years, verbal interventions have been heavily used by the Bank of Japan (see Chiu (2003) for a discussion). Similarly, time and again European central bankers asserted that the euro was a strong currency with sufficient potential to appreciate against the dollar. Table 1 lists some examples from our dataset. The first column reports the timing of the verbal intervention, the second and third column give the content and the headline of the news item reporting on the verbal intervention. The final column shows the exchange rate return in the interval following the verbal intervention.

## 2.2 Research questions

This paper extends the literature by focusing on high-frequency reactions to verbal interventions. As far as we know, this study is the first to analyse the effects of ECB communication on exchange rates using intra-day data. We analyse whether verbal interventions, in general, have effects on exchange rates. Then, we study whether verbal interventions are more effective under some conditions than others.

Firstly, we take the release of new macroeconomic data into account. There is a long list of papers that study the adjustment of exchange rates to macroeconomic news<sup>2</sup>. Dominguez (2003) provides evidence that official exchange rate

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<sup>2</sup> Frenkel (1981) is one of the earliest papers. More recent papers are Almeida, Goodhart and Payne (1998), Andersen, Bollerslev, Diebold and Vega (2003), Evans and Lyons (2003)

interventions may be more effective when closely timed to macroeconomic data releases. We analyse whether a similar conclusion holds for verbal interventions.

Secondly, we consider the structure of central bank communication. We examine whether our conclusions depend on: i) whether or not verbal interventions are made in conjunction with other policy comments, ii) whether or not there are more verbal interventions on the same trading-day and iii) the central banker who gives the comment.

In many cases, verbal interventions are made in conjunction with other comments on monetary policy. For example, the central banker expresses his or her opinion on economic growth with an accompanying conclusion on the implication for the exchange rate. The issue is then which piece of information is considered to be more important and whether the different pieces of information are considered to be consistent. In addition, in some cases, there is more than one verbal intervention on a trading day. It is more likely that traders will read about the verbal intervention in this case. Furthermore, the person making the statement may be of importance. A statement from the ECB president is more likely to attract attention than a comment by the president of one of the smaller national central banks.

Finally, we consider the manner in which Bloomberg reports the verbal intervention. It may matter whether or not the news report headline mentions the verbal intervention. If not, the fact that there has been a verbal intervention may not be noted by a currency dealer who merely scan the news headlines. Furthermore, sometimes verbal interventions by European central bankers are reported during New York, Tokio or Singapore trading hours. Traders in these locations may be less familiar with communication by European central bankers. Therefore, we pay special attention to interventions made during European trading, which we define broadly as between 8:00 and 18:00 CET.

## 3 Methodology and data

### 3.1 An event study approach

We are interested in explaining the effects of one particular type of economic news on the exchange rate. The event study methodology is therefore a useful  

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and Ben Omrane, Bauwens and Giot (2005).

basis for our analysis<sup>3</sup>. We focus on the behaviour of the euro-dollar exchange rate in the period starting three hours before the verbal intervention and ending three hours after the verbal intervention. We study the behaviour of cumulative exchange rate returns for each five-minute period in this time frame. We use the sign test, which is a non-parametric test to draw conclusions on the effectiveness of verbal interventions. In doing so, we follow Fatum and Hutchison (2003), who use this test to evaluate the effectiveness of official exchange rate interventions.

What effect should verbal interventions have? In other words, what criteria can we use to evaluate their effectiveness? As the euro depreciated during the time period we study, all verbal interventions are intended to ‘talk up’ the euro. We follow Fatum and Hutchison (2003) in using the direction criterion<sup>4</sup>. This test defines a successful verbal intervention as:

$$VI_t = 1 \quad \rightarrow \quad \Delta S_{t+i} > 0 \quad (1)$$

where  $VI_t$  denotes the occurrence of a verbal intervention,  $\Delta S$  denotes the exchange rate return and  $i = [1, n]$  denotes the several intervals over which we can evaluate the change in the exchange rate<sup>5</sup>.

In other words, this criterion measures whether, after a verbal intervention, we observe positive exchange rate returns. We then use the non-parametric sign test to calculate the likelihood of this event. To be more precise, assume that the chance of a positive exchange rate return is equal to  $p$ . Let  $OCC$  denote the number of verbal interventions and  $SUCC$  be the number of observations with a positive exchange rate return. The sign test uses  $p$ ,  $OCC$  and  $SUCC$  to calculate a level of significance, based on the binomial distribution.

To give an example, suppose that we observe 100 occurrences of verbal interventions. Suppose that 58 interventions were followed by a positive exchange rate return in the 5-minute time period following the verbal intervention. The sign test shows that the probability of observing 58 successes or more is equal to 0.07, assuming that  $p = 0.5$ . So, in this case, the conclusion is that the verbal interventions are indeed effective.

<sup>3</sup>See MacKinlay (1997) for a survey of the event study methodology.

<sup>4</sup> Fatum and Hutchison (2003) also consider a smoothing criterion. We have not yet found conclusive results using this criterion.

<sup>5</sup>We use dollars per euro exchange rates, so an exchange rate return larger (smaller) than zero denotes an appreciation (depreciation) of the euro against the US dollar.

The sign test is a non-parametric test. This entails the benefit that we do not have to pay attention to the distribution of the exchange rate returns. However, the conclusion will naturally depend upon our choice of  $p$ . A priori, the most neutral assumption is that we set  $p$  equal to 0.5. A higher (lower) probability of success would mean that we assume automatically that ECB verbal interventions are more (less) likely to be successful. To validate this choice empirically, we calculated the fraction of five-minute intervals with positive returns on all days in our sample. This fraction was equal to 48.1 %, which supports our choice for setting  $p$  equal to 0.5. We also calculated this fraction for every year in our sample. Once again, we find figures close to 50 %<sup>6</sup>.

## 3.2 Data

We conducted a search of the Bloomberg news service for reports on verbal interventions by European central bankers. We focus on members of the ECB Executive Board and presidents of national central banks. The sample period is 4 January 1999 to 17 May 2002. In total, we find 203 instances of verbal interventions. We exclude, however, verbal interventions on days with Governing Council meetings and official exchange rate interventions. Additionally, we exclude verbal interventions made during the weekend. In the end, our sample consists of 146 verbal interventions, made during 127 trading days.

We use 5-minute exchange rate data, provided by Olsen Financial Technologies. The exchange rate data consists of linearly interpolated bid and ask quotes for the euro-dollar exchange rate, denoted in dollars per euro. These quotes are not the actual prices at which trades were conducted, but represent the quotes at which foreign exchange dealers were willing to buy or sell currency. As such, we are in fact testing how currency traders interpret verbal interventions. First, we calculate mid-prices by taking averages of the bid and ask prices. Then, we transform the exchange rate series to percentage returns, by calculating the first difference of the natural logarithm of the mid-price series.

Our data on macroeconomic announcements is based on an ESCB release calendar. Table 2 gives an overview of the types of macroeconomic announcements that we take up in the analysis. Most of the Euro area data is released by Eurostat, the exception being the Purchasing Managers Index which is released

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<sup>6</sup>For 1999, the fraction was 45.3 %, for 2000 48.9 %, for 2001 49.0 % and for 2002 (until June) the fraction was 48.3 %.

by NTC/Reuters. In most cases, the releases occurred at noon CET.

### 3.3 Description of verbal interventions

Table 3 shows a classification of the verbal interventions. As noted, we find 146 instances of verbal interventions by European central bankers. Interestingly, the majority of these statements are made by national central bankers (80). Furthermore, most of the verbal interventions are *not* mentioned in the news report headlines: only 67 of the 146 interventions are noted in the headline.

As may be expected, a large portion of the statements (96) are made during European trading. In total, 49 of the verbal interventions are made on days with releases of macroeconomic data. In a few cases, there is more than one verbal intervention per day. Finally, it is noteworthy that in most cases, the verbal intervention is made in conjunction with other monetary policy comments.

## 4 Results

### 4.1 Full sample results

The full sample results are summarized in figure 1. We focus on the time period between three hours before and three hours after the verbal intervention. For every five-minute period, figure 1 plots the fraction of success according to the direction criterion, being equal to  $SUCC/OCC$  (the solid line) and the associated p-value (the dotted line). Starting with the interval after (before) the one during which the verbal intervention was reported by Bloomberg, we keep adding (backwards) 5-minute returns in order to calculate returns over the respective period. For example, we observe 66 positive exchange rate returns in the 15-minute interval after the verbal interventions. The associated p-value is equal to 0.86.

Figure 1 shows that there is very little evidence that verbal interventions have been successful. The only time-frame during which we observe a significantly number of positive exchange rate returns starts 10 minutes *before* the intervention ( $p=0.06$ ). After the verbal intervention is reported in Bloomberg, there is no clear reaction in the euro-dollar rate. In fact, in most time frames considered, the majority of exchange rate returns are negative.

One interesting point which emerges from figure 1 is that most of the reaction



of the exchange rate is in the hour *before* Bloomberg reports on the verbal intervention. For example, for the interval starting two hours before the verbal intervention, we find that there are a significant number of *negative* exchange rate changes ( $p=0.98$ ). However, starting with the time frame of one hour before the verbal intervention, this general picture disappears. One way to see this is to consider the fraction of positive exchange rate changes, which starts to trend upwards at this point in time.

What may explain this result? Firstly, it is interesting to note that Dominguez (2003) finds a similar result for the case of official exchange rate interventions: exchange rates react already in the hour prior to the news report on the intervention through the news-wire. However, in the case of official interventions, there are actual trades by central banks, so that markets may learn about interventions before news-wires report on this issue. As verbal interventions are, by definition, not accompanied by central bank trades, it is not clear whether this is an adequate explanation. Nevertheless, recent research on order flow highlights the effects of (net) trades on exchange rate determination: private information is incorporated in exchange rates through order flow. It may be the case that currency dealers learn about central bank communication through order flow in advance of the publication on news-wires. Future research could incorporate the actual trades conducted around periods with verbal interventions to further study this issue.

A second explanation may be a time lag in reporting of Bloomberg relative to Reuters<sup>7</sup>. As both news-wires are heavily used by financial markets participants, the results may be caused by the fact that Reuters reported the verbal interventions earlier than Bloomberg. However, there is no research on this issue, so that this suggestion is only a very tentative one. In fact, if this explanation is true, our results would suggest a time lag of about one hour lag between Bloomberg and Reuters. Considering the speed at which information spreads in financial markets, this seems to be a very long time lag, indeed.

In the end, the main point emerging from figure 1 is that verbal interventions do not have major effects on the exchange rate. As soon as after 15 minutes, the success fraction drops below 50 % again. Notwithstanding the fact that the timing of the adjustment remains partly unexplained, the conclusion must be that verbal interventions are not regarded as very informative by currency

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<sup>7</sup>We thank Jan Lamers for this suggestion.

dealers.

## 4.2 Focusing on special factors

To what extent are the full sample results driven by the six factors identified in section 2.2? To analyse this issue, we first include and then exclude those observations related to the special factors<sup>8</sup>. Figures 2 and 3 report the associated success fractions per category. As most of the differences appear in the 90 minutes after the verbal intervention, we focus our discussion on this particular time frame.

Firstly, does it matter whether the verbal intervention is reported in the headline? Focusing on only these observations shows that the success fraction is higher than on average (see figure 2). This effect is firstly visible 15 minutes after the news report and it continues to be visible after 90 minutes, when most differences between the other categories have disappeared. After about 2 hours, the success fraction of verbal interventions reported in the headline reverts to the full sample level (not shown in figure). Figure 3 shows that verbal interventions *not* reported in the headline clearly have a lower success ratio. Once again, this difference disappears after about two hours. This result is very intuitive, but it remains to be seen how one can use it from a policy perspective, given that central bankers do not determine what part of their message is condensed into the headline.

Secondly, are verbal interventions more effective when they coincide with releases of macroeconomic data? The figures suggest that this is not the case. Interventions on days with data releases have a lower fraction of success, whereas interventions on days with no releases perform somewhat above average. So, in contrast to official exchange rate interventions, timing statements closely to data releases does not increase their effectiveness. Whereas official interventions provide a clear signal to markets, the verbal interventions are too weak to be picked up by currency traders.

Does the structure of central bank communication have an influence on the effects of verbal interventions? Figure 2 indicates that more than one verbal intervention per trading day are far from successful. The fraction of successes in this case is only between 35 and 40 % in the hour after the verbal interven-

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<sup>8</sup>Naturally, when comparing the Executive Board members and national central bank president, we may skip this latter exercise.

tion. Indeed, when there are no other verbal interventions, the success ratio is somewhat above average (as shown in figure 3). Secondly, there are no clear differences between statements by the Executive Board and national central bank presidents. Initially, interventions by Executive Board members have a lower success fraction than on average, whereas interventions by national central bank presidents have a higher rate of success. After the 15 minute mark, this pattern reverses and interventions by the Executive Board seem more effective. However, if we study the p-values associated with the success fraction, there is no clear evidence that both types of interventions have been effective at all. Finally, backing up verbal interventions with comments on other policy issues seems to be important. This result is best illustrated in figure 3: when the verbal interventions are made in isolation, the success ratio becomes almost as low as 30 % after one hour.

Finally, does it matter whether the intervention is made during European trading hours? Interestingly, the answer is ‘no’. In fact, the reaction to verbal interventions outside European trading hours is even stronger than the initial reaction during these hours. Figure 3 shows that the success fraction jumps to a level of 70 % in the first case, whereas it only reaches a level of close to 60 % during European hours.

## 5 Conclusions

Do currency traders perceive verbal interventions as informative? This paper investigated this issue by analysing the effects of verbal interventions by European central bankers on high-frequency euro-dollar exchange rates. We conclude that, in general, the effects of verbal interventions are negligible and short-lived.

There are interesting qualifications to this result. The single most important determinant of effectiveness is whether or not the verbal intervention is captured in the news report headline. Releases of macroeconomic data seem to diminish the effectiveness of statements. There is no clear evidence that Executive Board members have been more effective than national central bank presidents.

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Table 1: Examples of verbal interventions

<b>Timing</b>	<b>Comment</b>	<b>Report headline</b>	$\Delta s_t$
9 June 1999, 20:18	'In the mid-term I see the euro strenghtening against the dollar'	Bundesbank's Welteke says euro to strenghten in the medium term	0.0000
28 January 2000, 10:18	'..the euro has a very strong potential to appreciate.'	ECB's Trichet says euro has strong potential to gain	0.0001
23 March 2000, 13:26	'..the euro's potential for appreciation should almost inevitably unfold'	ECB's Issing says euro to rise on faster growth, stable prices	0.0001
12 October 2000, 21:07	'..the euro has a strong potential to appreciate'	ECB's Duisenberg says euro has potential	-0.0004
20 November 2001, 7:51	'I am very confident over time the euro will show its strength ..'	ECB Vice President Noyer comments on euro's potential to gain	-0.0004

*Note:* This table shows a number of examples of verbal interventions as reported by Bloomberg. The exchange rate movement in the 5-minute period *after* the one during which the comment was made is recorded in the last column. A value larger (smaller) than zero denotes an appreciation (depreciation) of the euro against the dollar. All times are in CET.

Table 2: Releases of macroeconomic data

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<b>Series</b>	<b>Source</b>
<i>Real activity</i>	
National Accounts	Eurostat
Industrial Production Index	Eurostat
Retail Trade Turnover	Eurostat
Foreign Trade	Eurostat
Employment	Eurostat
<i>Prices and wages</i>	
Harmonised Consumer Price Index	Eurostat
Wages	Eurostat
Earnings	Eurostat
Industrial Producer Price Index	Eurostat
<i>Forward looking</i>	
Purchasing Managers Index	NTC/Reuters
Business Opinion Survey	Eurostat
Consumer Opinion Survey	Eurostat

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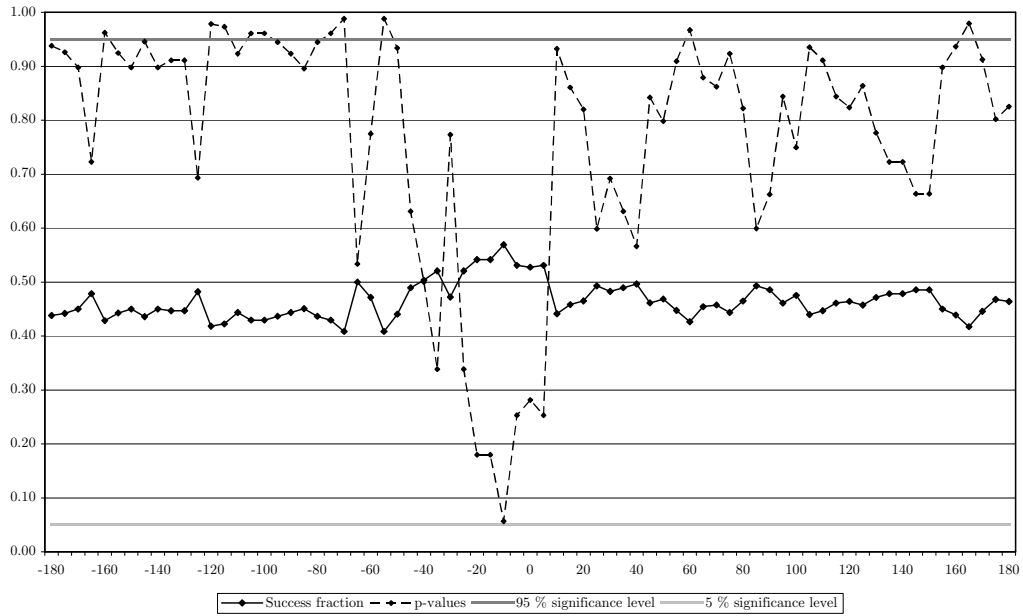
Table 3: Classification of verbal interventions

<b>Series:</b>	<b>Observations</b>
Number of verbal interventions	146
<i>of which:</i>	
During European trading	96
Reported in headline	67
<i>coinciding with:</i>	
Other policy comments	120
Other verbal interventions	36
Data releases	49
<i>made by</i>	
Executive Board	66
National Central Bank	80

*Note:* This table shows the total number of verbal interventions and their characteristics between 4 January 1999 and 17 May 2002. There are 127 days in the total sample. Days with ECB Governing Council meetings and official exchange rate interventions are excluded from the analysis. In addition, we exclude verbal interventions made during Saturdays and Sundays.

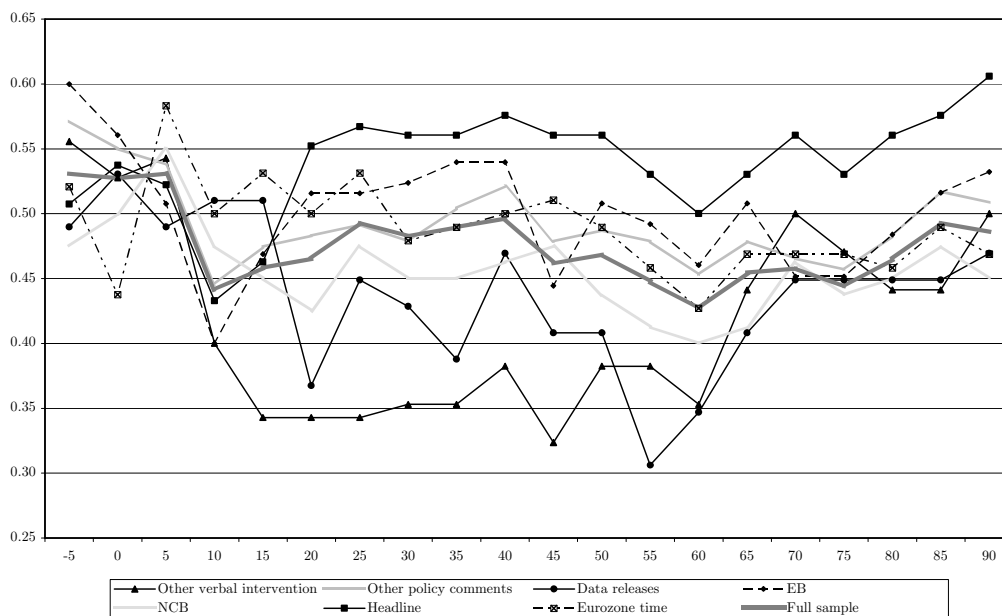


Figure 1: Direction test



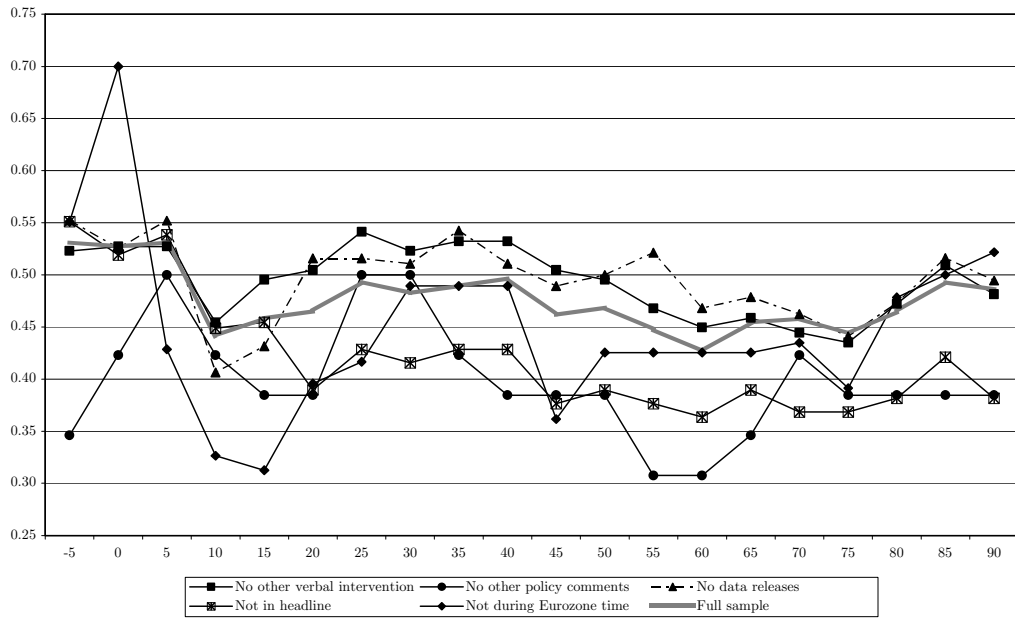
*Note:* This figure shows the results of the direction criterion using the nonparametric sign test. The solid line represent the fraction of successful verbal interventions. The dotted line represents the associated p-values, based on a binomial distribution assuming  $p = 50\%$ . The two horizontal lines denote the 5 % and 95 % significance thresholds.

Figure 2: Success ratios per factor



*Note:* This figure shows the success fraction per different category. The x-axis plots the time relative to the news report on the verbal intervention, ranging between 5 minutes before until 90 minutes after.

Figure 3: Success ratios excluding factors



*Note:* This figure shows the success fraction for excluding the different category. The x-axis plots the time relative to the news report on the verbal intervention, ranging between 5 minutes before until 90 minutes after.