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DEVELOPMENT OF AN INDEX FOR MEASURING TRANSPARENCY OF CENTRAL BANKS

Although introducing explicit indices for measuring the transparency of central banks has enabled many empirical researches about theoretical issues of central banks' transparencies, the simple and one-dimension definition of transparency behind many of these indices has raised doubts about their reliability. All of these indices explicitly or implicitly assume that making more information available or making more precise information would automatically lead to greater transparency. In other words, the fundamental presumption of all these indices is that there is no friction in the conveyance of information.

In this paper, by applying the conceptual framework proposed by Winkler (2000), transparency has been defined as "the degree of genuine understanding of the monetary policy process and policy decisions by the public". In accordance with such a definition, an index based on the four elements of Openness, Clarity, Honesty and Common Understanding has been developed to measure the transparency of central banks.

Using the proposed index for measuring the transparency of three major central banks: the Federal Reserve, the ECB and the Bank of England and comparing the results with that of Siklos(2010) reveals that not only our calculated transparency's score, but also our ranking is different from him. These two points highlight that central banks may find new ways of being transparent which could not be assessed just based on the openness on information, so the results of empirical studies conducted based on such indices could not be reliable.

Keywords: Central bank transparency index, Openness, Clarity, Honesty, Common Understanding

JEL Classification: E50, E52, E58

INTRODUCTION

The transparency of central banks has become the topic of a lively public and academic debate on monetary policy. Society calls for transparency of central banks, which has recently become very independent, in order to make them accountable for their performance (Eijffinger & Geraats, 2006).

Another reason for the growing importance of central banks' transparency is its effect on the formation of public expectations (Cruijsen & Eijffinger, 2010). The increasing importance of money and financial markets

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has changed the management of public expectations into a key element in monetary policy (Winkler, 2002). In fact, the success of monetary policy is closely dependent on the accurate guidance of public expectations. Proper monitoring of public expectations has several advantages such as: reduction in uncertainty, improved planning of market activists, lower volatility of interest rates and more effective monetary policy (Issing, 2005).

Based on the reasons mentioned above, emerging academic literature has focused on the analysis of the economic consequences of greater transparency of central banks and their impact on the success of monetary policy. In most of these studies, researchers have been confined to detailed case studies which are not suitable for generalization or they have to develop indices for measuring the transparency of some sample central banks. Although developing such indices enables researchers to study the effects of transparency on the success of central banks' monetary policy more accurately, and even allows them to propose an optimal level of transparency, but noticing the fact that all of these indices are founded on the assumption that making more information available or making more precise information automatically leads to more transparency and there is no potential friction on the way of conveying information (Winkler, 2000), they could not be an accurate measure of central banks transparency. Indeed, central banks may find new methods to be transparent which are not included in such points of view towards transparency. So, judgment about central banks' transparency based on these common indices will not be reliable in some cases (Cruijsen & Eijffinger, 2010).

Accordingly, this paper presented a conceptual framework of redefining transparency and creating a more comprehensive index for transparency based on this framework. In the present research, transparency is considered based on the definition of Winkler (2000) which is the “degree of genuine understanding of the monetary policy process and policy decisions by public”. Based on this definition, transparency is considered to have four components: Openness, Clarity, Honesty and Common Understanding, each of them playing an important role in the transparency of central banks. For measuring the level of each of these aspects in central banks a questionnaire has been designed. The aggregate level of transparency has been considered as the weighted average of each component’s score. The application of the developed index for measuring transparency of the Federal Reserve, the Bank of England and the ECB reveals that ECB with a 76% score stands in the first place of transparency. The Bank of England with 64% receives the second place and finally the Federal Reserve with a score of 61% comes in third

place. Comparing the results of our proposed index with that of Siklos (2010) reveals that not only our ranking is different but also our transparency scoring is different from him. Both of these two points highlight that central banks may have found new ways for being transparent which could not be assessed just based on the openness as regards information.

1. LITERATURE REVIEW

Empirical studies regarding the transparency of central banks are still in their infancy (Dincer & Eichengreen, 2007). Most of these studies are in the form of case studies which investigate transparency practices of specific central banks and assess the effect of them on economics and financial variables through an analysis of time series. Among these researches the following could be cited: Muller and Zelmer (1999) for Canada, Chadha and Nolan (2001) for the UK, Haldane and Read (2000) for the UK and US, and Kuttner and Posen (2000) for the US, Germany and Japan.

Although these studies are beneficial for demonstrating that the concept of transparency could be converted to data, the main problem of such studies is that the generalization from a specific case to the community and the implication about the effects of transparency based on time series is controversial.

In order to overcome such barriers, several indices have been proposed for measuring the transparency of central banks.

Fry, Julius, Mahadeva, Roger, and Sterne (2000) in their comprehensive survey of 94 central banks, constructed an index of policy explanations that consists of three components: (i) explanations of decision policy, (ii) explanations in forecasts and forward-looking analysis, and (iii) explanations in published assessments and research. Their index captures many transparency issues, but does not highlight the role of information in the decision-making process.

In another study, Bini-Smaghi and Gros (2001) presented an indicator of central bank transparency and accountability for six major central banks that captures four components: Objectives, Strategy, Publication of data and forecasts, and Communication strategy. The latter captures diversity in the medium of disclosure information, regardless of how informative the disclosures are. They implement their index for four countries: the Fed, the Bank of England, the Bank of Japan, and the ECB.

Siklos (2002) expands the coverage to 20 central banks, all from advanced industrial countries. Siklos' ranking has the Bank of England, the Fed and the Riksbank as first, second and third, and the Austrian National Bank, the Bank of France and the National Bank of Belgium bringing up the rear.

Fracasso, Genberg, and Wyplosz (2003) evaluate the inflation reports of 20 central banks that have adopted inflation targeting. They assess the quantity, quality and accessibility of the information provided the clarity of assumptions about key macroeconomic variables, the presentation of the policy-making process, and the executive summary. In addition, they provide an overall rating of each inflation report based on its persuasiveness, expertise, completeness, writing style and information. Their analysis considers many facets of communication but is confined to inflation reports.

Eijffinger and Geraats (2006), distinguish political transparency (openness about policy objectives), economic transparency (openness about data, models and forecasts), procedural transparency (openness about the way decisions are taken, achieved mainly through the release of minutes and votes), policy transparency (openness about the policy implications, achieved through prompt announcements and explanation of decisions), and operational transparency (openness about the implementation of those decisions, in other words about control errors and macroeconomic disturbances affecting their magnitude), and proposed their index based on these five categories. Their overall index is a sum (equally weighted average) of these sub-indices. Their index is constructed for nine major central banks including the Reserve Bank of Australia, Bank of Canada, the ECB, Bank of Japan, the Reserve Bank of New Zealand, the Swedish Riksbank, the Swiss National Bank, the Bank of England, and the Federal Reserve. The results indicate sharp differences between more and less transparent central banks as of that date (with the Reserve Bank of New Zealand, the Bank of England and the Swedish Riksbank at the top in terms of transparency, and the Reserve Bank of Australia, Bank of Japan and the Swiss National Bank at the bottom). Although their work has been the most comprehensive work until that time, like other works, it considers transparency as a synonym of openness of information.

Dincer and Eichengreen (2007) extended the data set of Eijffinger and Geraats (2006) in two ways: (1) the sample was extended to 100 countries instead of 9, and (2) the data period was broadened to 1998-2005.

Siklos (2010) by applying Eijffinger and Geraats (2006) methodology to a broader dataset and 10 years' time horizon 1999-2009, concluded an improvement in transparency is notable in Central and Eastern Europe, while the index has shown much smaller rises in most other parts of the world.

Although developing such indices has a major contribution to the development of knowledge about central banks transparency, their one-dimension point of view towards how central banks become transparent makes them unable to accurately measure the degree of central bank transparency. Hence, the results of the studies conducted based on them are

unreliable. Indeed, if a central bank is ranked as a transparent one based on these indices, it would not be necessarily transparent in reality and vice versa. Central banks might find a new way to become transparent which could not be accurately measured by these indices. These criticisms highlight the need for revising the definition of transparency and its elements. Accordingly, in the next section a new definition of transparency will be presented and a more comprehensive set of elements required for central bank transparency will be described based on that.

2. CONCEPTUAL FRAMEWORK

All the indicators described in the previous section are based on the presumption that transparency is a simple and single-dimension concept and making more information available or making more precise information would automatically be translated to greater transparency. In fact, based on this assumption, there is no potential friction in the conveying of information and all the members of society could accurately and rationally interpret them.

This paper, aiming at developing a more accurate index and getting rid of such unrealistic assumptions, defines transparency as "the degree of genuine understanding of the monetary policy process and policy decisions by the public" (Winkler, 2000). This broad definition provides the opportunity to differentiate among different and probably conflicting aspects of transparency.

Our broad definition of transparency was supported by different empirical works which show transparency has a different meaning for different people (Buiter, 1999; Issing, 1999; Remsperger & Worms, 1999; Padoa-Schioppa, 2000).

Accordingly, the first element of the transparency is the amount and accuracy of information released by the central bank which is referred to as Openness (it is worth noting that most of other developed indices consider openness synonymous with transparency). However, the presented definition of transparency shows that Openness is not sufficient to achieve transparency. Disclosed information should be processed, structured, condensed, simplified and put into content in order to be understood by the public. This second element of transparency is referred to as Clarity in presentation and analysis of information. The needs for Clarity become obvious in the first place in the process of filtering and interpretation of information. To achieve the maximum efficiency in use of information, the costs and benefits of this activity should be in balance. The optimal level of Clarity might vary among different agents and various decision making problems.

The need for Clarity becomes more pronounced when giving more attention to the bilateral nature of effective information transmission. In fact, transparency is a social phenomenon that involves both sides, i.e., the sender and receiver of information rather than merely a property of communication instrument. In the communication process, the important point is the degree to which both parties involved in communication use common language for encoding and decoding of information. In this paper, this third element of transparency is referred to as Common understanding and it could be described as a necessary precondition for successful communication and at the same time the ultimate goal of genuine transparency.

The two-sided nature of communication process means that a gap could arise between the intention of the sender and the understanding of the receiver. This issue paves the way for strategic considerations such as intentional distortion in the encoding of information. So, Honesty could be introduced as the fourth element of transparency. In the context of monetary policy, Honesty refers to the degree of correspondence between the framework used by the central bank for internal reasoning and presentation adopted for external communication.

Different elements of transparency interestingly coincide with the dictionary definition of this word, e.g. "Easily Seen-through" (Openness), "Evident" (Clarity), "Frank" (Honesty) and "Easily Understood" (Common Understanding).

To provide a conceptual framework showing the relationship between different elements of transparency and their role in making central banks transparent, monetary policy strategy should be defined as the first step.

There are various definitions of monetary policy strategy. In a narrow point of view, monetary policy strategy reflects how policymakers map information about the state and the working of the economy (data and models) into policy decisions in order to achieve a specific objective. In other words, in this sense monetary policy strategy is considered as a reaction function that makes a linkage between a policy decision and a specific economic variable. Academic economists generally tend to follow this narrow definition. In such a perspective, monetary policy reduced to engineering problem and transparency simple (and narrow) merely requires accurate disclosure of every kind of information used for taking a special policy decision.

Under a broad perspective, monetary policy strategy is a systematic framework for organizing and structuring information and analyzing it. This definition, which is more acceptable by practical economists, argues that monetary policy problems are so complex that it is hopeless to write down

the decision problem. Even if such an effort will be successful, any resulting decision making rule is too complicated to be comprehensible (Blinder, 1997). Such a definition of monetary policy strategy seems to support the transparency definition and its elements presented in this paper.

Considering the role of monetary policy strategy in the structuring and interpretation of information and making policy decisions, monetary policy should satisfy the element of Openness. For effective communication, monetary policy strategy is required to provide representation of complex monetary policy which is honest and can be clearly and commonly understood. The need for clarity arises symmetrically both for policymakers and the public, even if the requirements for each group are different. The ultimate measure of effective communication and at the same time the necessary precondition of it is the common understanding of monetary policy strategy. This element addresses the question of how much strategy is understood and interpreted in the same way by the central bank and the public. In a survey conducted by Ehraman and Fratzscher in 2005 about the effectiveness of central banks' communication strategies, it was concluded that a higher degree of dispersion in the communication about monetary policy direction by committee members worsens the ability of financial markets to anticipate future monetary policy decision and raises market uncertainty. On the other hand, communicating the risk and diversity of views regarding economic outlook enhances the financial markets' ability to anticipate the future path of interest rates. In other words, it is not just the collegiality of views on monetary policy inclination, but the diversity of views on the economic outlook that appear to enhance the effectiveness of central bank communication and policy making (Ehraman & Fratzscher, 2005b).

3. EMPIRICAL FINDING

In order to measure the level of transparency based on conceptual framework described above, a questionnaire has been designed that includes 32 questions. 15 of these 32 questions are designed by Eijffinger and Geraats (2006) for measuring their proposed transparency index which coincides with the Openness element in our proposed framework. The other 17 remaining questions are categorized as follows: 7 questions (No. 16 to No. 22) are used to measure Clarity in the presentation of the information. 4 questions (No. 23 to No. 26) measure Honesty in central bank's communication. Finally, the last 6 questions (No. 27 to No. 32) assess

Common understanding elements in our proposed index. The questionnaire, along with the terminology of concepts used in it, is presented in Appendix A.

After filling in questionnaire, the central bank's score in each of the four elements of transparency and its total transparency index are calculated as follows.

Openness

This element of transparency based on Eijffinger and Geraats 2006 framework consists of five aspects: Political transparency, Procedural transparency, Economic transparency, Policy transparency and Operational transparency. As stated above, questions used to measure each of these aspects are exactly the same as the ones proposed by Eijffinger and Geraats. It is worth noting that they designed three questions for measuring each of these aspects. The range of scores to each question varies from zero to one and each aspect score is a sum of the scores of three questions related to it. The overall Openness's score is the simple average of the acquired score of each aspect.

In mathematical notation:

$$Political\ Openness = \frac{\sum_{i=1}^{3} S_i}{3} \tag{1}$$

$$Economic\ Openness = \frac{\sum_{i=4}^{6} S_i}{3} \tag{2}$$

$$Procedural\ Openness = \frac{\sum_{i=7}^{9} S_i}{3} \tag{3}$$

$$Policy\ Openness = \frac{\sum_{i=10}^{12} S_i}{3} \tag{4}$$

$$Operational\ Opennes = \frac{\sum_{i=13}^{15} S_i}{3} \tag{5}$$

$$total\ Openness = \frac{Political\,Openness + Economic\,Openness + Procedural\,Openness + Policy\,Openness + Operational\,Openness}{3} \times 100 \tag{6}$$

Where S_i denotes a score of question i

Clarity

Questions 16 to 22 are used to measure Clarity in presentation of information by central banks. In order to compute a Clarity score this formula has been applied:

$$Clarity = \frac{S_{16} + S_{17} + S_{18} + S_{19} + S_{20}, S_{21}, S_{22}}{6} \tag{7}$$

The reason behind multiplying the score of questions No. 20, 21 and 22 is that in order to increase Clarity, the central bank should provide processed additional explanation regarding their monetary policy regularly and in reasonable time. Well processed information which is not communicated at the right time could not improve market understanding of monetary decision and their anticipation ability so much.

Honesty

Questions No. 23, 24, 25, and 26 are used to measure Honesty. Based on the answers to these questions, the Honesty score has been calculated as follows:

$$Honesty = \frac{S_{23} + S_{24} + (1 - |S_{23} - S_{25}|) + (1 - |S_{24} - S_{26}|)}{4} \quad (8)$$

Questions No. 23 and No. 24 assess the degree of consistency between committee members' communication in the inter-meeting period and decisions taken regarding monetary policy, direction and economic outlook respectively while question No. 25 and No. 26 measure the percentage of votes involved in taking these decisions.

Based on the presented definition for Honesty, while question No. 23 and No. 24 should receive a high score in order to show honesty of central banks' committee members in their communication with the public about monetary policy and economic outlook, at the same time the difference between the scores of each of these two questions and questions No. 25 and No. 26, respectively, should be as low as possible. Indeed, the similarity of the answers inside each of these two pairs of questions (23 and 25, 24 and 26) is a good indicator of compatibility between the framework used by the central bank for internal reasoning and presentation adopted for external communication.

Common Understanding

Questions No. 27 to No. 32 are designed to measure the degree of Common understanding. The score for Common understanding is measured through the formula below:

$$Common\ Understanding = \frac{S_{27} + (1 - S_{28}) + S_{29} + S_{30} + (1 - S_{31}) + S_{32}}{4} \quad (9)$$

Question No. 27 measures consistency among central bank committee members' statements about monetary policy while Question No. 28 measures consistency among committee members' statements regarding economic outlook. It is worth mentioning that, hence, based on Ehraman and

Fratzscher's (2005b) research, it is the consistency of communication about monetary policy direction and inversely, dispersion of communication regarding economic outlook which lead to the enhancement of the market's ability to anticipate the future path of the economy, we have designed our formula for assessing common understanding elements in a way to have a positive correlation with the variable of consistency of communication regarding monetary policy inclination and a negative correlation with communication consistency about economic outlook.

Question No. 29 measures the degree of consistency between committee members' statements about monetary policy in the inter-meeting period and next policy change and Question No. 30 measures the degree of consistency among committee members' statements about economic outlook and next policy change. The more effective central bank communications are, the higher the consistency between next policy change regarding monetary policy direction and economic outlook and committee members' statements in the inter-meeting period would be.

Besides, if the central bank's communication is effective, unexpected components of monetary policy monitored by changes in short term interest rate should be small on meeting days. The amount of this shock is measured by question No. 31.The above formula has been designed in such a way to increase Common understanding score with a reduction in the interest rate shock.

Finally, we could state central bank communications are effective if they have significant effects on economic variables, question No. 32 tracks the effectiveness of central bank's communication from this point of view through measuring its effect on the inflation rate.

Total Transparency Index

After measuring different elements of transparency, the total transparency index is calculated as the weighted average of its elements' scores:

$$\begin{aligned} &Central\ Bank\ Transparency = (W_1 * Openness + W_2 * Clarity + \\ &W_3 * Honesty + W_4 * Common\ Understanding) * 100 \end{aligned} \tag{10}$$

Weights have been determined by averaging several experts and scholars opinion toward the importance of each element. Proposed weights have been shown in Table 1.

Table 1

Final weights used in calculation of Total Transparency Index

Transparency Element	Proposed Weight
Openness	18%
Clarity	58%
Honesty	14%
Common Understanding	10%

Source: research's finding

It is worth mentioning, although scholars proposed weights vary, all of them weighted Clarity as the most important element and Common Understanding as the least important one in transparency.

In order to calculate the proposed index in this paper and compare the results with that of Siklos (2010), three central banks including the Federal Reserve, the Bank of England and the ECB have been chosen as samples and 2009 has been selected as the base year.

The answers to the questions related to Openness element have been extracted directly from Siklos's work without any change. The clarity related question has been answered based on investigation of the content, structure and timing of information released by these central banks. Other questions have been answered based on an updated version of Ehraman and Fratzscher (2005a). The reasons behind choosing such an approach to fill in the questionnaires instead of sending them directly to central banks could be named as follows: firstly, in this method variables are measured by examination of central banks' reports and communication records and this increases the accuracy of the answers; secondly, using this approach enables us to compare the result of the proposed index with that of Siklos (2010).

Through the aforementioned approach, questions are answered and the scores of different elements of transparency and total transparency index have been calculated for each of the three central banks. The results have been shown in Figure 1.

Based on the calculations, the ECB stands in first place of transparency with 76%, the Bank of England with 64% stands in second place and the Federal Reserve with a score of 61% comes after them.

Comparing the results of our proposed index with that of Siklos for 2009 reveals that not only our ranking, but also our transparency's scores, are different from him. These two points highlight that central banks might have found new ways for being transparent which could not be assessed just based on openness of information.

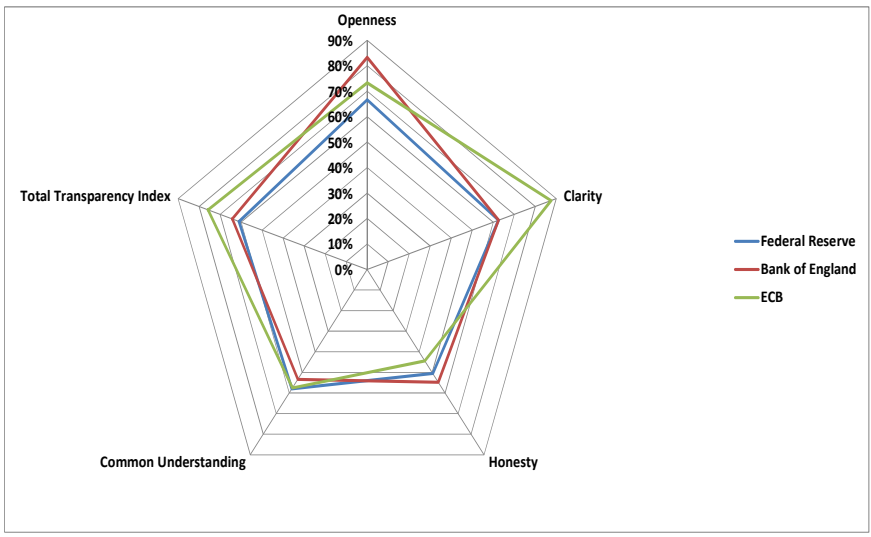

Figure 1. Total Transparency Score

Source: research's finding

In order to describe in more detail the condition of transparency in each of these central banks, the score of these three central banks in each of the transparencies' elements is analyzed as follow:

3.1. Openness

As stated before, this element corresponds to Eijffinger and Geraats' (2006) definition of transparency and shows the amount and precision of information disclosed by a central bank. This element, based on their work has five aspects: Political, Economic, Procedural, Policy and Operational. The answers to questions related to these aspects were directly extracted from Siklos's work for 2009. For further discussion on this element, please see Eijffinger and Geraats (2006) and Siklos (2010). Figure 2 shows the score of each bank in each of the five aspects of Openness and their total Openness score:

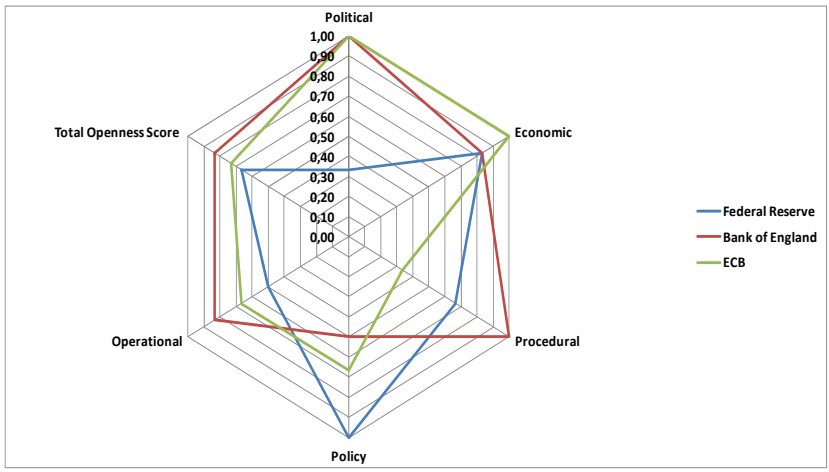

Figure 2. Openness Score
Source: research's finding

3.2. Clarity

Based on the definition presented in the section of conceptual framework, Clarity shows the degree to which information is processed, structured, simplified and condensed in a unique format and disclosed on time. Figure 3 shows the questions related to this element of transparency and their answers based on investigations of websites and reports of the central banks considered:

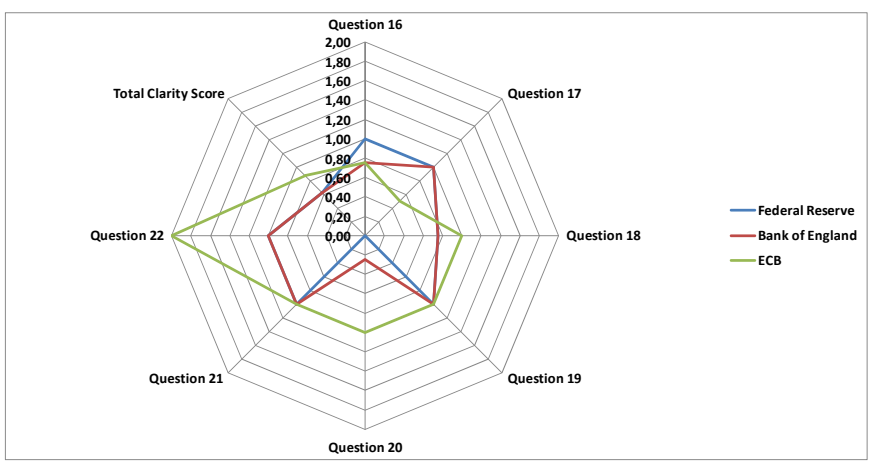

Figure 3. Clarity
Source: research's finding

Question No. 16 assesses how much information is processed. Based on the answer to this question, the Federal Reserve makes more processed information available for the market. Risk assessment and discussing different opinions towards specific policy is the most distinguishable characteristic of its report in comparison with the other two central banks. Question No. 17 examines the degree to which central banks have structured their reports. Certainly, applying a unique format with appropriate headlines for disclosing information enables users to search the required information more easily and compare them with the information of other periods. Both the Federal Reserve and the Bank of England have a unique format with differentiated headlines for disclosing information regarding monetary policy while the ECB in spite of benefiting from a relatively unique format, does not discriminate among different topics of report by using differentiated headlines. Question No. 18 determines the variety of formats used by central banks to disclose information regarding economic variables. Obviously, using a more variant format makes gathering and analyzing information more simple for different kinds of users. The ECB's website permits users to download time series of economic variable with several formats including PDF and Excel. In addition, the ECB's website provides the opportunity for users to draw graphs of variables and their components using the website utility and then download this graph with the desired format. The Federal Reserve and the Bank of England, however, provide information in a limited number of formats and they are not capable of drawing time-series graphs which make interpretation of trends simpler. Regarding question No. 19, each of the three central banks reveal all kinds of information concerning economic variables including components of variable, calculation method, changes in calculation method and its effect on previous disclosed information to make a meaningful comparison among different periods, in addition to the variable itself.

Question No. 20 assesses the time taken by the central bank to disclose additional information regarding the decision made. Question No. 21 assesses the frequency of providing additional information and question No. 22 determines approaches for providing this information. The ECB arranges press conference immediately after each meeting in order to announce a decision and provide additional information. The press conference has a unique format and at the end of each conference, a Q&A session is held, playing an important role in the clarification of the decision. The content of this press conference with the Q&A session is released on the bank website with both formats of audio and text and users easily have access to them.

However, the Bank of England and the Federal Reserve provide additional information about the decisions with a considerable lag (2 weeks for the Bank of England and 3 weeks for the Federal Reserve). While both of these central banks have a unique format of disclosing additional explanation, not holding Q&A sessions causes some questions to remain unanswered. Therefore their information is less clarified in comparison with the ECB.

Totally, it could be concluded that the ECB, with a score of 87.5%, is the clearest central bank in our sample group while the Federal Reserve and the Bank of England jointly with a score of 62.5% receive second place.

3.3. Honesty

This element examines the degree to which the framework of decision making corresponds to the disclosed framework. Figure 4 presents questions related to this element and answers to them.

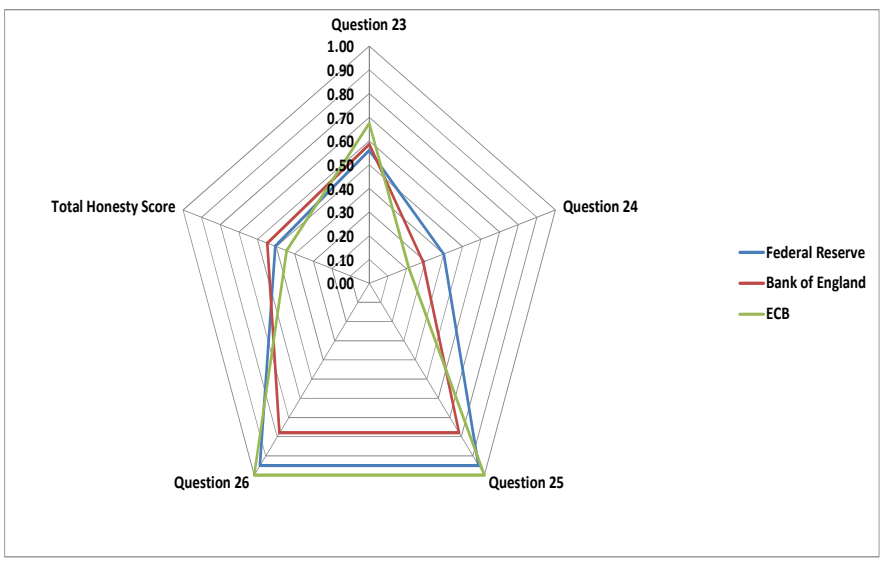

Figure 4. Honesty

Source: research's finding

Question No. 23 assesses the degree of consistency between committee members' statements in the inter-meeting period and decisions made regarding monetary policy at the meeting. Based on the answer to this question, the maximum degree of consistency belongs to the ECB with a

68% consistency. While at the Bank of England and the Federal Reserve there is 59% and 58% of consistency between committee members' statements and taken decisions regarding monetary policy, respectively.

Question No. 24 assesses the degree of consistency between committee members' statements in the inter-meeting period and taken decision regarding economic outlook. Maximum consistency between committee members' statements and the taken decision belong to the Federal Reserve with 40% consistency. The Bank of England, with 29% consistency, stands in second place and the ECB with 20% consistency comes last.

Based on the answer to question No. 25, the Bank of England decisions on monetary policy have been made with 78% of votes, which is the minimum deviation from the answer to question No. 23 (19.4% deviation). This small deviation shows that the committee members' statement in the intermeeting period is a good indicator of their opinion at the meeting and they insist on their statements. In other words, there is a high degree of similarity between the framework presented to the public and their internal framework. At the ECB, since the decisions are taken based on consensus, we can say they are taken by 100% of votes. Based on this, difference between the answer to question No. 23 and question No. 25 reach 32.5%. In the Federal Reserve such a decision is taken by 95% of votes which shows a 39% deviation from the answer to question No. 23.

Question No. 26 examines by what percentage of votes, decisions about economic outlook are taken. Since information regarding voting results has not been discriminated based on monetary policy and economic outlook, we assume both types of decisions are taken with a similar percentage of votes, hence there is not any difference between the answers to this question and question No. 25. Therefore, the smallest divergence between the answer to this question and question No. 24 belongs to the Bank of England with a 49.1% difference. The Federal Reserve with a 55% deviation has second place and finally the ECB with 78.8% stands in last place.

To sum up, with respect to the consistency between the presented framework for public purposes and the framework used for internal decision making regarding monetary policy, the Bank of England stands in first place, the ECB receives second place and finally the Federal Reserve receives third place. Regarding economic outlook decision, the Bank of England stands in first, Federal Reserve in second and the ECB comes at the end.

Based on the total Honesty score, it could be concluded that the Bank of England with a score of 55%, the Federal Reserve with a score of 51% and the ECB with a score of 44% stand in the first to third place, respectively.

3.4. Common Understanding

Common understanding assesses the degree of effectiveness of central bank communication. Figure 5 presents questions relating to this element and their answers:

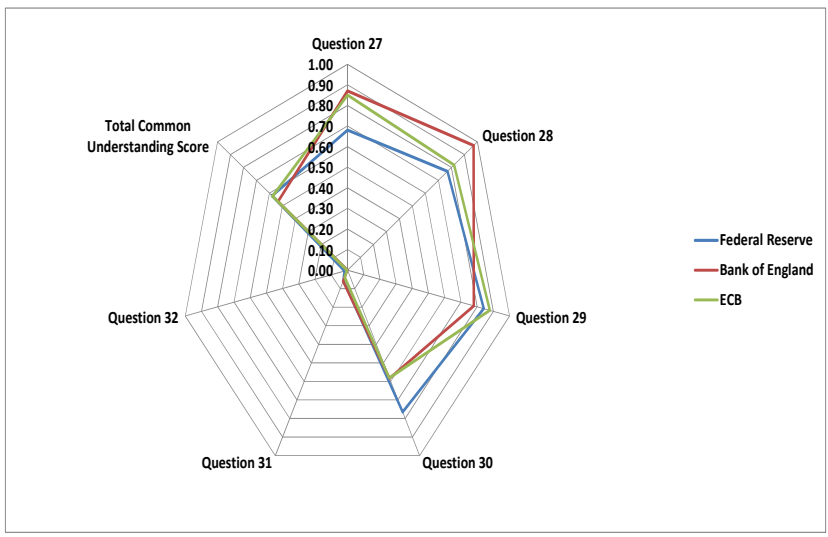

Figure 5. Common Understanding

Source: research's finding

Question No. 27 measures consistency among central bank committee members' statements about monetary policy. As stated before, the higher the degree of consistency between committee members' statements regarding monetary policy, the higher the degree of prediction power of market about monetary policy. This means more effectiveness of central bank's communication. As is observable in Table 5, the Bank of England with 87% consistency stands in first place. The ECB with 85% of consistency comes after that and finally the Federal Reserve with 68% consistency stands in third place.

Question No. 28 measures consistency among committee members' statements regarding economic outlook. Based on the description in section 3, the higher the dispersion in committee members regarding economic outlook is, the higher would be the prediction power of the market.

Based on this, the Federal Reserve with 77% consistency (23% dispersion) of committee members' statements about economic outlook provides the maximum prediction opportunity for market. The ECB with

87% consistency (13% dispersion) stands in second place and finally comes the Bank of England with 97% consistency (3% dispersion).

Question No. 29 measures the degree of consistency between committee members' statements about monetary policy in the intermeeting period and the next policy change. If this consistency is higher, there would be a more effective communication and a better understanding of economic policy in the market. Based on the answer to this question, the ECB, the Federal Reserve and the Bank of England with 87.8%, 84.1% and 78% consistencies' scores, respectively, stand in first to third places.

Question No. 30 measures the degree of consistency among committee members' statements about economic outlook and next policy change. The higher amount of this consistency means there is a better understanding of central bank orientation in the market. Based on the answer to this question, the Federal Reserve, the Bank of England and the ECB with 76.5%, 58.3% and 58.1% consistencies' scores stand in first to third place, respectively.

Question No. 31 measures the percentage of surprise in one month interest rate at the meeting day (unexpected component of monetary policy on the meeting day). Whenever this surprise is lower, it means that central bank's communications are more effective and the market could better anticipate the central bank's orientation based on committee members' communication in the inter-meeting period. Since the minimum amount of shock belongs to countries under supervision of the ECB, it could be concluded that from this point of view, the ECB has the most effective communication. The Federal Reserve with 5.6% shock in one month interest rate stands in second place and finally Bank of England with 6% shock stands in third position.

Question No. 32 measures the effects of inter meeting communication on inflation rate. An effective communication should be able to change inflation rate and hence the price of financial assets. As seen in table No. 5, the Federal Reserve intermeeting communication has changed five years expected inflation rate about 1.8% on average and has the maximum effect on inflation expectation. ECB communication has changed five years inflation expectation 0.3% on average and stands in second place. Finally, the Bank of England communication in intermeeting period has changed five years inflation expectation only 0.1% and receives third place.

In general, based on the provided formula for calculation of the score of common understanding elements, it could be said that the Federal Reserve with a score of 57.97% enjoys the maximum amount of common understanding of its policy by the public. The ECB with little deviation and with a score of 57/57% stands in second place. Finally the Bank of England with 53.4% stands in third place.

4. SUMMARY AND CONCLUSION

In recent years, transparency of central banks has become a topic of lively public discussions and many academic arguments about monetary policy.

In order to enable academicians to do empirical researches in this area, several indices have been developed to measure central banks' transparency. Although the development of such indices enable researchers to study the effects of transparency on the success of central banks' monetary policy more accurately and even permits them to propose an optimal level of transparency, but the fact that all of these indices are founded on the assumption that making more information available or making more precise information available automatically leads to more transparency and there is no potential friction in the way of conveying of information (Winkler, 2000), they could not be an accurate measure for central banks' transparency.

This research is aimed at developing a more accurate index and getting rid of such unrealistic assumptions. Therefore, transparency is defined broadly and loosely as "the degree of genuine understanding of the monetary policy process and policy decisions by the public" (Winkler, 2000) which in turn has four aspects of Openness, Clarity, Honesty and Common Understanding.

Based on this definition, our proposed index has been developed as a weighted average of these four elements and a questionnaire including 32 questions has been designed to gather the required information to calculate the index.

In order to test our index and compare it with that of Siklos (2010), the Federal Reserve, the Bank of England and the ECB were considered as the samples and all required information was collected for 2009.

Based on the suggested index, the ECB was found to stand in first place of transparency with a score of 76%, The Bank of England with 64% stands in second place and the Federal Reserve with a score of 61% comes after them. Comparing the results of our proposed index with that of Siklos reveals that our transparency's score and also our ranking are different from him. These points show that central banks may have found new ways to be transparent which could not be judged only based on openness about information and indices developed based on this point of view may lead our researches to misleading results.

A caveat of our index is that our samples are limited to only three central banks and data are from 2009, a few years ago. If this index is calculated for a broader group of samples with more up-dated data, it could be a valuable

reference for researchers interested in empirical studies about central banks' transparency. In addition by doing so, we will be able to make judgments about the relationship among different elements of transparency.

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APPENDIX A: TERMINOLOGY AND QUESTIONNAIRE

Terminology:

I. Openness:

Openness is the amount and precision of information that is released and it has five dimensions:

A Political transparency

Political transparency refers to openness about policy objectives. This comprises a formal statement of objectives, including an explicit prioritization in the case of multiple goals, a quantification of the primary objective(s), and explicit institutional arrangements.

B Economic transparency

Economic transparency focuses on the economic information that is used for monetary policy. This includes economic data, the model of the economy that the central bank employs to construct forecasts or evaluate the impact of its decisions, and the internal forecasts (model-based or judgmental) that the central bank relies on.

C Procedural transparency

Procedural transparency is about the way monetary policy decisions are taken. It involves an explicit monetary policy rule or strategy that describes the monetary policy framework, an account of policy deliberations and how the policy decision was reached.

D Policy transparency

Policy transparency means prompt disclosure of policy decisions. In addition, it includes an explanation of the decision, and an explicit policy inclination or indication of likely future policy actions.

E Operational transparency

Operational transparency concerns the implementation of the central bank's policy actions. It involves a discussion of control errors in achieving operating targets and (unanticipated) macroeconomic disturbances that affect the transmission of monetary policy. Furthermore, the evaluation of the macroeconomic outcomes of monetary policy in the light of its objectives is included here as well.

II. Clarity:

Clarity is degree to which information has been processed, structured, condensed, simplified and put into context.

III. Honesty:

Honesty is the degree to which the framework for reasoning and analysis adopted by the central bank internally correspond to the presentation for the external communication.

IV. Common Understanding:

Common understanding is the degree to which both parties to the communication process share a common interpretation device (or language) for encoding and decoding a message.

Openness Questionnaire:

Political transparency

1. Is there a formal statement of the objective(s) of monetary policy, with an explicit prioritization in case of multiple objectives?

☐ No formal objective(s) = 0.

☐ Multiple objectives without prioritization = 0.5.

☐One primary objective, or multiple objectives with explicit priority = 1.

2. Is there a quantification of the primary objective(s)?

☐No = 0.

☐Yes = 1.

3. Are there explicit institutional arrangements or contracts between the monetary authorities and the government?

☐No central bank, contracts or other institutional arrangements = 0.

☐Central bank without explicit instrument independence or contract = 0.5.

☐Central bank with explicit instrument independence or central bank contract (although possibly subject to an explicit override procedure) = 1.

Economic transparency

4. Is the basic economic data relevant for the conduct of monetary policy publicly available?

☐Quarterly time series for at most two out of the five variables = 0.

☐Quarterly time series for three or four out of the five variables = 1 / 2.

☐Quarterly time series for all five variables = 1.

5. Does the central bank disclose the formal macroeconomic model(s) it uses for policy analysis?

☐No = 0.

☐Yes = 1.

6. Does the central bank regularly publish its own macroeconomic forecasts?

☐No numerical central bank forecasts for inflation and output = 0.

☐Numerical central bank forecasts for inflation and/or output published at less than quarterly frequency = 0.5.

☐Quarterly numerical central bank forecasts for inflation and output for the medium term (one to two years ahead), specifying the assumptions about the policy instrument (conditional or unconditional forecasts) = 1.

Procedural transparency

7. Does the central bank provide an explicit policy rule or strategy that describes its monetary policy framework?

☐No = 0.

☐Yes = 1.

8. Does the central bank give a comprehensive account of policy deliberations (or explanations in the case of a single central banker) within a reasonable amount of time?

☐No, or only after a substantial lag (more than 8 weeks) = 0.

☐Yes, comprehensive minutes (although not necessarily verbatim or attributed) or explanations (in the case of a single central banker), including a discussion of backward- and forward-looking arguments = 1.

9. Does the central bank disclose how each decision on the level of its main operating instrument or target was reached?

☐No voting records, or only after a substantial lag (more than eight weeks) = 0.

☐Non-attributed voting records = 0.5.

☐Individual voting records, or decision by single central banker = 1.

Policy transparency

10. Are decisions about adjustments to the main operating instrument or target promptly announced?

☐No, or after a significant lag = 0.

☐Yes, at the latest on the day of implementation = 1.

11. Does the central bank provide an explanation when it announces policy decisions?

☐No = 0.

☐Yes, when policy decisions change, or only superficially = 0.5.

☐Yes, always and including forwarding-looking assessments = 1.

12. Does the central bank disclose an explicit policy inclination after every policy meeting or an explicit indication of likely future policy actions (at least quarterly)?

☐No = 0.

☐Yes = 1.

Operational transparency

13. Does the central bank regularly evaluate to what extent its main policy operating targets (if any) have been achieved?

☐No, or not very often (at less than annual frequency) = 0.

☐Yes, but without providing explanations for significant deviations = 0.5.

☐Yes, accounting for significant deviations from target (if any); or, (nearly) perfect control over main operating instrument/target = 1.

14. Does the central bank regularly provide information on (unanticipated) macroeconomic disturbances that affect the policy transmission process?

☐No, or not very often = 0.

☐Yes, but only through short-term forecasts or analysis of current macroeconomic developments (at least quarterly) = 0.5.

☐Yes, including a discussion of past forecast errors (at least annually) = 1.

15. Does the central bank regularly provide an evaluation of the policy outcome in light of its macroeconomic objectives?

☐No, or not very often (at less than annual frequency) = 0.

☐Yes, but superficially = 0.5.

☐Yes, with an explicit account of the contribution of monetary policy in meeting the objectives = 1.

Clarity

16. Released information about policy decision includes which of the following sections? (You can select more than one)

☐Summary of discussion of committee members and arguments for and against (0.25)

☐Decision and its expected result(s) (0.25)

☐Explicit discussion of the decision impacts on the economic condition and the main economic variable (0.25)

☐Analysis of risks surrounding the decision and its expected result(s) (0.25)

17. Does the central bank have a uniform format for releasing information specified in the previous question?

☐Yes, it has a uniform formats with headlines corresponding to information specified in the previous section or something like them (1)

☐Yes, it has uniform formats but without highlighted headlines (0.5)

☐No, the central bank does not prefer to use a uniform format (0)

18. In which format are the time series of economic variables available? (You can select more than one)

☐HTML (0.25)

☐Pdf (0.25)

☐Excel (0.25)

☐Published reports (0.25)

19. What kind of information about economic variable is released?

☐Variable (0.25)

☐Its component (0.25)

☐The way of computation (0.25)

☐Changes in the computation method and the effect of these changes on the previous disclosure amount (0.25)

20. How much time does it take to release an explanation about decisions taken after the monetary policy meeting?

☐Immediately (1)
☐One to two days (0.75)
☐Three to five days (0.5)
☐One week to two weeks (0.25)
☐More than two weeks (0)

21. Is additional explanation about the taken decision presented on the same day?

☐Never, and allow the agents to have their analysis (0)
☐Sometimes (0.25)
☐Often (0.5)
☐Most of the time (0.75)
☐Always (1)

22. Through which ways are these additional explanations regarding decisions presented?

☐Text without unique format and content (0.5)
☐Press Conference without Q&A sessions (0.5)
☐Text with special frame and specific contents (1)
☐Press conference with Q&A sessions (1)

Honesty:

23. How much consistency is there among committee members' statements about monetary policy direction in the inter-meeting period and the next policy decision?

0% 100%

24. How much consistency is there among committee members' statements about economic outlook in the inter-meeting period and the next policy decision?

0% 100%

25. With what percentage of votes are decisions about monetary policy direction taken?

0% 100%

26. With what percentage of votes are decisions about economic outlook taken?

0% 100%

Common understating

27. How much consistency is there among committee members' statements about monetary policy direction in the inter-meeting period?

0% 100%

28. How much consistency is there among committee members' statements about economic outlook in the inter-meeting period?

0% 100%

29. How much consistency is there among committee members' statements about monetary policy direction in the inter-meeting period and the next policy change?

0% 100%

30. How much consistency is there among committee members' statements about economic outlook in the inter-meeting period and the next policy change?

0% 100%

31. How much is the unexpected component of monetary policy on the meeting day? (Percent of surprise in one month interest rate)

0% 100%

32. How much inter-meeting communication change 5 years inflation expectation on average?

0% 100%

Dispersion:

In order to assess the consistency of communication in the period between meetings for each of the central banks, a simple statistical dispersion measure developed by Ehrmann and Fratzscher (2005a) is used. Dispersion for a particular inter-meeting period k is defined as the sum of the distances between each of the statements in the period divided by the maximum total distance:

$$C_K^{EC} = \begin{cases} +1 \textit{ stronger economic outlook} \\ 0 \textit{ unchanged economic outlook} \\ -1 \textit{ weaker economic outlook} \end{cases}$$

$$C_K^{MP} = \begin{cases} +1 \textit{ thightening inclination} \\ 0 \textit{ no inclination} \\ -1 \textit{ easing inclination} \end{cases}$$

$$\Omega_K^{MP} = \frac{\sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \left| c_i^{MP} - c_j^{MP} \right|}{1/2 \times (N^2 - D)} \qquad \text{Eq. (A.1)}$$

With C^{MP} defined as above, N the total number of statements in the inter meeting period k, and D a dummy that takes the value of one if N is an odd number and zero if it is even. The total dispersion measure Ω over all the intermeeting periods is defined as the average of the individual dispersion measures Ω_K.

$$\Omega^{MP} = \frac{\sum_{k=1}^{K} \Omega_k^{MP}}{K} \qquad \text{Eq. (A.2)}$$

Dispersion regarding economic outlook (C^{EC}) is calculated analogously.