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Discussion Paper No. 463

January 2011

Diskussionsbeiträge der Fakultät für Wirtschaftswissenschaft
der FernUniversität in Hagen

Herausgegeben vom Dekan der Fakultät

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The Effects of Central Bank Communication on Financial Stability: A Systematization of the Empirical Evidence

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January 2011

-Abstract-

The recognition of information asymmetries and uncertainties has led central banks to attach great importance to communication policy as a monetary policy instrument. In this paper, we argue that there is a role for central bank communication in maintaining and improving the resilience of the financial system. We conducted a systematic review of the empirical evidence on the financial stability effects of a range of different communication channels. The analysis identifies a pronounced effect of central bank communication on financial market variables, with statements and press conferences being seemingly the most effective channel of central bank communication. While less attention has been paid to written reports as a communication tool, our results also seem to support the view that written reports move asset prices.

Keywords: Monetary Policy, Central Bank Communication, Financial Stability

JEL Codes: E52, E58, E44

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1. Introduction

The stability of the financial sector is of decisive importance for achieving sustainable economic growth. By now, there exists considerable evidence that effective financial institutions and markets help to overcome market frictions and foster economic growth, and that financial instability can entail significant real costs (see, e.g., Levine, 2005; Reinhart and Rogoff, 2009). In reality, financial markets are far from frictionless and thus do not automatically lead to optimal growth outcomes when left to themselves. Since the functioning of the financial system cannot be ensured by market participants alone, and the implementation of governmental financial sector reforms is rather time-consuming (and typically watered down by lobbying), monetary policy-makers might need to step in. Moreover, financial globalization has led to an economic environment characterized by an increasing degree of complexity of financial instruments and a lack of transparency on global financial markets due to the increased occurrence of financial conglomerates and the blurring of boundaries between the segments of the financial sector. As a result of these developments, the uncertainty among market participants is rising and with it, the need to have sufficient information to reach well-founded decisions.

In this paper, we argue that there is a role for central bank communication in maintaining and improving the resilience of the financial system. Central banks can reduce uncertainty by communicating relevant information about macroeconomic fundamentals, the condition of financial institutions and the financial sector more generally, and the conduct of policy. Thus, while De Haan et al. (2007) define central bank communication “as the provision of information by the central bank to the general public on the objectives of monetary policy, the monetary policy strategy, the economic outlook, and the (outlook for future) policy decisions”, we take one step further in that we argue that central bank communication might be considered as a valuable tool regarding wider-ranging objectives like maintaining financial stability.

What is financial stability? Although academia and policy-makers have provided various definitions, financial stability still remains an elusive concept. Yet, there exists no consensus on what best describes the state of financial stability.¹ Goodhart (2006) notes that many commentators find it easier to perceive financial stability as a negative concept, involving the absence of something unwanted. In this vein, Davis (2002) defines financial instability as the “heightened risk of a financial crisis – a major collapse of the financial system, entailing

¹ See, e.g., Schinasi (2006) or Allen and Wood (2006) for extensive reviews.

inability to provide payments services or to allocate credit to productive investment opportunities.” With regard to definitions which focus on its positive counterpart, Issing (2003) differentiates between definitions which are based on a system approach and those which are related to the volatility of directly observable financial variables. Taking the systemic view, Mishkin (1999) argues that financial instability occurs “when shocks to the financial system interfere with information flows so that the financial system can no longer do its job of channelling funds to those with productive investment opportunities”. Following Schinasi (2004), a “financial system is in a range of stability whenever it is capable of facilitating (...) the performance of an economy, and of dissipating financial imbalances that arise endogenously or as a result of significant adverse and unanticipated events”. The volatility approach suggests that financial stability is somewhat related to the volatility of financial market variables and asset price bubbles. Such a definition is offered by Foot (2003) who identifies financial stability as a situation with “confidence in the operation of the generality of key financial institutions and markets in the economy and no relative price movements of either real or financial assets within the economy that will undermine monetary stability or employment levels close to the economy’s natural rate”.

In what follows, we will adhere to Crockett’s (1997) definition who somewhat bridges those two approaches by arguing that financial stability “requires (i) that the key institutions in the financial system are stable, in that there is a high degree of confidence that they continue to meet their contractual obligations without interruption or outside assistance; and (ii) that the key markets are stable, in that participants can confidently transact in them at prices that reflect fundamental forces and that do not vary substantially over short periods when there have been no changes in fundamentals”. On the one hand, this definition refers to the possibility of the financial system being itself a source of shocks (see also Borio and Drehmann, 2009). More importantly, we are emphasizing the importance of excessive volatility with respect to the maintenance of financial stability. In this regard, Crockett’s definition seems to be most suited for our purposes as we try to conceptualize the relationship between central bank communication and financial stability.

This paper is related to recent surveys on the effects of central bank communication. Van der Cruijssen and Eijffinger (2007) provide an overview of the literature on the desirability of central bank transparency from an economic point of view. They focus on an optimal overall degree of monetary policy transparency and show that there is likely to be an intermediate degree of central bank transparency at which the quality of the provided information is

optimized. The authors point out that too much transparency might be detrimental and the wealth of information provided by financial stability reports might complicate it for financial market participants to get an understanding of the situation at hand. Wagner (2007) discusses the implications of information asymmetries and uncertainty for the institutional design and the communication and information policy of central banks. The author argues that central bank communication leads to better monetary policy decisions by pooling knowledge and managing the expectations of market participants. Blattner et al. (2008) review conceptual issues relating to the predictability of central banks and the role of transparency as one of its main determinants. The authors distinguish between short-term and long-term predictability and conclude that for transparency to have a positive impact on predictability, it does particularly matter how information published by central banks is communicated to the public and financial markets. Closest to our paper is the work by Blinder et al. (2008) who offer an extensive survey on the issue of what constitutes an optimal central bank communication strategy and whether central bank communication can enhance monetary policy effectiveness. While their results indicate that communication can enhance the predictability of monetary policy and has the ability to move financial markets, the authors note that the distinction among different forms of communication merits further evaluation to reach results about what might work best.

Accordingly, the aim of this paper is to examine and systematize the empirical evidence on the financial stability effects of different central bank communication channels. As emphasized by Blinder (2008), the quantification of communication events tends to be extremely difficult so that most studies estimate the influence of central bank communication by using financial market data and focus on the volatility of the financial variables. The basic idea is that communication effects should be reflected by an increase in volatility of these variables on days of central bank communication. Thus, we will use the results of the empirical studies implementing such an approach and argue that central bank communication affects financial stability via enhanced transparency and decreased uncertainty. Against the background of our proposed definition of financial stability, a decrease (or at least, no increase) in financial volatility in the long term will thus contribute positively to financial stability, although volatility increases in the short term. The reason is that smaller volatility in turn leads to higher predictability and reduced uncertainty (see section 2).

Our main findings are that (i) the empirical evidence indicates a pronounced effect of central bank communication on financial market variables, regardless of the communication channel being considered; (ii) statements and press conferences seem to be the most effective

communication channel with regard to the influence on financial markets; (iii) written reports – which we may call the long-term channel of communication – tend to exert an influence on asset prices in multiple markets; (iv) OLS and (E)GARCH are the most frequently implemented empirical methods by far; and (v) the Euro area, the US and the UK are the countries (regions) on which the majority of the empirical work focuses.

The remainder of the paper is organized as follows: section 2 sets the stage by laying out the conceptual relationship linking central bank communication, volatility and financial stability. Section 3 reviews the empirical evidence of whether central bank communication has an impact on financial stability. The last section concludes and points out to some areas for further research.

2. Central Bank Communication, Volatility and Financial Stability

In the recent past, many central banks added financial stability to their monetary policy objectives output and inflation stabilization (see Buiter, 2008). There are several reasons for this. First, there is a close relationship between a functioning financial sector and economic performance. For example, the better the financial system ensures the efficient allocation of resources via different investment opportunities, the more efficiently credit can flow and the more efficiently the economy works (Mishkin, 2007). Second, some authors argue that price stability itself can aid financial stability (see Issing, 2003). The reason is that inflation (variability) increases the probability of misjudgements of returns and earnings of investment opportunities. Since high inflation is possibly followed by a reallocation of assets and a shortening of the investment horizon, inflation has the potential to destabilize the financial markets (Schwartz, 1995). Third, central banks themselves can play an important role in ensuring financial stability by providing liquidity and acting as lender of last resort. Fourth, a stable financial system can ensure a smooth functioning of the monetary policy transmission mechanism and hence monetary policy decisions.

What is the relationship between uncertainty, volatility and financial stability? A higher degree of uncertainty on financial markets often leads to an increase in volatility on financial markets. The volatility of asset prices thus can be understood as the fluctuation of the asset price which is rooted in the change of underlying factors of this asset. In this regard, the price of assets usually mirrors their “true” profitability. However, in exceptional situations, price developments may not always reflect fundamental factors since such developments can indicate the existence of an asset price bubble. As noted by ECB (2005), bubbles can blur the information content of asset prices stemming from their forward-looking character. The

literature with respect to asset price bubbles typically focuses on positive bubbles, since they typically precede negative bubbles and most arguments in regard to positive bubbles can be applied to negative bubbles as well.

The price of an asset can be illustrated as follows:

$$p_t = E_t \sum_{i=1}^T \frac{d_{t+i}}{\prod_{j=1}^i (1+r_{t+j})(1+\pi_{t+j}) + \rho_{t+i}}$$

with d_{t+i} as the nominal payment of the asset at time $t+i$. The variables r_{t+j} , π_{t+j} and ρ_{t+i} correspond to the real interest rate, inflation and the risk premium. The maturity date is given by T and the expectation's operator is given by E (BIS, 2006). It can be argued that the volatility of asset prices is due to the uncertainty of future payment flows and the discount rate. Considering the macro level, payment flows can be approximated by different economic variables, for example the GDP. Uncertainty in regard to the economic development can manifest itself in changes of the real interest rate, the inflation rate and the risk premium. Interest rates and inflation, in turn, can be influenced by monetary policy. It is important to stress that volatility is not necessarily identical to instability. On efficient markets, asset prices reflect the information available at any time and the volatility of asset prices is due to the changing assessment of the underlying fundamental factors. Even when financial instability is often associated with an increase in volatility, the inverse case is not necessarily true (see IMF, 2003; BIS, 2006).

However, financial instability is often associated with excessive volatility of asset prices. Volatility can be viewed as excessive, for example, when asset prices deviate significantly and for a longer time period than usual from their long-term equilibrium – presuming that such equilibria can be reasonably identified – and when they cannot be explained by data like payment flows or discount rates (see Wyplosz, 1999). For example, during one day stock markets typically fluctuate by 1-2%. But fluctuations of 30 % (as in October 1987 in the United States) can put the complete financial system at risk since such high volatility might induce misallocation of resources. An increased volatility leads to an increase in uncertainty so that investors refrain from long-term engagement, resulting in a worsening of economic conditions due to a reduced provision of capital. A loss of confidence can induce higher risk premia, a flight to quality and higher transaction costs in certain financial markets (see Ayuso et al., 1996). Furthermore, strong price declines can impair balance sheets of financial

intermediaries and lead via contagion and asymmetric information to destabilizing retroactions on the financial system (see Adrian and Shin, 2008).

Monetary policy can have direct and indirect effects on volatility on financial markets. The direct effects occur via the real interest rate and the risk premium and the indirect effects via the impact on economic variables like inflation and output. It is assumed that direct effects were responsible to a larger extent for the reduction of volatility since the 1980s. Partly, these direct effects of monetary policy are caused by the increase of monetary policy transparency and central bank communication. Transparency and communication might have worked via several channels. First, enhanced transparency might have increased the credibility of monetary policy, resulting in a decreased necessity of adjusting expectations regarding short-term interest rates, and, hence, a reduced volatility. Second, a longer policy horizon might have contributed to a stabilization of long-term interest rates since these are determined by short-term interest rates. Third, via improved communication the term premium might have reduced due to decreased uncertainty regarding to the future path of the policy rate (see BIS, 2006).

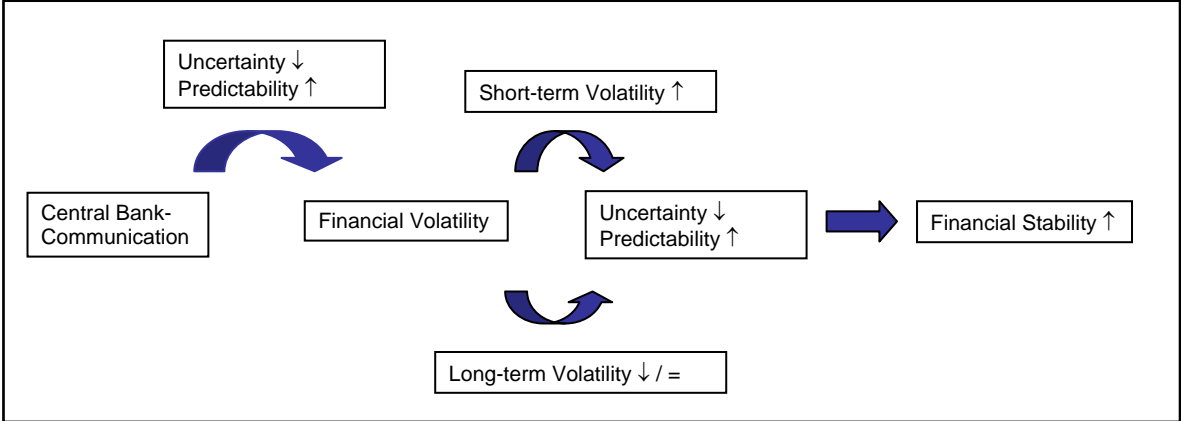
In this regard, central banks can help to maintain financial stability by providing information and ensuring credibility. A better understanding of monetary and financial stabilization policies might reduce financial sector uncertainty, thus enabling financial markets participants to make their investment decisions. The better financial markets understand the monetary policy stance the better the reaction of asset prices is aligned to monetary policy objectives. Furthermore, central banks might contribute to enhanced risk perception by an appropriate communication during irrational exuberance on financial markets (see also Knütter and Wagner, 2010).

When financial markets are better informed and more homogenous in their formation of expectations, a higher degree of transparency can ensure - by reducing uncertainty - a faster adjustment of private sector expectations and hence decrease financial market volatility (see Chadha and Nolan, 2001; Rafferty and Tomljanovich, 2002). In this regard, improved central bank communication has different implications for asset price developments. When central bank communication is viewed as credible, markets can be stabilized in that investors are not forced to adjust their expectations regarding short-term interest rates. Hence, the degree of interest rate reactions to monetary policy decisions (including their communication) could be reduced (see Muller and Zelmer, 1999; Haldane and Read, 2000). It should be stressed that private sector expectations are crucial for monetary policy transmission since central banks can control only the overnight interest rate. The relationship between this instrument and the

relevant asset prices depends almost exclusively on private sector expectations (Blinder, 1998). Hence, the “management of expectations” is of utmost importance (see Woodford, 2005). The reason is that investment decisions are based on intertemporal considerations, depending themselves on long-term interest rates. In turn, these long-term rates depend on private sector expectations regarding the future policy path (see Morris and Shin, 2005). Therefore, when monetary authorities aim at stabilizing expectations regarding the future path of policy, it should result in a higher stability of asset prices (see Amato et al., 2003).

Additionally, it should be stressed that the time horizon is important when considering the relationship between monetary policy and financial stability. That is, short-term volatility is not necessarily associated with financial market instability. Rather, the ability of central bank communication to reach and move markets is reflected by an increase in short-term volatility. However, long-term volatility is rather associated with financial market instability. In this regard, central bank communication is an important factor for reducing financial market volatility (BIS, 2006). There are several studies showing that improved central bank communication via reduced uncertainty contributed to enhanced predictability of monetary policy decisions, thus weakening a central cause for financial market volatility (see Ehrmann and Fratzscher, 2005a; 2007a; 2007b; Poole et al., 2002; Lange et al., 2003; Carlson et al., 2006; Blattner et al., 2008 for an overview).

Figure 1: Central Bank Communication, Volatility and Financial Stability



Source: Own display, using Blattner et al. (2008) and BIS (2006)

Hence, central bank communication might be an important instrument for influencing market behavior and information transmission and, in this regard, might work as a preventive instrument in a risk-management sense. Central bank communication might affect financial market volatility via enhanced transparency and decreased uncertainty. Whereas volatility can

increase in the short term, it will decrease (or at least, not increase) in the long term and thus contribute positively to financial stability. The reason is that smaller volatility in turn leads to higher predictability and reduced uncertainty (see figure 1). Furthermore, communication might be a protective instrument in financial crises, for example in case of coordination deficits.

3. Systematization of the Empirical Evidence

In this section we analyze the empirical evidence focusing on the impact of central bank communication on financial markets and, eventually, on financial stability. In what follows, we differentiate between minutes and voting records (3.1), statements and press conferences (3.2), speeches and interviews (3.3) and written reports (3.4). In this regard, we try to answer four questions, respectively:

- 1) Has the corresponding communication channel an impact on asset prices at all?
- 2) Does a particular channel of central bank communication exert an influence on the volatility of asset prices and if so, does the volatility increase or decrease?
- 3) Which empirical method is most frequently used by the authors (OLS vs. (E)GARCH vs. Event study)?
- 4) Is there a common pattern with regard to the country sample included in the empirical study?

3.1 Minutes and Voting Records

Minutes can give market participants important information regarding the different views of the committee members in terms of the future path of policy and the economic outlook. Minutes may enable market participants to understand how several members of the decision-making body have voted and which reasons they gave for their decision. The publication of voting records might – via the votes of deviators – shed light on the future path of policy and the clarity of macroeconomic signals. This, in turn, is believed to enhance the predictability of monetary policy (Blinder et al., 2008). Geraats (2009) reports that the number of central banks publishing minutes within six to eight weeks after the monetary policy decision has grown strongly in the period 1998-2006 (from six to sixteen), but is still small relative to the overall number of central banks. The publication of minutes only makes sense in monetary policy committees. However, minutes and voting records may have negative effects for central banks with a collegial decision-making (e.g. the ECB) in that they undermine the

desired “aura of consensus”. Hence, this communication instrument is rather suitable for committees with an individualistic decision-making (Blinder, 2006).

The effect of minutes on financial stability might be given by the retrospective effect on expectations of financial market participants. The participants are enabled to anticipate future decisions by the publication of historic discussions. This might happen the sooner minutes and voting records are published. Furthermore, central banks can document that they took all risks into account and thus might be able to calm markets.

Up to now, there is not so much empirical evidence on the effects of minutes and voting records which might be rooted in the fact that the number of central banks publishing minutes and voting records is still relatively small. We reviewed seven empirical studies focusing on the impact of minutes and voting records on financial markets which appeared between 2001 and 2007 (see table 1 in the appendix). Four analyses focus on the UK, three on the U.S. and one study on the Euro area, Australia, Canada, New Zealand and Sweden. All methods are represented throughout the samples. The most frequently used method is OLS (three times), whereas all other methods (event study and (E)GARCH) are used only once, respectively. Furthermore, one study is using an ARFIMA (Autoregressive Fractionally Integrated Moving Average) model.

When looking at the results of the empirical evidence, it turns out that minutes and voting records clearly have an impact on asset prices in general. Furthermore, in nearly all studies, there is a short-term increase in volatility. Six out of the seven studies find an increase in the short-term volatility; only one study (Andersson et al., 2006) finds a small and insignificant impact on asset prices (here: term structure of interest rates). With respect to the method, it can be noted that all types of analyzed methods support the basic result. Of the three OLS studies, two report on an increase in short-term volatility. The remaining methods find an increase in short-term volatility as well. Hence, the overall impression of the analyzed studies is that minutes and voting records have a clear positive impact on short-term volatility, and thus, in turn, are able to contribute to financial stability against our conceptual background. However, further empirical research on the impact of minutes and voting records on financial markets is still needed.

3.2 Statements and Press Conferences

Statements and press conferences have developed to one of the most important channels of central bank communication, in particular when focusing on financial markets. Of special interest are statements and press conferences immediately after monetary policy decisions.

They are used to explain to financial market participants the reasons for the interest rate decision, the economic outlook and the future path of policy. It should be stressed that central banks have developed “codes” to illustrate certain situations (e.g. the ECB uses certain words, like “vigilance”, to indicate a probable interest rate increase, see Rosa and Verga, 2008).

The contribution to financial stability can be seen in the fact that the information contained in the statements is used by market participants to build their expectations regarding short- and long-term interest rates. In particular, this is true for the economic development. The fact that statements and press conferences contain information beyond the actual monetary policy decision contributes to a higher predictability in situations under uncertainty. Thus, press conferences are able to move markets to a larger extent than the decision itself (Ehrmann und Fratzscher, 2009a).

There is broad empirical evidence of the importance of press conferences and statements on financial stability. For our paper, we studied thirty-four analyses published between 2000 and 2010. Most of them conclude that there is a positive influence of these communication instruments on asset prices in general. Furthermore, it turns out that in most cases (twenty-seven out of thirty-four) there is a short-term increase in volatility. Hence, the percentage of analyses finding an increase in short-term volatility is relatively high, albeit not as high as for minutes and voting records.

Most of the analyses focus on the Euro Area (twenty) and the U.S. (fifteen). In addition, the U.K. is analyzed six times and Japan and Canada twice, respectively. All methods are represented throughout the samples. The most frequent used method is (E)GARCH (eleven times), followed by OLS (ten times) and event studies (6 times). Furthermore, there is one study using method of moments estimation, tobit regression, non-parametric tests, ordered-probit regression, univariate regression and the ARFIMA model, respectively. Regarding the empirical strategy, it can be noted that all studies support the basic result of an increase in short-term volatility of financial markets after statements and press conferences have been issued, regardless of the method used. In particular, OLS (eight out of ten) and event studies (five out of six) show that statements and press conferences induce the volatility to rise in the short term. The method (E)GARCH (seven out of eleven) has also a high degree of positive impact on financial markets. With respect to the country samples, it turns out that, in particular, Japan (two out of two), Canada (two out of two), the U.S. (thirteen out of fifteen) and the Euro Area (seventeen out of twenty) have a very high degree of studies with an

positive impact on the short-term volatility of financial markets. Studies analyzing the U.K. find a slightly smaller degree (four out of six).

Summing up, the empirical evidence on the impact of statements and press conferences by central banks on financial markets shows that they can move asset prices in the short-term and, at the same time, reduce uncertainty and increase predictability, thus contributing to financial stability.

3.3 Speeches and Interviews

While statements and press conferences contain crucial information regarding the central banks' monetary policy decisions and its assessment of the economic situation, important information is also provided via speeches and interviews. Members of a monetary policy committee give lectures and interviews or deliver speeches at irregular intervals and appear at public events. Communication with the public via this communication channel tends to be rather flexible in timing and content. Typically speeches and interviews take place in the time between and around the monetary policy committee's meetings and occur relatively frequently. With respect to its content, the monetary policy committee members present their views of the economic outlook and try to explain current policy decisions. An important function is to signal their interpretation of new incoming economic information – either because of sudden changes in the economic outlook or some other news (see, e.g., Andersson et al., 2006). At the same time, speeches and interviews are rarely coordinated and sometimes the views put forward can differ.

As it is the case for statements and press conferences, the contribution of speeches and interviews to financial stability lies in the impact on the market participants' formation of expectations regarding short- and long-term interest rates and interest-rate expectations on financial markets. The information contained in interviews and speeches goes beyond the information provided in statements and press conferences and creates an added value, since its flexibility in timing allows the decision-maker to react on unforeseen circumstances, thereby enhancing predictability and reducing uncertainty. Especially in turbulent times on financial markets the policy makers can calm down the markets by communicating to the public via this channel, conveying information that might contain unexpected signals.

We reviewed thirteen empirical studies which deal with the effects of speeches and interviews and appeared in the time between 2004 and 2010. The empirical methods used most frequently are (again) (E)GARCH and OLS. Regarding the country samples, eight of

these analyse the US economy, three studies investigate communication effects in the Euro area, while four papers examine the UK and two examine Canada. One is a cross-country study covering 35 mainly advanced countries (see table 1 in the appendix).

When looking at the big picture, it's fair to say that this communication channel appears to have an influence on asset prices, albeit a rather weak one when compared to the other channels. Of the thirteen studies considered, seven studies find a significant effect on the volatility of various asset prices, while three studies conclude that communication has a statistically significant impact on asset prices or that some asset price merely responds to speeches and interviews. However, three of the thirteen studies find no significant impact on asset prices at all, which accounts for nearly 25 percent of the studies reviewed. A possible explanation why the effects of this communication channel are not as pronounced as in the other cases is possibly that speeches typically deliver well-known facts which change only slightly over prolonged periods of time. Furthermore, news agencies publishing speeches and interviews act as a kind of filter since journalists determine which kind of information is worth reporting (see also Hayo et al., 2008). Thus, speeches and interviews can only be collected to the extent that a news agency provides the relevant information.

Whereas interviews and speeches tend to move asset prices in general, the evidence regarding the impact on the volatility of asset prices is less clear. First, the number of studies demonstrating an influence on the volatility tends to be rather limited – with seven out of thirteen studies. Second, two of the seven studies show a negative influence on the volatility of asset prices. While a decrease in market volatility could be interpreted as reflecting a lower degree of uncertainty, it seems to run against our proposed conceptual framework which assumed an initial increase in market volatility. However, with regard to the two studies showing a negative effect on volatility, it should be noted that the Hayo et al. (2008) study does not distinguish different news content, they just focus on the news event. Fratzscher (2008), on the other hand, captures oral *interventions* which are supposed to convey a stance with respect to the exchange rate and with the objective of moving the exchange rate in a certain direction. As such, these interventions could probably be interpreted as a kind of crisis management as opposed to the speeches which just deliver content in terms of the economic situation or explaining the latest monetary policy decision. Nevertheless, the observation of a reduced volatility seems to be consistent with the notion that central bank communication should in principle have positive effects on financial stability via a decrease in market volatility.

3.4 Written Reports

In the last decade, we have seen an increasing number of central banks widening their financial stability mandate. Evidence of this increased focus on financial stability aspects has been the rising number of central banks publishing *financial stability reports*. Cihák (2006) defines financial stability reports as regular, independent central bank publications that focus on risks and exposures in the financial system.

With respect to the promotion of financial stability, the publication of financial stability reports serves several purposes. First and foremost, the publication of such a report allows central banks, financial market participants and other relevant authorities to understand risks and vulnerabilities in the financial system. Second, financial stability reports can provide a systemic focus to risk management by highlighting the build-up of excessive risk-taking at a broader level of the financial system and other systemic threats to financial stability (see Wilkinson et al., 2010). Gai and Shin (2003) argue that such reports provide a kind of common knowledge in that each economic agent can be confident that the “audience as whole has grasped the main propositions.” And third, it puts the central banks’ actions and analysis under public scrutiny and by this, the quality, accuracy and frequency might be improved. Thus, a financial stability report can increase the transparency and accountability of its activities and concerns (see Bowen et al., 2003). In short, the publication of a financial stability report assures the public and financial markets that the financial sector is doing well and serves as an early warning arrangement for economic agents and regulatory agencies so that the relevant authorities can take early action to prevent ensuing financial stability risks from materializing (Svensson, 2003).²

Another essential element of the central banks’ communication policy is the publication of a *monthly bulletin or monetary policy report* by which the public and financial markets are given a comprehensive development of the economy, macroeconomic projections and an insight to the use of the analytical tools with regard to its monetary policy strategy. As is the case at the ECB, the bulletins often contain articles on selected topics as well as a statistical section presenting comprehensive data on the economic and financial developments (see European Central Bank, 2001; 2002). Instead of publishing a monthly bulletin, some

² Examples of such reports are the ones of the European Central Bank (ECB) or the Bank of England (BoE). The ECB follows a three-step approach in providing a comprehensive picture of the stability of the financial system. In this regard, it first assesses the individual and collective robustness of market participants and infrastructures in general. In a second step the ECB identifies the sources of risk and vulnerabilities in the financial system. Finally, it evaluates the ability of the financial system to overcome a crisis, provided that the risks materialize (see ECB, 2004). The approach of the BoE comprises four elements: (i) the identification of key vulnerabilities to the financial system; (ii) the mapping of risk transmission channels; (iii) the quantification of impact and probability; and (iv) the identification of appropriate policy actions (see Haldane et al., 2007).

inflation-targeting central banks such as the BOE prepare an *inflation report* in which they set out a detailed economic analysis and inflation projections relevant for their interest rate decisions and present an economic outlook for the following two years (see, e.g., Bank of England, 2010).

Before turning to the review of the empirical evidence, one should note that there is relatively little systematic cross-country research on the financial stability effects of external communication in terms of written reports. This essentially owes to the fact that the quantification and measurement of the impact of this form of communication on financial stability is a complex and complicated task since it has a rather indirect influence on financial stability (see, e.g., Oosterloo and De Haan, 2006). To compensate for the dearth of empirical research on this topic, we also took those studies into account that did not refer to the written reports of central banks directly but rather to the transparency of the public sector in general. Nevertheless, this strand of empirical work puts its focus on the disclosure of such publications that convey substantial macroeconomic and financial information and investigates its impact on financial market participants.

All in all, we have considered 20 empirical studies which were published in the time between 2001 and 2010 and deal with the financial stability effects of written reports in its broadest sense, thus also including the empirical work concerning the effects of transparency more generally. On the methodological side, it should be noted that the OLS technique is the empirical strategy most of the studies follow (twelve studies). Regarding the country sample there seems to be no common pattern – at the most, the US and the UK seem to be investigated most frequently (see table 1 in the appendix).

Taken together, the studies surveyed demonstrate that written reports tend to exert an influence on asset prices in multiple markets, though the form of written reports may vary. With 14 out of 20 studies, the majority of the empirical work focuses on the effects of monetary policy reports (inflation reports). Only two papers examine the effects of financial stability reports on financial stability – the ones by Oosterloo et al. (2007) and Born et al. (2010) respectively.

We categorize the four remaining studies into ‘other studies’: the ones that do not refer to the central bank communication channel directly but to transparency more generally. Gelos and Wei (2005) investigate the impact of macroeconomic policy transparency on international portfolio holdings. Glennester and Shin (2008) examine whether transparency, which is measured by the accuracy and frequency of macroeconomic information released to the

public, leads to lower borrowing costs in the sovereign bond market. And while Islam (2007) studies how greater transparency is related to financial sector performance, Tong (2007) analyses in which way the implementation of the IMF's Special Data Dissemination Standard translates into a higher forecasting ability of financial analysts.

Furthermore, the empirical work reviewed suggests that written reports of various kinds reduce volatility in financial markets. To be sure, not all studies examine the volatility of asset prices per se. Fracasso et al. (2003) examine the influence of the quality of inflation reports on interest-rate surprises. In the work of Glennester and Shin (2008), a decline in credit spreads of sovereign bonds is interpreted as a reduction in market uncertainty. In Tong (2007), a decrease in forecast errors and dispersion of stock analysts' forecasts reflects a decrease in market uncertainty. In this regard, we interpreted reduced uncertainty as a manifestation of reduced volatility and vice versa.

3.5 Summing Up

To sum up, our main findings are that (i) the empirical evidence surveyed indicates a pronounced effect of central bank communication on financial market variables; (ii) statements and press conferences seem to be the most effective communication channel with regard to the influence on financial markets; (iii) written reports – which we may call the long-term channel of communication – tend to exert an influence on asset prices in multiple markets; (iv) OLS and (E)GARCH are the most frequently implemented empirical methods by far; and (v) the Euro area, the US and the UK are the countries (regions) on which the majority of the empirical work focuses.

4. Conclusions

Literature on central bank communication analyzing the direct impact on financial stability is rather limited. This survey aims to fill this gap. Whereas several recent surveys examine central bank communication in light of achieving the objective of price stability, here financial stability is put in the focus. Although the majority of studies we are analyzing is focusing primarily on price stability, we try to infer the impact of central bank communication on financial stability and macroeconomic performance since these studies are using high frequency data from financial markets.

Our analysis can be interpreted in a way that central banks are able to move markets via their communication channels. In particular, this is true for statements and press conferences as well as minutes and voting records. To a lesser extent, speeches and interviews are able to

affect financial markets. As regards central bank communication instruments, there has been relatively little research on written reports. Our results support the view that written reports also seem to move asset prices.

How is the observation of a reduced volatility (uncertainty) in the case of written reports related to the increased volatility in case of the other communication channels? Financial Stability Reports and Inflation Reports are communication events occurring less frequently. So this form of communicating to financial markets and the public could be interpreted as a kind of long-term type of communication. In principle, this could mean that the observed effect of a reduced volatility of asset prices does not contradict the finding in the other categories indicating an increasing short-term volatility. To be clear, central bank communication affects (short-term) financial market volatility via enhanced transparency and reduced uncertainty. Whereas this volatility will increase in the short-term, it will – due to enhanced predictability and less uncertainty – decrease in the long term and thus exert a positive impact on financial stability.

However, there is still room for future research. For future empirical research, it might be particularly fruitful to explicitly focus on the financial stability effects of central bank communication, thereby using other financial stability measures than high frequency data as sub-ordinate target. Furthermore, the country samples could be extended by using country samples that include central banks from emerging and developing countries. Moreover, another interesting strand could be the relationship between the monetary policy strategy, central bank communication and financial stability. Can central banks with an inflation targeting strategy more effectively affect financial markets? These issues could be – in our opinion – the starting points for future research dealing with the question of whether and how central bank communication can affect financial stability.

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Appendix

Table 1: Systematization of the empirical studies on the financial stability effects of central bank communication

Study	Method	Results	Country/-ies
<i>Minutes, voting records</i>			
Andersson et al. (2006)	OLS using weekly data	Minutes have a small and insignificant effect on investors expectations as reflected in the term structure of interest rates	Sweden
Chadha and Nolan (2001)	QML, GARCH	Implementation of inflation targeting and the publication of minutes has significantly increased volatility in short-term interest rates	UK
Clare and Courtenay (2001)	OLS using intra-day data	Minutes increase volatility for most of asset prices studied	UK
Connolly and Kohler (2004)	EGARCH	Minutes in the UK have a small and significant effect on interest rate expectations, in the case of the US the effect is statistically insignificant	Australia, Canada, USA, Euro Area, New Zealand, UK
Reeves and Sawicki (2007)	OLS using intra-day data	Minutes increase the variance of financial market prices	UK
Rigobon and Sack (2004)	Event study	Sharper response of asset prices and market interest rates to policy rate changes on days of FOMC meetings	US
Van Bleijskwijk et al. (2007)	ARFIMA (Autoregressive Fractionally Integrated Moving Average) model, non-parametric tests	Minutes only affect the volatility of long-term interest rates (Tnotes)	US

Study	Method	Results	Country/-ies
<i>Statements, press conferences</i>			
Alt-Sahalia et al. (2009)	Event study	Announcements of interest rate cuts contributed positively, announcements of domestic and foreign currency liquidity support mostly associated with reductions in interbank risk premia throughout the crisis, as measured by a reduction in libor/ois spread	Euro Area, UK, US, Japan
Bernroth and von Hagen (2004)	OLS	Volatility of the Euribor futures rates on Governing Council days significantly larger than on non-Council days, effect of statements after monetary policy decisions cause some surprises, but effect on volatility of Euribor futures is small	Euro Area
Brand et al. (2006)	Method of Moments estimation (Principal component analysis, recursive regressions)	Conferences (jump news) have a strong impact across all maturities along the yield curve - volatility not examined	Euro Area
Chirinko and Curran (2005)	Event study	Statements have a strong and positive effect on bond market volatility (30-y treasury bond futures)	US
Coffinet and Gouteron (2007)	OLS	Impact of money news via press releases on medium-term and long-term interest rates appears as both statistically significant and strong	Euro Area
Connolly and Kohler (2004)	EGARCH	Commentary accompanying rate moves influences policy expectations significantly, no systematic effect for "no move"-decisions	Australia, Canada, USA, Euro Area, New Zealand, UK
Dominguez and Panthaki (2007)	Event study	Intervention news and news of 'no intervention' have a statistically significant influence on intra-day exchange rate returns and volatility	Euro Area, Japan, UK, US
Egert (2009)	GARCH	Communication aimed at talking up the rand against the dollar appears to have the expected appreciating effect, effect is very short-lived, does not carry over to a period longer than a day	South Africa
Ehrmann and Fratzscher (2005a)	Tobit regression	Communication dispersion raises interest rate volatility in the case of the Fed	Euro Area, UK, US
Ehrmann and Fratzscher (2005b)	EGARCH	Financial markets respond significantly stronger to Fed and ECB communication prior to interest rate changes, as measured by interest rates across all maturities	Euro Area, UK, US
Ehrmann and Fratzscher (2009a)	OLS using high frequency intra-day data	Increased market activity and volatility (Euribor futures), while magnitude of effect depends on size of "surprise component"	Euro Area

Study	Method	Results	Country/-ies
Ehrmann and Fratzscher (2009b)	EGARCH	Statements immediately before FOMC meetings exert strong effect on volatility of short-term interest rates, while pre-Purdah statements raise volatility post-Purdah statements lowers volatility	US
European Central Bank (2007)	Non-parametric tests	During press conferences trading activity on future markets increases significantly	Euro Area
Fay and Gravelle (2008)	OLS using daily data	Statements significantly influence short-term interest rate expectations as measured by the volatility of market interest rates	Canada
Fratzscher (2008)	EGARCH	Oral interventions reduce market volatility whereas actual interventions raise volatility. Oral interventions are effective independently from the occurrence of actual interventions	Euro Area, UK, US
Guthrie and Wright (2000)	Ordered-probit regression	Statements lead to an increase of market interest rates of all maturities and an appreciation of the exchange rate	New Zealand
Gürkaynak et al. (2005)	OLS using daily and intra-day data	FOMC statements move asset prices, exert a significant and strong influence on interest rates at the long end of the yield curve, more so than interest rate decision itself	US
Hayo et al. (2008)	GARCH	Statements exert a negative influence on volatilities of financial variables (stocks, bonds, forex)	US
Hayo et al. (2010)	GARCH	Communication has significant statistical impact on European and Pacific equity market returns, post-meeting statements and testimonies affect both Pacific and European markets	US
Jansen und de Haan (2005)	EGARCH	Statements significantly increase volatility of exchange rate, larger impact on conditional volatility than on conditional mean of exchange rate	Euro Area
Jansen und de Haan (2007)	Event study using high-frequency data, non-parametric tests	Effects on exchange rates are negligible and short-lived, releases of macroeconomic data diminish the effectiveness of verbal interventions	Euro Area
Kohn and Sack (2004)	Event study	Statements significantly increase the volatility of financial variables, especially at the short end of the yield curve	US
Lucca and Trebbi (2009)	Univariate regression using intra-day data, VAR	Short-term nominal yields on Treasury securities respond to changes in policy rates and content of statements. Medium and long-term yields only react to changes in communication	US

Study	Method	Results	Country/-ies
Musard-Gies (2005)	PCA and OLS using daily data, non-parametric tests	Statements have an impact on short-term and long-term interest rates, stronger influence on short end, direction depending on the "tone" of the statement	Euro Area
Reeves and Sawicki (2007)	OLS using intra-day data	Testimonies have no significant impact on financial market prices	UK
Rosa (2007)	Descending hierarchical classification algorithm, OLS	Conferences exert an influence on the volatility of financial market expectations, linguistic categories contribute to explain strength of reaction of market prices	Euro Area
Rosa (2008)	OLS	ECB and the Fed can systematically and significantly move market rates of all maturities, Fed communication has more pronounced effect on the long end of the yield curve	Euro Area, US
Rosa und Verga (2005)	OLS	Press conferences exercise significant influence on market interest rates (Euribor)	Euro Area
Rosa und Verga (2008)	Event study, ordered-probit regression	Wording in press conferences can influence the direction the Euribor future prices will move, futures rates increase after an unexpected hawkish announcement, decrease after a dovish one	Euro Area
Rozkrut et al. (2007)	EGARCH	Statements and press conferences influence asset prices at short and medium maturities of the yield curve, increase in volatility most pronounced in Czech Republic and Poland - mixed results in the case of Hungary	Czech Republic, Hungary, Poland
Sahminan (2008)	EGARCH	Market interest rates significantly influenced by communication. Monetary policy decision statements increase the volatility of short-term interest rates in Thailand (while no influence in Indonesia). Inter-meeting statements have no effect on volatility	Indonesia, Thailand
Siklos and Bohl (2007)	EGARCH, OLS	Interest rate changes exert much larger influence on exchange rate movements and volatility than statements, in previous studies measurement of news was too highly aggregated	Euro Area
Sturm and de Haan (2009)	Ordered-probit regression	Interbank interest rate does not contain all the information provided by the communication indicators, inclusion of communication indicators leads to better forecasts of ECB interest rate decisions	Euro Area
Van Bleijskwijk et al. (2007)	ARFIMA (Autoregressive Fractionally Integrated Moving Average) model, non-parametric tests	All markets significantly react to FOMC statements as measured by volatility of TBills, TNotes and S&P500	US

Study	Method	Results	Country/-ies
<i>Speeches, interviews</i>			
Andersson et al. (2006)	OLS using weekly data	Unexpected news in speeches have significant effects on the long end of the yield curve	Sweden
Beine et al. (2009)	GARCH	Speeches play a signalling role regarding the volatility of exchange rates, type of speech is of crucial importance	Germany, Japan, US
Born et al. (2010)	Event study	Only modest effects on stock market returns; speeches and interviews tend to increase market volatility	35 mainly advanced countries
Chirinko and Curran (2005)	Event study	Speeches have a strong and positive effect on bond market volatility (30-y treasury bond futures)	US
Connolly and Kohler (2004)	EGARCH	No systematic effect across the country sample, only in Australia a significant but minor effect is measured	Australia, Canada, USA, Euro Area, New Zealand, UK
Ehrmann und Fratzscher (2007a)	EGARCH	Statements in the inter-meeting period are a statistically and significant driver of financial markets as measured by the volatility of stock market returns and exchange rates	Euro Area, UK, US
Fay and Gravelle (2008)	OLS using daily data	Speeches significantly influence short-term interest rate expectations as measured by the volatility of market interest rates	Canada
Fratzcher (2008)	EGARCH	Oral interventions reduce market volatility whereas actual interventions raise volatility. Oral interventions are effective independently from the occurrence of actual interventions	Euro Area, UK, US
Hayo et al. (2008)	GARCH	Speeches have a significant impact on financial markets' returns, in particular on bond markets, volatility is lowered in the case of three and six month t US bills on bond markets	US
Hayo et al. (2010)	GARCH	Communication has significant statistical impact on European and Pacific equity market returns, speeches primarily induce adjustments on European markets	US
Kohn and Sack (2004)	Event study	Speeches have no significant impact on financial market prices	US
Rinaldo and Rossi (2010)	OLS using high frequency data, non-parametric tests	Exchange rates, the equity market and bonds in particular respond significantly to speeches and interviews	Switzerland
Reeves and Sawicki (2007)	OLS using intra-day data	Little evidence for impact on market prices	UK

Study	Method	Results	Country/-ies
<i>Written reports</i>			
Andersson et al. (2006)	OLS using weekly data	Inflation reports appear to have some impact on interest rates with a maturity of 1 year	Sweden
Andersson and Hofmann (2009)	EGARCH	Publication of interest rate path increases sensitivity of medium term bond yields to forward-looking monetary policy news, sensitivity to news about current policy stance reduced	New Zealand, Sweden
Born et al. (2010)	Event study	Financial stability reports (FSR) have repercussions on financial sector stock prices; they also reduce noise, as market volatility tends to decline in response to the publications of FSR	35 mainly advanced countries
Clare and Courtenay (2001)	OLS using intra-day data	Inflation report has an impact on the volatility of short-term assets	UK
Connolly and Kohler (2004)	EGARCH	Monetary policy reports appear to be the most important channel of communication outside of rate decisions as measured by its influence on interest rate expectations (futures)	Australia, Canada, USA, Euro Area, New Zealand, UK
Ehrmann and Sonderman (2009)	EGARCH	(Conditional) Volatility declines in response to inflation report, public signals serve to homogenize agents' information sets, significant increase in market volatility over the time window in between two inflation reports	UK
Fay and Gravelle (2008)	OLS using daily data	Markets do not react to the publication of monetary policy reports as measured by the volatility of market interest rates	Canada
Fracasso et al. (2003)	OLS	The quality of inflation report proxied by its information content is associated with reduction of uncertainty in financial markets (as measured by variable interest rate surprise)	18 mainly industrialised and emerging market countries
Gelos and Wei (2005)	OLS	Higher government transparency (contains measure of macroeconomic policy transparency) has positive effects on investment flows from international funds, transparency helps avoiding excessive volatility in turbulent times	40 mainly emerging market and developing countries
Gerlach (2007)	Ordered-probit regression	Governing Council's discussion of the economy in the editorials of the monthly bulletin as a measures of economic conditions. ECB's statements about its assessment and outlook of economic conditions can convey a better understanding about its conduct of monetary policy	Euro Area

Study	Method	Results	Country/-ies
Glennester and Shin (2008)	OLS, 2SLS	Countries publishing Article IV reports and ROSCs, realize lower credit spreads, indicating that lack of transparency creates uncertainty	23 emerging market economies
Hayo et al. (2008)	GARCH	Monetary policy reports exert a negative influence on volatility of the stock market and market interest rates	US
Hayo et al. (2010)	GARCH	Communication has significant statistical impact on European and Pacific equity market returns, monetary policy reports primarily induce adjustments on European markets	US
Hubert (2009)	OLS, Granger causality tests	No evidence of improvement of forecasting ability after the publication of central banks' forecasts. Sweden, UK, Japan display strong influence of the central bank on private agents through inflation forecasts	Sweden, Japan, Canada, Switzerland, UK, US
Islam (2007)	OLS, Instrumental Variables	Greater transparency - availability of economic information measured by information provided on central bank websites, among others - associated with better performing financial sector proxied by non-performing loan ratio	170 countries
Jansen (2008)	OLS	Greater clarity and transparency of Humphrey-Hawkins Report significantly reduces volatility on financial markets (in particular bonds, exchange rates)	US
Oosterloo et al. (2007)	Bi-variate correlation	No relationship between amount of information provided in financial stability reviews and health of the banking system as measured by Moody's weighted average bank financial strength index and financial system soundness indicator of Das et al. (2004)	40 mainly industrialised and emerging market countries
Reeves and Sawicki (2007)	OLS using intra-day data	Publication of inflation report has a positive and significant effect on interest rate expectations, but response occurs in a short period around the time of communication	UK
Siklos (2003)	OLS	Publication of inflations report significantly reduces uncertainty and volatility as measured by kurtosis of financial asset prices derived from options and the US-CAN interest rate spread (10-year term)	Canada, UK
Tong (2007)	OLS	Transparency, defined as analysts' forecasting efficiency, is positively associated with SDDS implementation	30 developing countries

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