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A New Perspective on the Consistency of ECB Communication

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Abstract

Wordscores uses word frequencies to extract information from texts with well-defined policy positions. Wordscores uses the information from these reference texts to estimate the unknown policy positions of so-called virgin texts. We apply Wordscores to the ECB President's introductory statements following Governing Council meetings. We code policy positions of statements from the first three years of the Economic and Monetary Union (our reference texts) using various indicators of ECB communication as well as actual policy decisions. Treating introductory statements from 2002 to July 2009 as virgin texts, Wordscores is able to present a fairly accurate picture of the ECB's monetary policy decisions during that period. Therefore, we conclude that the ECB's communications have been quite consistent over the last decade. The results also suggest changes in ECB communications occurred: using more introductory statements as reference texts improves the match between estimated positions and actual policy.

JEL classifications: E52, E58

Keywords: central bank communication, ECB, consistency, content analysis

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1. Introduction

Over the past two decades, communication has become an important instrument for monetary policymakers. In line with this development, there has been a surge in empirical studies on central bank communication (Blinder, Ehrmann, Fratzscher, De Haan and Jansen 2008). Many of these studies refer to the communication policy of the European Central Bank (ECB). There is substantive evidence that ECB communications move financial markets in the intended direction (see, for instance, Ehrmann and Fratzscher, 2007). Likewise, there is much evidence that ECB communications increase the predictability of interest decisions (see, for instance, Sturm and De Haan, 2009).

An important requirement for communication to be effective is consistency. If central bankers regularly change the frequency and meaning of words, it will be hard for observers to properly infer the message that central bankers are trying to convey. On the other hand, changed circumstances may make it necessary for communication to adapt. A priori, there are a number of reasons why one might expect that the ECB's communications have changed over time. First, as a new organisation the ECB perhaps had to learn how to communicate effectively with the outside world. The first years of the Economic and Monetary Union (EMU) may, therefore, have constituted a learning period for the ECB. Second, after an internal assessment, the ECB clarified its monetary policy strategy in 2004. Although this was not supposed to reflect a change in strategy, many observers interpreted the clarification as downplaying the importance of the role of money in the ECB's strategy (Berger et al., 2010). Of course, an appropriate communication strategy would reflect changes in the monetary strategy. Third, the financial turmoil may have forced communication to adapt since mid-2007. The turbulence in financial markets, followed by a severe economic downturn may have

forced the ECB to find new words to describe the considerations underlying its monetary policy in this changed environment.

In this paper we examine whether ECB communications have remained consistent over time, and whether possible changes have increased our understanding of monetary policy. We investigate these two issues by conducting the following thought experiment. Suppose someone had closely followed and analyzed ECB communications through the early years of EMU. How well would this person have been able to understand monetary policy during subsequent years, *without heavily investing in any further kind of analysis*? To conduct our thought experiment, we use the Wordscores methodology introduced by Laver, Benoît and Garry (2003). The idea underlying Wordscores is the following: given texts about which something is known (the so-called reference texts), Wordscores extracts information using word frequencies, and this information on frequencies is employed to estimate the policy positions of subsequent texts about which nothing is known (the so-called virgin texts). All that is used to infer the policy positions of virgin texts are the words contained in these texts, which are compared with the words that were observed in reference texts with a “known” policy position.

We apply the Wordscores method to the introductory statements by the President of the ECB at the press conference following the ECB’s monetary policy meetings, as that is the ECB’s most important communication device (Blinder et al., 2008). We start by using the introductory statements between 1999 and 2001 as reference texts and statements in subsequent years as virgin texts. Wordscores requires that the reference texts are coded. To do so, we use various indicators of ECB communication developed by other authors. As an alternative, we use the actual policy decisions of the ECB to code the reference texts. In various steps, the time frame of the

reference texts is expanded to examine whether this enhances the ability of Wordscores to identify the policy positions of the virgin texts.

Given the reasons to expect that the ECB's communications may have changed over time, we were somewhat sceptic that the mechanical approach underlying Wordscores would be able to generate an accurate representation of the ECB's monetary policy. However, we find that on the basis of the early years of the EMU, the Wordscores method is able to present a fairly accurate picture of the ECB's policy stance in subsequent years. From that perspective, the ECB's communication as laid down in the introductory statements can be considered as quite consistent over the last decade. At the same time, our evidence also suggests that ECB communications have changed: adding more years of introductory statements to the set of reference texts generally improves our understanding of monetary policy. From that perspective, it seems the introductory statements continued to provide new relevant information for central bank watchers. For instance, adding the statements from 2006 changes the relative occurrence of the word 'vigilance', enabling us to better match subsequent decisions to tighten monetary policy.

This paper proceeds as follows. Section 2 outlines the methodology, section 3 present the results, and section 4 gives the conclusions.

2. The Wordscores methodology

Laver, Benoît and Garry (2003) introduced the Wordscores methodology to estimate policy positions of political parties in the UK. In a nutshell, the idea underlying Wordscores is to estimate policy positions by comparing two sets of texts using the relative frequency of words. Prior knowledge on the first set of texts, called reference texts, is used to infer the policy position of the second set, called virgin texts. All that is

needed to infer the positions of the virgin texts are the words contained in these texts, which are compared with the words that were observed in reference texts with “known” policy positions.

As Laver et al. (2003, p. 312) argue, the method treats “texts not as discourses to be read, understood and interpreted for meaning – either by a human coder or a computer program applying a dictionary – but as collections of word data containing information about the position of the texts’ authors on predefined policy dimensions”. They identify three benefits of the Wordscores methodology: “Because it treats words unequivocally as data, our technique not only allows us to estimate policy positions from political texts written in any language but, uniquely among the methods currently available, it allows us to calculate confidence intervals around these point estimates. Our method of using words as data also removes the necessity for heavy human intervention, and can be implemented quickly and easily using simple computer software which we have made publicly available.”³

To use Wordscores properly, the selection of appropriate reference texts is crucial. The reference texts are required to provide sufficient information on the policy dimension for which one would like to evaluate the virgin texts. Laver et al. (2003) identify three guidelines for the selection of reference texts. First, the reference texts should be used in the same context as the virgin texts. This implies that the reference texts should deal with similar topics as the virgin texts. Second, the reference texts should contain enough variation in policy positions, so that the complete spectrum of positions is covered. Finally, the reference texts should contain as many different words

³ Wordscores is implemented as a set of Stata programs. The programs can be downloaded at: <http://www.wordscores.com>. We present the technical details underlying Wordscores in the appendix. See also Lowe (2008) for a further discussion of the Wordscores method.

as possible. The more words the reference texts contain, the more likely it is that words from the virgin texts can be assigned scores.

We apply this approach to ECB communications. The ECB's most important communication device is the President's introductory statement at the monthly press conference in which he reports on the decisions taken by the ECB's Governing Council. Following meetings of the Council, which typically take place on the first Thursday of each month, the ECB announces the monetary policy decisions at 13:45 (CET). Some 45 minutes later, at around 14:30, the ECB President and Vice-President hold a press conference that comprises two elements: a prepared introductory statement that contains the background considerations for the monetary policy decision, and a Questions & Answers (Q&A) part during which the President and the Vice-President are available to answer questions by the attending journalists. The introductory statement is understood to reflect the position and views of the Council, agreed upon on a word-by-word basis by its members (Ehrmann and Fratzscher, 2009; Berger, Sturm and De Haan, 2010).

We use the ECB President's introductory statements from the early years of EMU in order to understand introductory statements in later years. To be more precise, as a first step we will consider the period between January 1999 and December 2001 as the reference period, and use the introductory statements from that period to understand monetary policy between January 2002 and July 2009. It seems uncontroversial that these reference texts were used in the same contexts as the virgin texts. The second requirement to apply Wordscores is also met. As the ECB monetary policy has shown sufficient variation – in terms of the direction of interest rate decisions – between 1999 and 2001, there is enough relevant information in the reference texts, which can be used to identify the policy positions of the virgin texts. Finally, we are able to use a

respectable number of words as references. The introductory statements are of course much shorter than the party manifestos used by Laver et al. (2003), but our number of observations is much larger. Our baseline set of reference texts (1999 – 2001) contains well over 45,000 words. Therefore, the third requirement to apply Wordscores is also met.

Wordscores requires that the reference texts be coded. We use two different sets of anchors. First, we employ the actual policy decisions by the ECB Governing Council. In doing so, we define the policy dimension ranging between easing (which we assign a score of -1) and tightening (which we assign a score of +1).⁴ Second, we make use of four ECB communication indicators that are all based on the ECB President's introductory statements, namely the aggregate indicator of Berger et al. (2010), the updated indicator of Rosa and Verga (2007), the indicator of Ullrich (2009), and the KOF MPC Communicator index.⁵ These various indicators code ECB communications on a numerical scale. Negative (positive) values are assigned to communications that are perceived as dovish (hawkish), and zero to those that appear to be neutral. Whereas some researchers restrict the coding to directional indications by using a scale between -1 and +1, others assign a finer grid that is at least suggestive of magnitude, e.g., by coding statements on a scale from -2 to +2.⁶

The four indicators have been used previously for various purposes. Berger et al. (2010) examine the role of money in the policies of the ECB, using introductory statements of the ECB President at the monthly press conferences during 1999-2004.

⁴ An interesting extension would be to use the *size* of the interest rate change as the policy dimension.

⁵ We downloaded the KOF MPC data from <http://www.kof.ethz.ch/publications/indicators/communicator/en>. URL last accessed on 25 March 2010. We also thank Carlo Rosa, Giovanni Verga and Katrin Ullrich for making their data available.

⁶ Using these indicators, Sturm and De Haan (2009) examine whether ECB communication adds information compared to the information provided by a Taylor rule model in which expected inflation and output are used. They find that even though the indicators are sometimes quite different from one another, they add information that helps predicting the next policy decision of the ECB compared to the information provided by expected inflation and expected output growth.

They construct an aggregate indicator as well as indicators of the economic and monetary analysis. We use their aggregate indicator as we want to include all possibly relevant statements. Rosa and Verga (2007) use the introductory statements to show that the predictive ability of these statements is similar to that implied by market-based measures of monetary policy expectations. To do so, they provide a glossary that translates the qualitative information of the press conferences into an ordered scale. Ullrich (2009) shows how the indicator measuring ECB rhetoric contributes to explaining inflation expectations formation. Finally, the KOF MPC is based on a quantification of the statements of the ECB president made during the monthly press conference. The indicator is based on statements, which reveal the Governing Council's assessment of developments which directly affect future price stability.

As the indicators use different scales, we standardize each index, and then take the average of the standardized indicators. This average is the score for the reference texts. The policy dimension is similar to the first case, i.e., positive signs indicate a tightening, while negative signs denote an easing of policy. The difference is, however, that the policy dimension is defined as the number of standard deviations from a neutral policy stance.

We also use the Wordscores methodology to make inferences about changes in ECB's communications. As Laver et al. (2003, p. 314) point out, Wordscores assumes that "that party manifestos in country c at election t are valid points of reference for the analysis of party manifestos at election $t+1$ in the same country." However, as Laver et al. acknowledge, this "assumption is unlikely to be 100 percent correct, since the meaning and usage of words in party manifestos changes over time, even over the time period between two elections in one country." As we have argued, the same may be true for ECB communications. To identify whether this is the case, we therefore gradually

expand the window of introductory statements that we consider as reference texts. If ECB communication changes over time, the positioning of the virgin texts will then also change. As more information becomes available through the wording of the statements, we expect that the method will be better able to match actual interest rate policy. We check this by confronting the estimated policy positions of the virgin text with the actual developments in the ECB's monetary policy stance.

3. Results

Figure 1 shows the results when we use the introductory statements between January 1999 and December 2001 as reference texts and the actual policy decisions to code them. The solid line shows the scores for the virgin texts, i.e., the introductory statements spanning the period January 2002 to July 2009. The figure also shows the 95% confidence interval around the scores. The bars indicate the timing and direction of changes in the ECB main refinancing rate. Figure 2 shows the results in case the reference texts are coded using the ECB communication indicators. Note that we do a contemporaneous evaluation of the scores versus the actual policy decision. In other words, we relate the scores for the introductory statement to the policy decision taken on that day.⁷

<insert figures 1 and 2 about here>

It is striking how the estimated scores for the introductory statements broadly follow the actual developments in ECB monetary policy. As such, they provide an indication of the ECB monetary policy stance. Admittedly, the correlation is far from perfect, which indicates that the scores for the introductory statements may not be the best forecasts.

⁷ We also evaluated how well the scores of the statements matched next month's decisions. In general, the match was not as good as in the contemporaneous case.

Nevertheless, using only information for the first three years of EMU goes a long way in understanding monetary policy in subsequent years. We therefore conclude that ECB communication over the last decade may be considered as quite consistent.

Next, we address the possibility of changes over time. Tables 1 and 2 provide information on how well the estimated policy positions match the actual policy stance if the window for the reference texts is expanded by one year in subsequent steps. Again, we relate the scores to the contemporaneous decisions.⁸ The tables show the correlation between the Wordscores coding of the virgin texts and the actual policy decisions (row 1). The remaining rows of the tables show indicators for the ability of the Wordscores coding of the virgin texts to match policy decisions taken between January 2007 and July 2009. This sample includes the period when one of the changes in communication may have occurred. In Table 1 the reference texts are coded using actual policy decisions, while in Table 2 these texts are coded using the ECB communication indicators.

<insert tables 1 and 2 about here>

Although there is some variation, the overall impression is that adding additional introductory statements to the set of reference texts leads to a better correspondence between the scores and the actual development in the monetary policy stance. For instance, the correlation increases, although not monotonically. Also, the percentages of correct decisions, in most cases, increases over time, while the number of incorrect decisions decreases.

However, adding the introductory statements from the year 2006 to the reference texts does not uniformly improve the correspondence between estimated

⁸ Also for this moving window analysis, the results are similar to the contemporaneous case if we relate today's statements to next month's decisions. Results available upon request.

positions and actual policy.⁹ The last columns of Tables 1 and 2 show that the correlations between the scores and actual interest rate policy decrease in comparison with ending the reference period in 2005. Also, the percentage of correct ‘no change’ decisions is lower.

In contrast, decisions to tighten monetary policy are better matched. For the first time, we are able to correctly match two of the three decisions to tighten monetary policy in 2007 and 2008. Figures 3 and 4 further illustrate this point. The figures show the match between scores for the virgin texts and the actual policy decisions, using the introductory statements of the ECB President between 1999-2006 as reference texts. Compared to Figures 1 and 2, the estimated policy positions are more closely linked in case of decisions to tighten monetary policy, especially when the references texts are coded using the ECB communication indicators.

<insert figures 3 and 4 about here>

One explanation for the better match with respect to tightening decisions is the use of the codeword ‘vigilance’ in ECB communication. Jansen and De Haan (2007) discuss how this term was often used to signal the ECB’s worry on higher euro area inflation expectations. However, from 2005 onwards, it was increasingly seen as an indication of upcoming tightening of ECB monetary policy.¹⁰ It seems plausible that adding 2006 to the set of reference texts changes the relative occurrence of vigilance, enabling us to better match tightening decisions in 2007 and 2008.

⁹ It would be interesting, therefore, to expand the set of reference texts further. Momentarily, this would leave us with too few interest rate changes to evaluate the estimated policy positions.

¹⁰ According to Bloomberg ‘ECB president Jean-Claude Trichet has used the word “vigilant” to flag each of the six rate increases since late 2005’ (Bloomberg News, 15 February 2007). Likewise, according to UBS: ‘Trichet has made a practice of effectively pre-announcing hikes at the prior meeting with the use of the key “vigilant” phrase’ (UBS FX Trade and Research, 9 January 2007).’

4. Conclusions

In this paper, we apply Wordscores - a method for content analysis based on word frequencies - to the introductory statements by the ECB President. To use Wordscores, we code introductory statements from the early years of the Economic and Monetary Union using various indicators of ECB communication as well as actual policy decisions.

There are two main conclusions. First, using Wordscores we are able to present a fairly accurate picture of the ECB's monetary policy stance in subsequent years. From that perspective, the ECB's communication as laid down in the introductory statements can be seen as quite consistent over the last decade. This point becomes especially clear if we again consider the simplicity of the Wordscores methodology. We only use information on the number of times particular words appear in ECB introductory statements. Using more sophisticated content analysis methods would probably only increase the matching between estimated policy positions and actual monetary policy.

A second conclusion refers to the changes in ECB communication during the last decade. Adding more introductory statements to the set of reference texts helps, in general, to improve our understanding of monetary policy in subsequent years. From that perspective, the introductory statements seem to provide new relevant information for central bank watchers. One interesting example is when we add the year 2006 to the set of reference texts. Adding the statements from this year changes the relative occurrence of the word 'vigilance', enabling us to better match subsequent decisions to tighten monetary policy.

How could we further apply the Wordscores methodology to the literature on central bank communication? Perhaps other anchors could be used to code the reference texts. Also, it would be interesting to use the individual indicators from the literature used in this paper together with Wordscores. Finally, Wordscores may also be

applied to other central banks, or other communication channels. We leave these issues for future work.

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Table 1: Accuracy when using actual policy decisions to code statements

	Reference periods ends in:					
	2001	2002	2003	2004	2005	2006
Correlation	0.26	0.33	0.21	0.43	0.65	0.52
% correct ease	0.0	0.0	16.7	50.0	50.0	33.3
% correct tight	0.0	33.3	0.0	0.0	0.0	66.7
% correct no change	75.0	80.0	75.0	80.0	85.0	70.0
% incorrect ease	NA	NA	0.0	40.0	50.0	50.0
% incorrect tight	100.0	80.0	100.0	100.0	NA	66.7
% incorrect no change	37.5	33.3	34.8	27.3	26.1	26.3

Note: The correlation is measured between an indicator (measured on a scale of -1, 0, 1) of actual decisions and the Wordscores for the introductory statements. The correlation is computed over the entire sample of virgin texts. All other measured are based on a forecast evaluation for the period January 2007 to July 2009. The percentage of correct predictions is conditional on the actual decisions, while the percentage of incorrect predictions is conditional on predicted decisions. The top row shows the last year of the reference period. The predicted value is determined by checking the scores for the texts. When the score is higher (lower) than +0.5 (-0.5), the predicted value is equal to +1 (-1), whereas in between the predicted value is 0.

Table 2: Accuracy when using the average of four indicators to code statements

	Reference periods ends in:					
	2001	2002	2003	2004	2005	2006
Correlation	0.38	0.34	0.28	0.56	0.65	0.62
% correct ease	33.3	16.7	16.7	50.0	50.0	33.3
% correct tight	0.0	0.0	0.0	0.0	0.00	66.7
% correct no change	90.0	90.0	85.0	95.0	95.0	75.0
% incorrect ease	33.3	0.0	0.0	25.0	25.0	0.0
% incorrect tight	100.0	100.0	100.0	NA	NA	71.4
% incorrect no change	28.0	30.8	32.0	24.0	24.0	25.0

Note: The correlation is measured between an indicator (measured on a scale of -1, 0, 1) of actual decisions and the Wordscores for the introductory statements. The correlation is computed over the entire sample of virgin texts. All other measured are based on a forecast evaluation for the period January 2007 to July 2009. The percentage of correct predictions is conditional on the actual decisions, while the percentage of incorrect predictions is conditional on predicted decisions. The top row shows the last year of the reference period. The predicted value is determined by checking the scores for the texts. When the score is higher (lower) than +1.0 (-1.0), the predicted value is equal to +1 (-1), whereas in between the predicted value is 0.

Figure 1. Wordscores for virgin texts vs. actual policy decisions
(reference texts: 1999-2001)

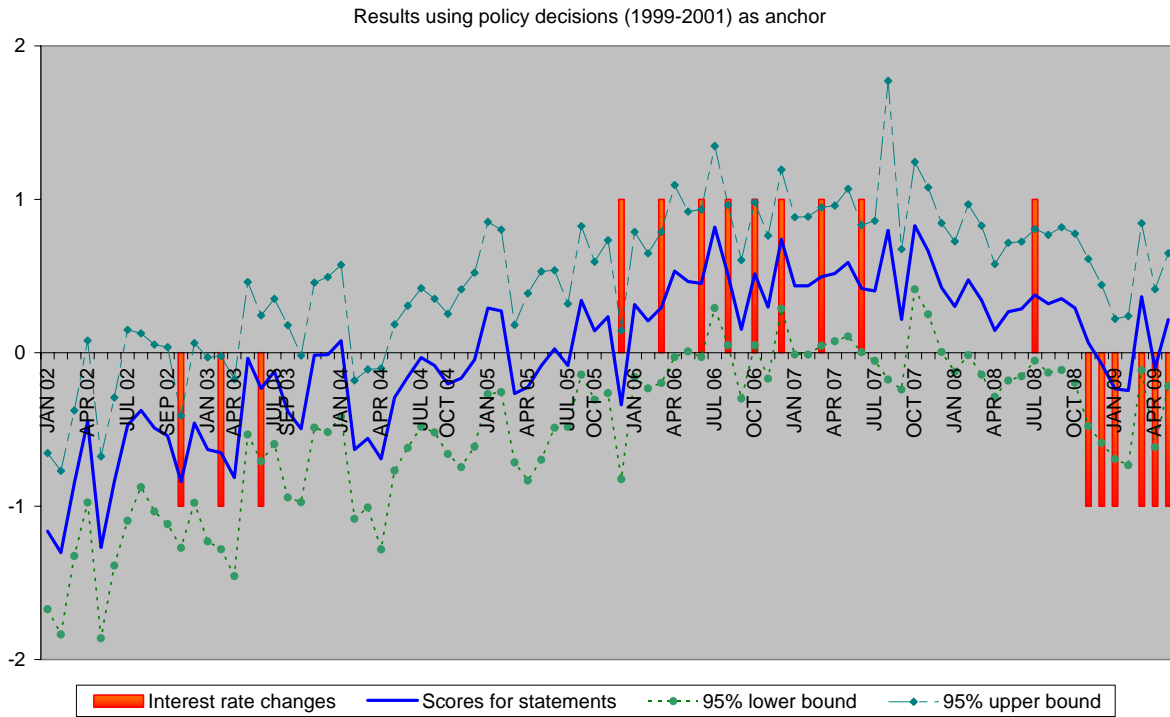


Figure 2. Wordscores for virgin texts vs. actual policy decisions
(reference texts: 1999-2001)

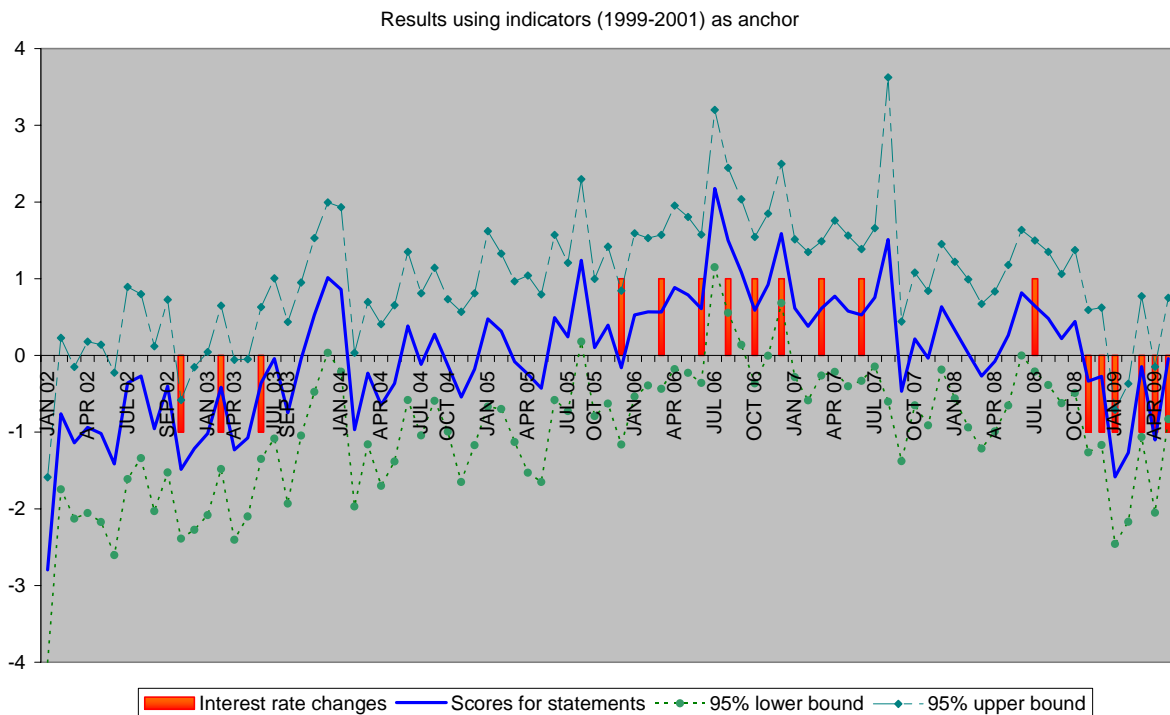


Figure 3. Wordscores for virgin texts vs. actual policy decisions
 (reference texts: 1999-2006)

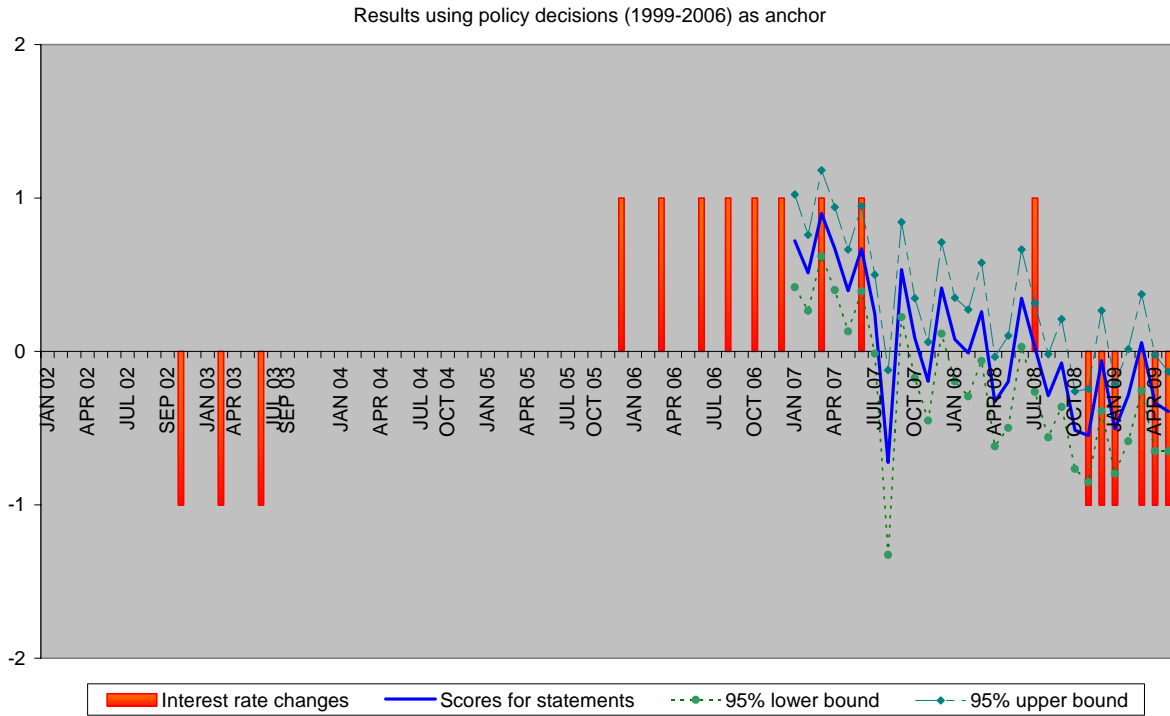
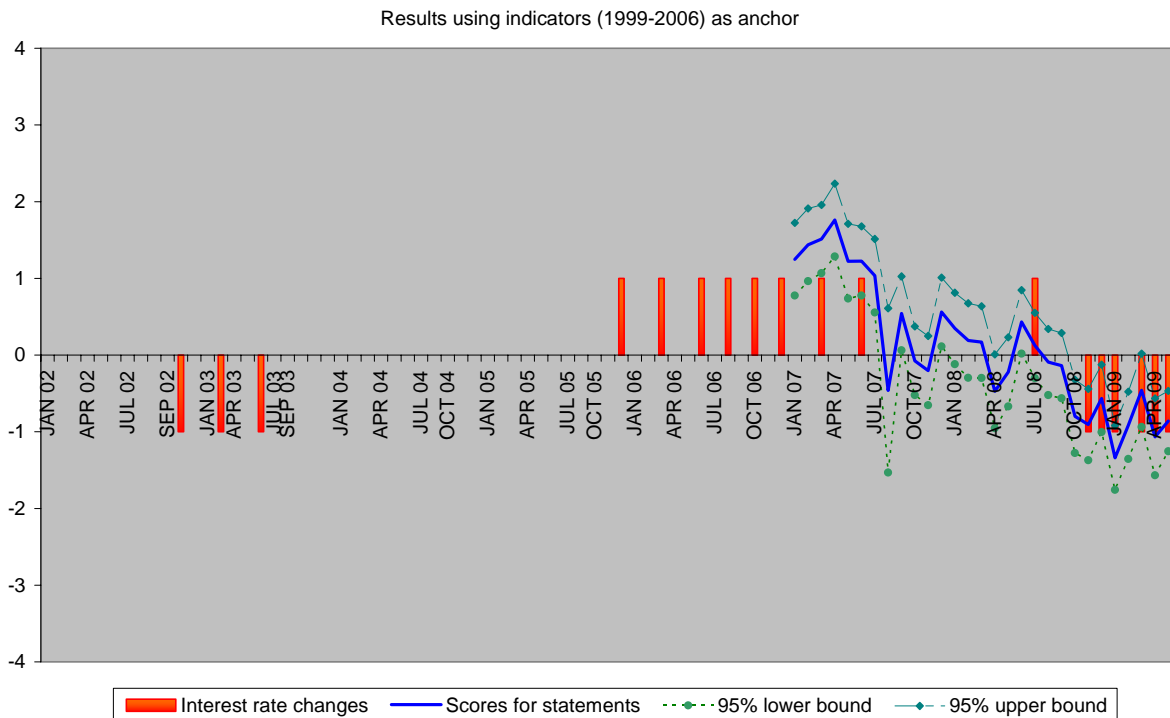


Figure 4. Wordscores for virgin texts vs. actual policy decisions
 (reference texts: 1999-2006)



Appendix: details on the Wordscores methodology

Wordscores proceeds in three steps¹¹:

Treatment of reference texts:

1. There is a set R of reference texts, each of which has a position on the policy dimension d .
2. The position on this dimension of individual texts – denoted by r – is denoted by A_{rd} .
3. The relative frequency, as a proportion of the total number of words in a text, of each unique word w in text r is denoted by F_{wr} .
4. Wordscores uses the matrix of F for all unique words in a text to estimate the conditional probability that one is reading text r given that one is reading word w .

5. This probability is calculated as:

$$P_{wr} = F_{wr} / \sum_r F_{wr}$$

6. The matrix of the conditional probabilities for all unique words is then used to produce a score S_{wd} for each word on dimension d . This score is the expected position on dimension d , given that one is reading w .
7. This score is the average of *a priori* scores for the reference texts weighted by the probabilities P . It is calculated as:

$$S_{wd} = \sum_r (P_{wr} * A_{rd}).$$

Treatment of virgin texts

1. First, the relative frequency of each word in the virgin texts is calculated. This frequency is denoted by F_{wv} .
2. The score of any virgin text v on dimension d is the mean dimension score of the scored words weighted by the frequency of the scored words. It is computed as:

$$S_{vd} = \sum_w (F_{wv} * S_{wd})$$

¹¹ This appendix is based on Laver et al. (2003), pp. 315-316.

Transformation of raw virgin scores

1. A final technical issue is the fact that common words in the reference texts tend to be assigned the mean overall scores of the reference texts.
2. Therefore, raw virgin texts scores tend to be more clustered than the reference texts.
3. To deal with this issue, Laver et al. (2003) propose a transformation to guarantee that the scores of the virgin texts have the same dispersion metric as the reference texts. The results presented throughout this paper are the transformed scores.
4. The transformation is done by computing:

$$S_{vd}^* = (S_{vd} - S_{\acute{v}d})(SD_{rd}/SD_{vd}) + S_{\acute{v}d}$$

where $S_{\acute{v}d}$ is the average score of virgin texts, and SD_{rd} and SD_{vd} are the sample standard deviations for reference and virgin text scores.