

Hüning, Hendrik

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Hamburg Institute  
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Economics

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Hendrik Hüning

**HWWI Research**

Paper 177

Corresponding author:

Hendrik Hüning

Hamburgisches WeltWirtschaftsinstitut (HWWI)

Baumwall 7 | 20459 Hamburg, Germany

Tel +49 (0)40 34 05 76 - 353 | Fax +49 (0)40 34 05 76 - 776

[boll@hwwi.org](mailto:boll@hwwi.org)

HWWI Research Paper

Hamburg Institute of International Economics (HWWI)

Baumwall 7 | 20459 Hamburg, Germany

Phone: +49 (0)40 34 05 76 - 0 | Fax: +49 (0)40 34 05 76 - 776

[info@hwwi.org](mailto:info@hwwi.org) | [www.hwwi.org](http://www.hwwi.org)

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Prof. Dr. Henning Vöpel

Dr. Christina Boll

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# Asset market response to monetary policy news from SNB press releases

*Hendrik Hünig* \*

## Abstract

This paper analyses the effects of Swiss National Bank (SNB) communication on asset prices. It distinguishes between different monetary policy news contained in press releases following a monetary policy decision. Employing a latent variable approach and event-study methods, I find that medium- and long-term bond yields respond to changes in the communicated inflation and GDP forecasts as well as to the degree of pessimism expressed in press releases. Exchange rates mainly react to changes in the GDP forecast while stocks do not react to SNB communication on monetary policy announcement days. Additionally, short-term expectations about the future path of the policy rate are driven by the communicated inflation forecast. The results underline the role of qualitative news next to quantitative forecasts in influencing market expectations and asset prices.

**Keywords:** monetary policy communication, asset markets

**JEL:** E43, E52, G12

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\*Hamburg University and Hamburg Institute of International Economics, Baumwall 7, 20459 Hamburg, Germany, [huenig@hwwi.org](mailto:huenig@hwwi.org).

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# 1 Introduction

Communication nowadays has become an important tool for central banks to influence and steer market expectations. In recent years, central bank communication became an even more important policy instrument since the central bank's primary policy tool, the policy rate to steer short-term interest rates, reached the zero lower bound ([Lucca and Trebbi 2009](#)). There is now a vast amount of empirical evidence that central bank communication significantly affects asset prices on various markets (for an overview, see [Blinder et al. 2008](#)). However, [Hughes and Kesting \(2014\)](#) suggest that until now little attention has been paid to the content of speech, meaning that there is potential for linguistic approaches to contribute to the discussion of optimal central bank communication. Understanding which aspects of monetary policy news influence financial market expectations and asset prices is important for an optimal communication design.

The effect of central bank communication on asset prices is identified either directly or indirectly. The indirect econometric method identifies the effect of communication on asset prices via changes in medium-term futures prices on policy announcement days (among others, [Gürkaynak 2005](#), [Gürkaynak et al. 2005](#), [Brand et al. 2010](#), [Ranaldo and Rossi 2010](#), and [Kurov 2012](#)). This method measures to what degree expectations regarding medium-term interest rates changed on policy announcement days. The advantage of this approach is that it does not rely on subjective measures of communication, e.g. specific word counts. Additionally, the meaning of subjective measures does not necessarily coincide with how financial markets understand the new information provided by central banks ([Brand et al. 2010](#)). Nonetheless, the disadvantage of an indirect identification is that it does not give clear policy advice about which news contained in monetary policy communication are responsible for market expectations and asset prices to change.<sup>2</sup> For instance, do asset prices respond to quantitative forecasts given in press releases? Does communication about economic activity affect expectations about the future path of the policy rate beyond communication about inflation? Do asset prices respond to qualitative news of press releases?

The direct approach identifies the effect of central bank communication on asset prices by extracting monetary policy news from official press releases, press conferences, speeches, interviews or written reports (among others, [Ehrmann and Fratzscher 2007](#), [Rosa and Verga 2007](#), [Berger et al. 2011](#), and [Amaya and Filbien 2015](#)). These studies employ coding techniques and relate the explicit wording of central bank communication to financial market reactions and thereby show which aspects of monetary policy news lead to asset prices to change.

In this paper, I investigate the effect of Swiss National Bank (SNB) communication on asset prices by extracting monetary policy news from press releases. The paper contributes to the literature in two important ways. First, I distinguish between different monetary policy news expressed in SNB press releases and show that asset markets respond to all this news beyond

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<sup>2</sup>In the words of [Hughes and Kesting \(2014\)](#): “To account for the effects of central bank communication, economists do not turn to linguistic analysis, but generally stick to their usual methodological guns of formal modelling and econometric treatment of quantitative data. This tends to transform questions of how and why central bank speech acts have an intended impact or not ([Blinder et al. 2008](#), p. 912) into questions of whether and how much effect central bank announcements have.”

the response to policy rate surprises. In doing so, I account for the joint-response-bias inherent in standard event studies with market-based measures of policy rate surprises by employing the latent variable approach proposed in [Thornton \(2014\)](#). Second, I show that relating the direct with the indirect method can be fruitful in order to investigate which aspects of monetary policy news matter for policy expectations to change.

The paper's findings are that asset prices respond significantly to the inflation and GDP forecasts as well as to the degree of pessimism expressed in SNB press releases with bonds being the most responsive assets. Moreover, the SNB's inflation forecast for the current year is the main driver of expectations about the future path of the policy rate. The findings can help to improve the communication design of central banks by investigating which policy news in press releases matter for expectations and asset prices to change. Particularly, investigating the effects of central bank communication on medium- and long-term bond yields is important in assessing the success of central banks in managing expectations about future policy rates ([Brand et al. 2010](#)).

As regards previous studies, there are two studies investigating the effect of SNB communication on asset prices. Employing the indirect method via changes in futures prices, [Ranaldo and Rossi \(2010\)](#) investigate the effect of SNB communication through policy announcements, speeches and interviews on high-frequency movements in Swiss asset markets. They find that asset prices react significantly to all types of SNB communication. Moreover, interviews affect markets more strongly than speeches. Among all assets investigated, bonds are most responsive while the exchange rate and stocks just show modest reactions. Interestingly, the reaction of asset prices to speeches and interviews lasts longer than that of policy announcements probably because it takes longer for financial market participants to digest policy news contained in them.

[Burkhard and Fischer \(2009\)](#) construct an intervention reference index in order to show the asset market response to SNB communication regarding possible foreign exchange intervention. They ask whether the reaction varies in different monetary policy environments, i.e. whether communication regarding foreign exchange intervention is a policy option at the zero lower bound of the policy rate. They show that the SNB communicated frequently possible forex interventions between 2002 and 2005 although it was not a direct policy objective during this period. They find that the Swiss franc depreciates for several hours in response to SNB forex intervention references. The authors conclude that communication about possible forex interventions can be an effective tool at the zero lower bound.

In sum, there is empirical evidence that SNB communication affects asset prices. However, to my knowledge, there is no study extracting monetary policy news from SNB press releases to investigate its effect on asset prices. As mentioned before, this is important to evaluate the success of SNB communication and to improve the communication design according to the SNB's objectives.

The remainder of the paper is organized as follows: Section 2 provides an overview over the SNB's communication strategy and its main differences to other major central banks. Section 3 presents the data. Section 4 introduces the methodology and the empirical specification. Section 5 discusses the results and section 6 concludes.

## 2 The SNB's communication strategy

The SNB's communication strategy is an integral part of the SNB monetary policy concept with important differences to other central banks.<sup>3</sup>

In the end of 1999, the SNB abandoned its monetary policy concept of monetary targeting. Three elements of an inflation targeting concept were introduced. First, an explicit target of price stability, which is defined as an increase in the consumer price index of less than 2% per year. Second, the three-month Libor as an operational target and third, a conditional inflation forecast as a main indicator for future SNB policy decisions. The inflation forecast is conditional in the sense that it is made under the assumption that the reference interest rate, i.e. policy rate, remains constant over the forecast horizon. The conditional inflation forecast is the central ingredient in the communication concept regarding monetary policy decisions. In each press release after a scheduled monetary policy meeting, the SNB communicates a conditional inflation forecast for the current and the two following years. Additionally, the SNB communicates its GDP forecast for the current year and, at the end of each year, its GDP forecast for the upcoming year. The European Central Bank (ECB), however, does not announce inflation or GDP forecasts in its press conference following a monetary policy decision but releases inflation reports separately.

Moreover, compared to the ECB and US Federal Reserve that take monetary policy decisions all six weeks, i.e. eight times in one year, the SNB announces monetary policy decisions quarterly, i.e. in March, June, September and December. While the ECB holds a press conference after each meeting in order to communicate its policy decision, the SNB holds a press conference in June and December only. In March and September the SNB publishes press releases which are substantially longer than those in June and December partly substituting for the additional information provided in the press conferences in June and December.

Furthermore, the SNB holds an annual general meeting in April, where it communicates the economic outlook but also issues not related to monetary policy. Although being an important communication channel for the SNB, there is no policy decision preceding this meeting which suggests that it might have a different impact on financial markets than monetary policy meetings.

Similar to the ECB or the US Federal Reserve, the SNB uses other communication channels such as speeches, interviews of SNB officials, and written reports. Not all of these communication events necessarily include statements concerning monetary policy. Some have different purposes and especially speeches and interviews are usually less standardized than monetary policy announcements. Nevertheless, as previous research suggests, financial markets also respond to speeches and interviews of SNB officials ([Ranaldo and Rossi 2010](#)).

A last difference between the SNB and ECB refers to communication about financial stability. The ECB publishes financial stability reports twice a year in May and November. The SNB, however, publishes a financial stability report once a year in June but discusses issues of financial

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<sup>3</sup>Compare for more detailed discussions of the SNB's monetary policy concept [Jordan et al. \(2009\)](#), [Jordan and Peytrignet \(2001\)](#), and [Jordan and Peytrignet \(2007\)](#).

stability twice a year in the press conferences following the monetary policy decisions in June and December. Results from recent research indicate that communication about financial stability has an impact on financial markets as well (Born et al. 2014). Although an interesting aspect, this paper does not consider communication about financial stability because it might have a different impact on financial markets than communication about monetary policy and it is not part of the SNB’s official objectives.

### 3 Data

We use daily financial market data from January 2000 to December 2015. The sample starts in 2000 because in the end of 1999 the SNB abandoned their monetary targeting approach and implemented inflation targeting instead. The sample contains daily changes of Swiss government bond yields with one to thirty years of maturity. As for the currency market, I consider percentage changes in the CHF/Euro, the CHF/USD, and the CHF/GBP exchange rates. The stock market is represented by percentage changes of the Swiss Performance Index (SPI) and a corresponding sectoral index for bank equities. To measure changes in expectations regarding short- and medium-term interest rates, changes in the implied rate of Euroswiss spot futures prices and of maturities from one to six month traded on LIFFE are used.<sup>4</sup>

Information about SNB monetary policy events (PE) and the corresponding press releases during this time period are collected from the SNB homepage.<sup>5</sup> The sample contains 63 scheduled PE. Additionally, 17 unscheduled PE took place during the sample period. Altogether, the sample contains 80 SNB PE. In what follows,  $m$  denotes days with PE and  $t$  all trading days. Table 1 summarizes all PE of the sample. In September 2001, there was no scheduled PE because of two unscheduled PE in the same month. There are 15 policy rate cuts, 13 raises, and 52 PE with no policy rate change. For each of those events, I extract monetary policy news contained in the corresponding press release explaining the reasons behind the monetary policy decision. More precisely, I extract the SNB’s updated conditional inflation forecast for the current as well as for the two following years. Similarly, GDP forecasts for the current and upcoming year are extracted. Moreover, the degree of pessimism expressed in the press releases is calculated (see below).

### 4 Methods

In the following, I first introduce how surprises in SNB policy rate changes are measured, before monetary policy news from SNB press releases are constructed. Subsequently, the control variables are presented as well as the correlation of all (constructed) variables. Finally, I introduce the latent variable approach employed as well as the specifications.

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<sup>4</sup>All time series data are from Macrobond.

<sup>5</sup>See [http://www.snb.ch/en/for/media/id/media\\_releases](http://www.snb.ch/en/for/media/id/media_releases).



Table 1: Summary of Monetary Policy Events (PE)

Year	Policy Events (PE)		Policy Rate Change						
	Scheduled	Unscheduled	-1	-0.5	-0.25	0	0.25	0.5	0.75
2000	4	2	0	0	0	3	1	1	1
2001	3	2	0	3	1	1	0	0	0
2002	4	2	0	2	0	4	0	0	0
2003	4	1	0	1	0	4	0	0	0
2004	4	0	0	0	0	2	2	0	0
2005	4	0	0	0	0	3	1	0	0
2006	4	0	0	0	0	0	4	0	0
2007	4	0	0	0	0	1	3	0	0
2008	4	3	1	2	1	3	0	0	0
2009	4	0	0	0	1	3	0	0	0
2010	4	0	0	0	0	4	0	0	0
2011	4	5	0	0	1	8	0	0	0
2012	4	0	0	0	0	4	0	0	0
2013	4	0	0	0	0	4	0	0	0
2014	4	1	0	0	1	4	0	0	0
2015	4	1	0	1	0	4	0	0	0
all	63	17	1	9	5	52	11	1	1

#### 4.1 Calculating monetary policy rate surprises

Following the procedure introduced in [Kuttner \(2001\)](#), the one day change of the spot-month Euroswiss futures rate proxies surprises of SNB policy rate changes on PE days. Formally, this proxy is given by

$$\Delta \tilde{r}_t^u = \Delta f_t^0 = f_t^0 - f_{t-1}^0, \quad (1)$$

where  $f_t^0$  is the implied rate of the spot-month futures at the end of day  $t$  and  $f_{t-1}^0$  is the implied rate of the spot-month futures one day before. On PE days  $m$  this measure serves as a proxy for the unexpected component of SNB policy rate changes ( $\Delta \tilde{r}_{t=m}^u$ ). On all days  $t \neq m$ , the change in the implied rate of the Euroswiss futures serves as a latent measure of how financial market expectations about interest rates change due to news not related to monetary policy news on PE (see 4.5 below).

#### 4.2 Monetary policy news from press releases: Inflation, GDP forecasts and degree of pessimism

The conditional inflation forecast is a central element in the SNB's communication strategy. Therefore, I extract the communicated inflation forecast from each press release. The SNB communicates an inflation forecast for the current year and the following two years.  $\pi_{im}^f$  denotes the inflation forecast of PE day  $m$  for the current year ( $i = 1$ ), the upcoming year ( $i = 2$ ) and the year after ( $i = 3$ ).  $\pi_{im}^f$  is set to zero for all days  $t \neq m$  or when no inflation forecast was communicated on PE day  $m$ . In the sample, there are 21 PE without an inflation forecast for the current year. Inflation forecasts for the upcoming and the year after are missing both on 20 PE. In fact, most of these days, where inflation forecasts are missing in the press release, are either at the beginning of the sample period or were unscheduled PE. Generally, on unscheduled

PE there are no forecasts provided.

Furthermore, I extract the forecast of economic activity from the press releases, because of the importance of the SNB's view on future economic activity for the future path of the policy rate.  $y_{im}^f$  denotes the GDP forecast of PE day  $m$  for the current year ( $i = 1$ ) and the upcoming year ( $i = 2$ ).<sup>6</sup> GDP forecasts for the upcoming year are communicated only in the press release after the last policy meeting each year in December. First, as a measure of the SNB's view of economic activity, the current year forecast is used ( $y_{1m}^f$ ). Second,  $\Delta y_m^f = y_{1m}^f - y_{1m-1}^f$  measures the short-term change in the SNB's view about economic activity from policy meeting  $m - 1$  to the next meeting  $m$ . This measures are set to zero for all days  $t \neq m$  or are zero in case there was no forecast given on PE day  $m$ . There are 22 PE where  $y_{1m}^f$  is not provided. Due to missing values,  $\Delta y_m^f$  cannot be calculated for 25 PE.

The update of the GDP forecast from one meeting to the next one informs financial market participants about the central bank's updated view of future economic activity and thus reflects valuable information for the likely future path of the policy rate. For PE in March and December, I deviate from this calculation of  $\Delta y_m^f$ . For the PE in December,  $\Delta y_m^f = y_{2m}^f - y_{1m}^f$  measures the difference between the forecast of the upcoming year compared to the forecast for the current year from the same press release. For the PE in March,  $\Delta y_m^f = y_{1m}^f - y_{2m-1}^f$  measures the difference of the current year's forecast to the December meeting's forecast for the next year. Table 2 provides an example of this calculation.

Table 2: Example for calculation of  $\Delta y_m^f$

Date of PE	$y_{1m}^f$	$y_{2m}^f$	$\Delta y_m^f$
13/12/2012	1	1.25	0.25
14/03/2013	1.25	No forecast	0
20/06/2013	1.25	No forecast	0
19/09/2013	1.75	No forecast	0.5
12/12/2013	1.75	2	0.25

The changes for December and March are made because of the discontinuity between the years. The change in the GDP forecast for the current year communicated in the monetary policy meeting mid-December compared to the forecast of the September meeting is less informative to financial markets than the SNB's view on the change in activity from the current year to the next year. While  $y_{1m}^f$  measures the overall forecasted level of economic activity,  $\Delta y_m^f$  measures the short-term change in the SNB's view of current economic activity.

Beside these quantitative measures, I also use a qualitative aspect of monetary policy news from SNB press releases. In contrast to the ECB, the SNB does not follow a "code word approach" meaning that there are no words such as "vigilance" giving a hint to the monetary policy

<sup>6</sup>In some cases, the SNB communicates an imprecise GDP forecast such as an interval (e.g. press release of the meeting on the 12/03/2003: "...the SNB is now forecasting a contraction in GDP of between 2.5% and 3% for this year.") or a rough estimate (e.g. press release of the meeting on the 20/03/2003: "The National Bank now anticipates that economic growth will be just under 1% for 2003."). In case of an interval the midpoint of that interval is chosen, in case of a rough estimate that quantitative estimate is taken. The same applies in case that the inflation forecast is given as an interval or rough estimate.

inclination. Moreover, coding each sentence of a given press release as dovish or hawkish has been criticized to be subjective and easily prone to coding errors. In order to reduce this critical point, I concentrate on the negative informational content of a given press release. I calculate the degree of pessimism by using the methodology proposed in Tetlock et al. (2008) and Garcia (2013). The methodology counts all words with positive and negative connotation and relates them to all words of a given press release. This measure can be seen as a proxy for the negative news contained in a given press release. The negative news captured by this measure is valuable information for financial markets because it expresses the SNB’s view on the state of the economy beyond the quantitative forecasts provided. For instance, the macroeconomic condition can be favorable although there is a (transitory) decline in expected inflation. The SNB’s qualitative explanations clarify the interpretation of the changes in its quantitative forecasts and the severity of its macroeconomic outlook. In order to account for the specific use of words in the financial press the word list provided by Loughran and McDonald (2011) is employed, which was already successfully used in Amaya and Filbien (2015) for the ECB’s introductory statement. The variable  $Pess_t$  is defined as

$$Pess_t = \frac{NegativeWords_t - PositiveWords_t}{TotalWords_t}, \quad (2)$$

where  $NegativeWords_t$  and  $PositiveWords_t$  denote the number of all negative and positive words in a given press release.<sup>7</sup> The expression  $TotalWords_t$  denotes all words of a given press release.<sup>8</sup> On all days  $t \neq m$ ,  $Pess_t$  is set to zero. The higher the value of  $Pess_t$ , the stronger the degree of pessimism expressed in a given press release. Figure 1 depicts the evolution of  $Pess_t$  from one press release to the next for the sample period from 2000 to 2015. As expected, the degree of pessimism in the press release varies with the business cycle. One can clearly detect a low degree of pessimism, i.e. a higher degree of optimism, during the upswing until the outbreak of the financial crisis and the high degree of pessimism during the crisis.<sup>9</sup>

As mentioned before, in June and December each year, the SNB holds a press conference additionally to the press release published after a policy meeting. It is therefore unclear whether extracting the degree of pessimism expressed in the press release or in the press conference is appropriate for constructing the pessimism measure. As a robustness check, I calculate

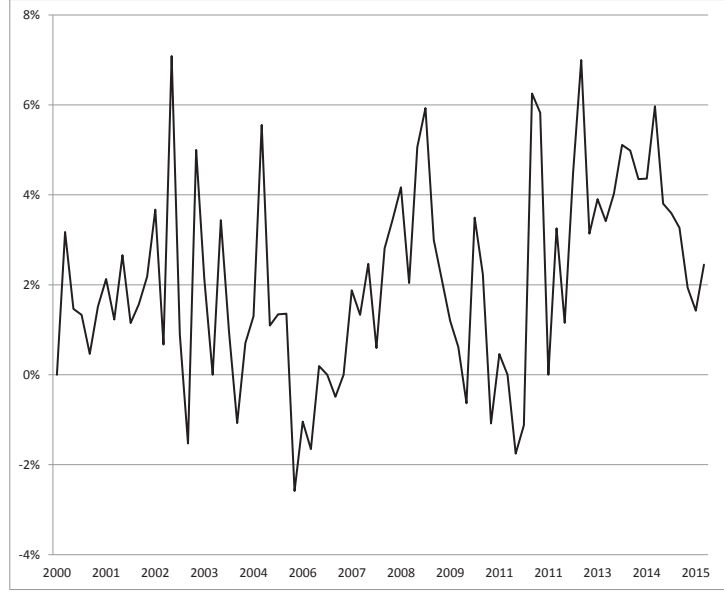
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<sup>7</sup>It is worth noting that a shortcoming of this measure is that it does not capture the context in which negative expressions are used. For instance, the SNB says “In the foreseeable future, therefore, there continues to be no threat of inflation in Switzerland” (press release of 14/03/2013). Here, the pessimism measure captures the word “threat” being negative but not the negation of the sentence. A manual check of all press releases reveals that this happens throughout the sample but at most twice in a given press release. An exclusion of these sentences should not affect the results since it changes the pessimism measure only marginally. Moreover, it is reasonable to assume that the SNB avoids words with negative connotation and rather uses words with positive connotation if the macroeconomic conditions are favorable because words with negative connotation may be easily misunderstood in this context.

<sup>8</sup>For convenience of the calculation, I remove common English stopwords such as “of”, “by” or “at” in order to concentrate on words with informational content. Therefore  $TotalWords_t$  corresponds to all words minus stopwords of a given press releases.

<sup>9</sup>It is important to note that in the word list provided by Loughran and McDonald (2011) there are more words categorized as being negative than as being positive. For this reason the overall average of pessimism in our sample is not zero but 2.1 percent. See the word list under [http://www3.nd.edu/~mcdonald/Word\\_Lists.html](http://www3.nd.edu/~mcdonald/Word_Lists.html).

Figure 1: The degree of pessimism expressed in SNB press releases over time



the degree of pessimism expressed in the introductory statement of the press conference and construct the variable  $Pess\_mixed_t$  which (a) is equal to the pessimism expressed in the press conference whenever there was one and (b) is equal to the degree of pessimism of the press release whenever there was no press conference. Since there are only 35 press conferences in the sample, I construct this mixed measure rather than a variable only containing the degree of pessimism on days of press conferences. The correlation of the degree of pessimism expressed in the press releases and the corresponding press conferences is 0.62 indicating that the communication is quite consistent between these two channels of communication. As an additional robustness check, I construct a pessimism variable only for scheduled PE ( $Pess\_sched_t$ ). Unscheduled meetings usually lead to different market reactions which might be more driven by policy rate surprises than by the degree of pessimism expressed in press releases or conferences.

### 4.3 Control variables

Not only monetary policy news on PE days leads market participants to revise their expectations about future SNB monetary policy, therefore affecting asset prices. On days without a policy meeting other SNB communication events such as speeches, the annual main meeting, and economic data surprises might lead to revised monetary policy expectations. I control for these influences by constructing two variables accounting for the effect of other SNB communication and economic news on monetary policy expectations. First, the dummy variable  $C_t$  is equal to one on days where there is a speech of a member of the SNB's Governing Board or the SNB's annual General Meeting and zero otherwise. As in [Thornton \(2014\)](#),  $C_t + \Delta \tilde{r}_t^u C_t$  control for the effect of news from other communication channels on policy expectations and asset prices.

Second, I account for the market's reaction to other economic news surprises. The variable  $S_t$  denotes the normalized Citi Economic Surprise Index for Switzerland. The index aggregates a

broad range of data surprises (actual data release versus Bloomberg survey median prior to the release) and is calculated daily in a rolling three-month window. The index is a measure of the general macroeconomic condition, i.e. if Swiss economic data have been favourable on average over the last month. Unfortunately,  $S_t$  is only available since 2003. To avoid losing PE days in the estimations,  $S_t$  is set to zero between 2000 and 2002. The results, however, do not change dramatically when the beginning of the sample is set to 2003. Thus,  $S_t + \Delta \tilde{r}_t^u S_t$  account for the effect of economic news surprises on policy expectations and asset prices.<sup>10</sup>

Finally, since the SNB holds a press conference on the PE days in June and December and publishes merely a press release on the other two scheduled PE each year, the dummy variable  $pc_t$  controls for the possible different impact of press conferences compared to press releases.  $pc_t$  is equal to one on PE days with a press conference and zero otherwise.

#### 4.4 Correlations

Table 2 shows the correlations among the constructed variables on PE days. The majority of the variables show a low degree of correlation. An (unsurprising) exception are the high values with respect to the inflation forecasts  $\pi_{1m}^f$ ,  $\pi_{2m}^f$  and  $\pi_{3m}^f$ . If inflation is expected to be high (low) this year, it most likely will be expected to be high (low) the following two years. To avoid suffering from any collinearity problems in the regressions, I construct a variable measuring the SNB's expected medium-term inflationary pressure as explanatory variable instead of using the single variables  $\pi_{1m}^f$ ,  $\pi_{2m}^f$  and  $\pi_{3m}^f$  as regressors. I construct the distance of the average inflation forecasts  $\pi_{2m}^f$  and  $\pi_{3m}^f$  to the SNB's defined target of 2%. Formally, this is given by

$$d\pi_{23m}^f = \left( \frac{\pi_{2m}^f + \pi_{3m}^f}{2} \right) - 2. \quad (3)$$

Table 3 shows that the constructed variable is less correlated with  $\pi_{1m}^f$  and ensures a more clear identification of the different monetary policy news from press releases. Employing both,  $\pi_{1m}^f$  and  $d\pi_{23m}^f$ , has an intuitive motivation. While  $\pi_{1m}^f$  captures the current inflation outlook,  $d\pi_{23m}^f$  captures if the SNB expects to meet the defined target in the medium-term. Both variables contain different information for financial market participants about the likely path of the policy rate.

#### 4.5 A latent variable approach

Many event studies employ the procedure introduced by [Kuttner \(2001\)](#) to estimate the asset price response to monetary policy surprises using a market-based measure such as changes in

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<sup>10</sup>[Thornton \(2014\)](#) controls for the effect of other news surprises on expectations and asset prices by constructing a dummy variable which is equal to one on days with headline news and zero otherwise. The advantage of the Citi Economic Surprise Index is that it covers not only headline news but a broad range of economic news surprises. Additionally it accounts for the size of the surprise effect and not only if there were headline news on a given day or not.

Table 3: Correlation among explanatory variables on all PE days (Obs=80)

Variables	$\Delta\tilde{r}_t^u$	$Pess_t$	$\pi_{1m}^f$	$\pi_{2m}^f$	$\pi_{3m}^f$	$\pi_{23m}^f$	$y_{1m}^f$	$\Delta y_m^f$	$C_t$	$pc_t$	$S_t$
$\Delta\tilde{r}_t^u$	1.000										
$Pess_t$	-0.055	1.000									
$\pi_{1m}^f$	-0.009	-0.283	1.000								
$\pi_{2m}^f$	0.099	-0.368	0.750	1.000							
$\pi_{3m}^f$	0.200	-0.444	0.581	0.820	1.000						
$\pi_{23m}^f$	-0.332	-0.324	0.318	0.320	0.052	1.000					
$y_{1m}^f$	0.157	-0.195	0.422	0.512	0.632	-0.004	1.000				
$\Delta y_m^f$	-0.039	-0.274	0.037	0.151	0.212	0.160	0.156	1.000			
$C_t$	-0.035	0.186	0.136	0.005	0.115	-0.073	-0.011	1.000			
$pc_t$	0.122	-0.073	0.138	0.140	0.176	-0.331	0.198	0.041	-0.174	1.000	
$S_t$	-0.062	0.136	0.002	0.059	0.078	-0.189	0.049	-0.085	0.007	0.077	1.000

futures prices. The regression usually takes the form

$$\Delta R_m = \alpha + \beta \Delta\tilde{r}_{t=m}^u + e_m, \quad (4)$$

where  $\Delta\tilde{r}_{t=m}^u$  is defined as in (1) and  $\Delta R_m$  is the return of a financial market asset on the same PE day, e.g. a bond yield. However, as noted by some authors, this specification can lead to a biased estimate of the impact of the true monetary policy surprise on asset prices parameterized by  $\beta$ , if both, the market-based measure and the asset price, react simultaneously to ambient news on the same day (for details, see [Thornton 2014](#)).

The literature proposes three solutions to this “joint-response-bias” problem. One solution is to narrow the event window to a few minutes around the monetary policy announcement using intra-day data ([Gürkaynak et al. 2007](#)). This limits the potential bias by excluding possible confounding events. The problem with this approach is that markets might initially overreact to the announcement and therefore the response using intra-day data might not be indicative to the response using daily data. Moreover, the parameter estimation is mostly sensitive to the size of the chosen event window. [Rigobon and Sack \(2004\)](#) and [Craine and Martin \(2008\)](#) propose another solution which they call “identification through heteroscedasticity”. For this identification procedure, it has to be assumed that the variance of monetary policy surprises is larger on PE days than on the other days. The last solution proposed in [Thornton \(2014\)](#) uses the market-based measure defined in (1) on all days as a latent variable to account for its reaction to ambient news on days when there is no PE. It thus allows estimating the potential bias inherent in regressions of the form described in (4). Contrary to the other two approaches, there is no need for the use of intra-day data or an assumption about the relative variance of monetary policy surprises.

In the following, I employ the latent variable approach and apply it to the SNB monetary policy data. The regression takes the form

$$\Delta R_t = \alpha + \beta_0(PE_t) + \beta_1\Delta\tilde{r}_t^u + \beta_2\Delta\tilde{r}_t^u(PE_t) + \beta_3C_t + \beta_4\Delta\tilde{r}_t^u C_t + \beta_5S_t + \beta_6\Delta\tilde{r}_t^u S_t + e_t, \quad (5)$$

where  $(PE_t)$  is a dummy variable that is one on days with SNB PE and zero otherwise. As

before,  $\Delta R_t$  is the daily return of a financial market asset (e.g. a bond yield). The variable  $\Delta \tilde{r}_t^u$  is defined as in (1). As outlined before,  $C_t + \Delta \tilde{r}_t^u C_t$  and  $S_t + \Delta \tilde{r}_t^u S_t$  control for the impact of revised policy expectations due to other SNB communication events (speeches or the general meeting), and due to other news surprises on asset prices. The coefficient  $\beta_1$  measures the joint response of an asset price and the market-based measure on all trading days. Hence, it measures the potential bias inherent in the parameter estimation of  $\beta$  in (4). The coefficient  $\beta_2$  denotes the asset price response to monetary policy surprises on SNB PE days.

The specification in (5) replicates the one in Thornton (2014) and serves as a starting point of the analysis. As it will turn out in the next section, results for the effect of SNB monetary policy surprises are comparable to those obtained with US data. However, extending the specification by the monetary policy news extracted from press releases substantially improves the explanation of asset price reactions on PE days. This is particularly true for those of long-term government bond yields. I therefore estimate

$$\Delta R_t = \alpha + \beta_j \mathbf{X}_t + \beta_7 Pess_t + \beta_8 \pi_{1m}^f + \beta_9 d\pi_{23m}^f + \beta_{10} y_{1m}^f + \beta_{11} \Delta y_m^f + \beta_{12} pct + e_t, \quad (6)$$

where  $\mathbf{X}_t$  is a matrix that contains all explanatory variables from (5). Although the specification in (5) controls for other communication events such as speeches of central bank officials (controlled by  $C_t$ ) it does not account for monetary policy news other than  $\Delta \tilde{r}_t^u$  on PE days. As Gürkaynak et al. (2005) note: Any analysis of market response to monetary policy news using only the unexpected policy rate change misses most of the story. Therefore, the extension accounts for a crucial part in the transmission of SNB monetary policy.

#### 4.6 Explaining expectations about future policy with monetary policy news from press releases

Extracting monetary policy news from SNB press releases is one way to identify the effect of monetary policy news on asset prices. The indirect methods use changes in medium-term futures prices to identify central bank communication. Gürkaynak et al. (2005) decompose target rate surprises and slope surprises based on a principal component analysis of changes in futures prices with one year or less to expiration. They show that two factors are sufficient to account for most of the variation in changes of asset prices on PE days. Gürkaynak (2005) offers an alternative method based on a recursive regression scheme. Since the constructed slope surprises are quite similar between these two methods (see Brand et al. 2010), I rely on the simpler recursive regression scheme. I investigate whether the monetary policy news that is extracted from SNB press releases ( $Pess_t$ ,  $\pi_{1m}^f$ ,  $d\pi_{23m}^f$ ,  $y_{1m}^f$  and  $\Delta y_m^f$ ), explain the slope component extracted through the recursive regression scheme.

The recursive regression scheme decomposes monetary policy surprises on PE days  $m$  into three components. First, the *level<sub>m</sub>* component comprises the parallel shift of interest rate expectations due to changes in the policy rate. Second, *timing<sub>m</sub>* comprises the surprise that policy action was made earlier or later than expected (but the level of the change was expected). The *timing<sub>m</sub>* component is defined as a policy surprise which leaves expected interest rates after



the next SNB meeting unchanged. Therefore, the change in the futures prices with a maturity in the month of the next policy meeting is used for construction. Third,  $slope_m$  is constructed from changes in futures prices with maturity in the month of the policy meeting after the next policy meeting. The  $slope_m$  component can be interpreted as the change in expectations about the future path of the policy rate not related to  $timing_m$  and  $level_m$ . Formally,  $timing_m$  and  $slope_m$  surprises are obtained as the residuals from the OLS regressions

$$\Delta f_m^0 = \alpha_0 + \alpha_1 level_m + timing_m, \quad (7)$$

$$\Delta f_m^6 = \gamma_0 + \gamma_1 level_m + \gamma_2 timing_m + slope_m, \quad (8)$$

where  $\Delta f_m^0$  is defined as in (1). The  $level_m$  component is defined as the one day change of the implied rate of the Euroswiss futures expiring in three month, i.e. in the month of the next SNB PE (formally  $\Delta f_m^3 = f_m^3 - f_{m-1}^3$ , where  $m-1$  corresponds to the day before the PE). Similarly,  $\Delta f_m^6$  is defined as the change of the implied rate of the Euroswiss futures expiring in six month, i.e. in the month of the PE after the next PE (formally  $\Delta f_m^6 = f_m^6 - f_{m-1}^6$ ).<sup>11</sup> I use the constructed  $slope_m$  component in a regression of the form

$$slope_m = \alpha + \beta_1 Pess_t + \beta_2 \pi_{1m}^f + \beta_3 d\pi_{23m}^f + \beta_4 y_{1m}^f + \beta_5 \Delta y_m^f + pc_m + e_m \quad (9)$$

in order to investigate which aspects of policy news successfully affect market expectations about the future path of the policy rate. It is important to note that  $slope_m$  can only be calculated for the 63 scheduled PE in our sample because the recursive regression scheme implicitly assumes that the days of future PE are known in advance.

## 5 Results

First, I estimate (5) in order to replicate the findings of Thornton (2014) for the Swiss government bond market and to compare the results with results obtained estimating (4) with the standard event study methodology. Second, I estimate (6) to show that monetary policy news extracted from press releases affect bond yields beyond the unexpected policy rate change ( $\Delta \tilde{r}_t^u$ ). Third, I estimate (6) for the other assets considered. Finally, I estimate (9) to investigate if monetary policy news from press releases affects expectations about the future path of the policy rate ( $slope_m$ ).<sup>12</sup>

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<sup>11</sup>For the estimation of (8), bootstrap standard errors are calculated to account for the extra sample variation stemming from constructing  $timing_m$  by estimating (7) (Compare Gürkaynak 2005). Results of these regressions are not reported but are available upon request.

<sup>12</sup>For the following analysis, I exclude two extraordinary data points, i.e. two days with unscheduled SNB PE. The introduction of the minimum exchange rate to the Euro on the 6th of September 2011 and its end on the 15th of January 2015. Both SNB decisions on these days caused strong reactions in financial markets and are outlier in the analysis.



## 5.1 Yield curve - Swiss government bonds

Results estimating (5) with Swiss government bond data of one to thirty years of maturity are given in Table 4. The bond market response to changes in  $\Delta\tilde{r}_t^u$  is significant for all maturities. The estimate controls for the joint-response-bias inherent in an estimation of  $\beta$  in (4) due to the fact that  $\Delta\tilde{r}_t^u$  and  $\Delta R_t$  simultaneously react to other than monetary policy news. However, estimates of the market response to  $\Delta\tilde{r}_t^u$  on PE days are statistically significant only for government bonds of maturities of one year. Moreover, I find only weak evidence that the one year bond yield responds to other communication events such as speeches and the main meeting.

In contrast, bond yields from three to five years of maturity significantly react to economic news surprises ( $S_t$ ). Interestingly, at least for bonds with maturities from one to five years, the response of yields to  $\Delta\tilde{r}_t^u$  is moderated by the current macroeconomic condition. The more favorable the macroeconomic conditions, the smaller the impact of  $\Delta\tilde{r}_t^u$  on bond yields. This finding is consistent with previous findings of a time-varying response of asset prices to  $\Delta\tilde{r}_t^u$  (among others, Kurov 2012, Wang and Mayes 2012, and Marfatia 2015). In this case, however, this estimate reflects the time-varying response of bonds to all policy-relevant news rather than only to monetary policy news, since  $\Delta\tilde{r}_t^u$  on all days  $t$  serves as a latent variable to account for the market's reaction to news not related to monetary policy.<sup>13</sup> Comparing the results of the

Table 4: Latent variable approach with specification in (5)

VARIABLES	1Y	2Y	3Y	4Y	5Y	7Y	10Y	20Y	30Y
$(PE_t)$	-0.010 (0.012)	-0.002 (0.006)	-0.001 (0.006)	-0.001 (0.005)	-0.001 (0.005)	-0.000 (0.004)	0.002 (0.004)	0.003 (0.004)	-0.003 (0.007)
$\Delta\tilde{r}_t^u$	0.203*** (0.040)	0.077*** (0.017)	0.089*** (0.019)	0.089*** (0.018)	0.085*** (0.017)	0.082*** (0.015)	0.077*** (0.014)	0.054*** (0.013)	0.040*** (0.014)
$\Delta\tilde{r}_t^u * (PE_t)$	0.654*** (0.161)	0.065 (0.058)	0.059 (0.053)	0.056 (0.046)	0.056 (0.045)	0.052 (0.049)	0.045 (0.054)	0.035 (0.060)	0.020 (0.071)
$C_t$	-0.008* (0.004)	0.001 (0.003)	-0.001 (0.003)	-0.001 (0.003)	0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.002 (0.002)	-0.002 (0.002)
$\Delta\tilde{r}_t^u * C_t$	0.013 (0.105)	0.054 (0.074)	0.015 (0.065)	-0.001 (0.059)	-0.008 (0.058)	-0.015 (0.059)	-0.013 (0.053)	-0.016 (0.053)	-0.048 (0.061)
$S_t$	0.000 (0.002)	0.001 (0.001)	0.001** (0.001)	0.002*** (0.001)	0.001** (0.001)	0.001 (0.001)	0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)
$\Delta\tilde{r}_t^u * S_t$	-0.049** (0.020)	-0.027*** (0.009)	-0.025*** (0.008)	-0.020** (0.008)	-0.014* (0.008)	-0.006 (0.007)	0.002 (0.006)	0.004 (0.007)	0.000 (0.010)
Constant	0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
Observations	4,172	4,172	4,172	4,172	4,172	4,172	4,172	4,172	4,172
$R^2$	0.040	0.014	0.016	0.017	0.017	0.015	0.014	0.008	0.003

Notes: Dependent variables are the one-day change of Swiss government bond yields from one (1Y) to thirty years (30Y) of maturity. Robust standard errors are in parentheses. \* Indicates significance at the 0.1 level, \*\* at the 0.05 level and \*\*\* at the 0.01 level.

estimation of (5) with results estimating (4) employing the standard event study methodology, i.e. only PE days are considered, reveals that the sum of the estimates for  $\Delta\tilde{r}_t^u$  and  $\Delta\tilde{r}_t^u(PE_t)$  in

<sup>13</sup>The significant estimates for  $\Delta\tilde{r}_t^u$  and  $\Delta\tilde{r}_t^u * (PE_t)$  change very little in their size when the control variables are excluded. Results are available upon request.

Table 4 correspond to the estimates for  $\Delta\tilde{r}_t^u$  in Table 5. The null hypothesis  $\hat{\beta}_1 + \hat{\beta}_2 = \hat{\beta}$  cannot be rejected at any reasonable significance level.<sup>14</sup> The results indicate that the joint-response-bias is relatively large. Overall, the results resemble those obtained by Thornton (2014) for the US government bond market. Therefore, the first result is that the monetary policy transmission to bond markets concerning unexpected policy rate changes is comparable for Switzerland and the US.

Table 5: Estimating (5) with the standard event study methodology

VARIABLES	1Y	2Y	3Y	4Y	5Y	7Y	10Y	20Y	30Y
$\Delta\tilde{r}_t^u$	0.852*** (0.159)	0.141** (0.056)	0.146*** (0.050)	0.143*** (0.043)	0.140*** (0.042)	0.133*** (0.048)	0.122** (0.053)	0.089 (0.059)	0.059 (0.071)
Constant	-0.010 (0.012)	-0.002 (0.006)	-0.001 (0.006)	-0.002 (0.005)	-0.002 (0.005)	-0.001 (0.005)	0.001 (0.004)	0.002 (0.004)	-0.003 (0.007)
Observations	78	78	78	78	78	78	78	78	78
$R^2$	0.379	0.079	0.082	0.101	0.111	0.116	0.115	0.062	0.011

Notes: Dependent variables are the one-day change of Swiss government bond yields from one (1Y) to thirty years (30Y) of maturity. Robust standard errors are in parentheses. \* Indicates significance at the 0.1 level, \*\* at the 0.05 level and \*\*\* at the 0.01 level.

So far, the analysis focused on the exact estimation of the unexpected policy rate change but neglected the influence of communication on SNB PE days. Table 6 shows the results from estimating (6). The results indicate that monetary policy news expressed in press releases affect changes in bond yields beyond the effect of the unexpected component of the policy rate change. The communicated inflation forecast for the current year negatively affects bond yields from two to ten years of maturity. Generally, yields of bonds with longer maturity decline less. This finding is consistent with the expectation hypothesis of the yield curve. An increase in the SNB's inflation forecast leads to an increase of financial market participants' expectations of medium-term interest rates, resulting in more demand for bonds at the shorter end and less at the longer end. The variable  $d\pi_{23t}^f$  affects the yield curve at the longer end, namely the yield of bonds with twenty years of maturity. The communicated GDP forecast for the current year affects bond yields with two to seven as well as thirty years of maturity. However, changes in the SNB's GDP forecast from one press release to the next one only affect bond yields of five and thirty years of maturity.

The degree of pessimism expressed in a given press release affects bond yields significantly only for bonds with three to five years to maturity. An increase of pessimism by one percentage point decreases bond yields on average by 0.4 to 0.7 basis points (bp). This finding underlines the importance of the explicit wording of press releases in clarifying the interpretation of the quantitative forecasts provided.

Overall, the results indicate that, while the policy rate surprise affects the yield curve at the short end, communication affects medium and long term bond yields. This finding is consistent with Brand et al. (2010) for the European bond market employing changes in medium-term

<sup>14</sup>The detailed test results are available upon request.

futures prices to identify the effects of communication.<sup>15</sup>

Table 6: Latent variable approach with specification in (6)

VARIABLES	1Y	2Y	3Y	4Y	5Y	7Y	10Y	20Y	30Y
$(PE_t)$	-0.006 (0.038)	0.008 (0.009)	0.012 (0.009)	0.010 (0.006)	0.006 (0.006)	0.001 (0.007)	-0.002 (0.006)	-0.010 (0.007)	-0.028** (0.011)
$\Delta \tilde{r}_t^u$	0.203*** (0.040)	0.077*** (0.017)	0.089*** (0.019)	0.089*** (0.018)	0.085*** (0.017)	0.082*** (0.015)	0.077*** (0.014)	0.054*** (0.013)	0.040*** (0.014)
$\Delta \tilde{r}_t^u * (PE_t)$	0.664*** (0.163)	0.033 (0.065)	0.022 (0.063)	0.028 (0.055)	0.035 (0.051)	0.031 (0.057)	0.017 (0.062)	-0.008 (0.069)	-0.025 (0.082)
$Pess_t$	0.002 (0.008)	-0.006 (0.004)	-0.007** (0.004)	-0.006** (0.003)	-0.004** (0.002)	-0.003 (0.002)	-0.002 (0.002)	-0.003 (0.002)	-0.002 (0.003)
$\pi_{1m}^f$	-0.012 (0.014)	-0.032** (0.014)	-0.037*** (0.013)	-0.032*** (0.011)	-0.027*** (0.008)	-0.018*** (0.006)	-0.009* (0.005)	0.004 (0.006)	0.006 (0.006)
$d\pi_{23m}^f$	0.007 (0.030)	0.004 (0.010)	0.004 (0.011)	0.005 (0.009)	0.006 (0.007)	0.001 (0.006)	-0.008 (0.006)	-0.021** (0.008)	-0.019 (0.012)
$y_{1m}^f$	0.007 (0.007)	0.010*** (0.003)	0.012*** (0.004)	0.012*** (0.003)	0.011*** (0.003)	0.008*** (0.003)	0.003 (0.003)	-0.001 (0.002)	0.009* (0.005)
$\Delta y_m^f$	-0.007 (0.008)	-0.001 (0.006)	-0.001 (0.005)	0.004 (0.004)	0.008* (0.005)	0.007 (0.005)	-0.003 (0.004)	0.000 (0.005)	0.040*** (0.011)
$C_t$	-0.008* (0.004)	0.002 (0.003)	-0.001 (0.003)	-0.000 (0.003)	0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.002 (0.002)	-0.002 (0.002)
$\Delta \tilde{r}_t^u * C_t$	0.012 (0.105)	0.054 (0.074)	0.014 (0.065)	-0.002 (0.059)	-0.008 (0.058)	-0.014 (0.059)	-0.011 (0.053)	-0.012 (0.053)	-0.041 (0.060)
$pct$	-0.011 (0.019)	0.015 (0.012)	0.014 (0.012)	0.011 (0.011)	0.011 (0.010)	0.007 (0.009)	0.003 (0.009)	-0.000 (0.009)	0.003 (0.012)
$S_t$	0.000 (0.002)	0.001 (0.001)	0.001** (0.001)	0.002*** (0.001)	0.001** (0.001)	0.001 (0.001)	0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)
$\Delta \tilde{r}_t^u * S_t$	-0.049** (0.020)	-0.027*** (0.009)	-0.025*** (0.009)	-0.020** (0.008)	-0.014* (0.008)	-0.006 (0.007)	0.002 (0.006)	0.004 (0.007)	-0.000 (0.010)
Constant	0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
Observations	4,172	4,172	4,172	4,172	4,172	4,172	4,172	4,172	4,172
$R^2$	0.040	0.021	0.025	0.026	0.025	0.019	0.015	0.010	0.021

Notes: Dependent variables are the one-day change of Swiss government bond yields from one (1Y) to thirty years (30Y) of maturity. Robust standard errors are in parentheses. \* Indicates significance at the 0.1 level, \*\* at the 0.05 level and \*\*\* at the 0.01 level.

## 5.2 Exchange rates and stocks

Now I estimate (6) using exchange rates and stock indices. Results are given in Table 7. First of all,  $\Delta \tilde{r}_t^u$  on PE days only significantly affects CHF/Euro and CHF/USD but not CHF/GBP. For instance, a one percentage point increase of  $\Delta \tilde{r}_t^u$  increases the value of the Swiss Franc denominated in Euro by about 1.6 percent on PE days. The degree of pessimism expressed in a given press release only affects CHF/USD. An increase of pessimism by one percentage point depreciates the Swiss Franc denominated in US-Dollar by about 0.09 percent. Additionally, all

<sup>15</sup>It is important to note that the results are not driven by the latent variable methodology employed. As a robustness check, I estimate (6) employing the standard event study methodology, i.e. only PE days are considered, and obtain similar results (Compare Table A.3). As a further robustness check, I employ  $Pess_{mixed_t}$  and  $Pess_{sched_t}$  in estimating (6) (Compare Section 4.2). Results are shown in Table A.1 in Appendix A. To conserve space, only coefficients are reported. In the case of  $Pess_{mixed_t}$ , the significance of the effect on bond yields with maturity of three to five years is weaker.  $Pess_{sched_t}$  affects bond yield of two to seven year of maturity significantly. In this case, coefficients are slightly larger. For all other variables the results remain virtually the same.

three investigated exchange rates are driven by the SNB’s updated view on economic activity measured by  $\Delta y_t^f$ . The SNB’s inflation forecast does not seem to play a role in determining movements in exchange rates on PE days. An exception is the effect of  $\pi_{23t}^f$  on CHF/Euro where I find a significant influence.

Evaluating the Swiss stock market reveals that the Swiss Performance Index (SPI) does not react significantly to  $\Delta \tilde{r}_t^u$  on PE days. However, employing a sectoral stock index of the banking sector, I find weak evidence that bank stocks are affected by  $\Delta \tilde{r}_t^u$  on PE days. All other sectoral indices do not show significant responses to monetary policy surprises (results not reported). Interestingly, stocks do not react significantly to monetary policy news from press releases. Additionally, it seems that stocks perform significantly worse on days where there is a SNB communication event such as a speech or the main meeting.<sup>16</sup>

Altogether, the results are in line with the findings of the high-frequency analysis of [Ranaldo and Rossi \(2010\)](#). Bonds show the closest link to SNB policy rate surprises and communication, while exchange rates are valued in terms of economic fundamentals and therefore respond to policy news too. In the analysis, however, I can distinguish the response of assets to different aspects of monetary policy news, i.e. to inflation or GDP forecasts communicated or the degree of pessimism expressed in press releases. For instance, it is interesting to note that the results indicate that the SNB’s change in its GDP forecast from one meeting to the next drives the currency market response next to the response to  $\Delta \tilde{r}_t^u$  but not the inflation forecast. Stocks, however, might be more influenced by equity risk premia which are more due to corporate-specific issues than due to monetary policy. The weak evidence for the asset price response to speeches and communication at the main meeting ( $C_t$  and  $C_t \Delta \tilde{r}_t^u$ ) might also be due to the fact that all other monetary news might be incorporated into prices a lot faster during the day but speeches might be more time-consuming to analyse (See [Ranaldo and Rossi 2010](#)).

### 5.3 Explaining Gürkaynak’s slope factor with monetary policy news from press releases

As outlined in the methodology part, identifying the effect of SNB communication on asset prices can take one of two forms: (a) The indirect approach constructing monetary policy news from changes in medium-term futures prices or (b) the direct approach using SNB press releases. Here I show that monetary policy news obtained from SNB press releases at least partly relate

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<sup>16</sup>The results do not depend on the estimation methodology employed. Qualitatively similar results are obtained estimating (6) with the standard event study methodology (Compare Table A.4 in Appendix A). As before for the bond market, I conduct a further robustness check and employ  $Pess\_mixed_t$  and  $Pess\_sched_t$  in estimating (6). Results are shown in Table A.2 in Appendix A. To conserve space, only coefficients are reported. Employing  $Pess\_mixed_t$ , only changes the significance of the response of the exchange rate between the Swiss Franc and the US-Dollar and the influence of  $d\pi_{23t}^f$  being less significant as well. With  $Pess\_sched_t$ , the exchange rate between the Swiss Franc and the British Pound also gets significantly influenced by the degree of pessimism expressed in press releases. More interestingly, there is also weak evidence that  $Pess\_sched_t$  affects bank stocks. Finally, on eight SNB PE days, the ECB also has its policy meeting (this coincidence happens mainly at the start of the sample). Since it is reasonable to assume that ECB monetary policy affects exchange rates as well, I remove those PE days and re-estimate (6). Results are also given in Table A.2. It can be seen that the influence of  $d\pi_{23t}^f$  on the exchange rate between the Swiss Franc and the Euro is now statistically insignificant. Additionally,  $\Delta \tilde{r}_t^u$  on PE is now insignificant for bank stocks but there is weak evidence that  $y_t^f$  affects bank stocks. All other results remain similar to those obtained before.

Table 7: Exchange rates and stock market

VARIABLES	CHF/Euro	CHF/Dollar	CHF/GBP	SPI	Banks
$(PE_t)$	0.056 (0.156)	0.434** (0.201)	0.189 (0.238)	-0.250 (0.520)	-0.019 (0.728)
$\Delta \tilde{r}_t^u$	-0.677*** (0.147)	-1.101*** (0.246)	-0.954*** (0.256)	2.423*** (0.522)	3.425*** (0.847)
$\Delta \tilde{r}_t^u * (PE_t)$	1.580*** (0.473)	4.843*** (0.988)	1.509 (1.253)	1.845 (1.590)	4.368* (2.461)
$Pess_t$	-0.010 (0.032)	-0.093** (0.043)	-0.049 (0.046)	0.045 (0.102)	-0.036 (0.157)
$\pi_{1m}^f$	-0.072 (0.089)	0.141 (0.130)	-0.094 (0.111)	0.210 (0.205)	0.362 (0.390)
$d\pi_{23m}^f$	0.172** (0.088)	-0.158 (0.155)	0.009 (0.176)	-0.249 (0.380)	-0.398 (0.602)
$y_{1m}^f$	0.070 (0.062)	-0.077 (0.075)	-0.012 (0.073)	-0.062 (0.118)	-0.309 (0.224)
$\Delta y_m^f$	0.334*** (0.126)	0.380** (0.164)	0.328* (0.168)	0.016 (0.148)	-0.007 (0.225)
$C_t$	0.009 (0.019)	0.055 (0.041)	-0.019 (0.034)	-0.153** (0.071)	-0.292** (0.122)
$\Delta \tilde{r}_t^u * C_t$	0.261 (0.390)	-0.608 (1.152)	-0.454 (0.815)	1.906 (2.426)	3.398 (4.673)
$pc_t$	0.134 (0.129)	-0.352** (0.178)	-0.083 (0.171)	-0.269 (0.327)	-0.396 (0.517)
$S_t$	0.012* (0.006)	0.036*** (0.013)	0.028** (0.013)	-0.018 (0.020)	-0.017 (0.043)
$\Delta \tilde{r}_t^u * S_t$	0.020 (0.085)	0.334*** (0.110)	0.117 (0.239)	-0.505 (0.342)	-0.639 (0.744)
Constant	0.006 (0.006)	0.003 (0.011)	0.012 (0.010)	0.026 (0.018)	0.027 (0.031)
Observations	4,172	4,172	4,172	4,172	4,172
$R^2$	0.023	0.021	0.012	0.016	0.013

Notes: Dependent variables are the one-day percentage change of the exchange rate of the Swiss Franc denominated in Euro, US-Dollar and British Pounds as well as the one-day percentage change of the Swiss Performance Index (SPI) as well as the ICB Supersector Index from SIX (here Supersector Banks). Robust standard errors are in parentheses. \* Indicates significance at the 0.1 level, \*\* at the 0.05 level and \*\*\* at the 0.01 level. It is important to note that I arrive at very similar results if I exclude the data of the time where the SNB set the minimum exchange rate to the Euro (from 6/09/2011 to 15/01/2015). Results are available upon request.

to the slope component constructed from changes in futures prices. More specifically, I regress  $slope_m$  on the monetary policy news as summarized in (9). This is done separately with (a)  $Pess_m$  and (b)  $Pess_{mixed}_t$ . Since  $slope_m$  can only be calculated for the 63 scheduled PE,  $Pess_{sched}_t = Pess_m$ .

Table 8: Explaining  $slope_m$  with monetary policy news from press releases

VARIABLES	(a)	(b)
$Pess_m$	-0.009 (0.116)	
$Pess_{mixed}_t$		-0.112 (0.182)
$\pi_{1m}^f$	0.622** (0.289)	0.670** (0.335)
$d\pi_{23m}^f$	0.075 (0.554)	-0.113 (0.625)
$y_{1m}^f$	0.107 (0.257)	0.091 (0.272)
$\Delta y_m^f$	0.698 (0.614)	0.637 (0.661)
$pc_t$	0.010** (0.005)	0.009* (0.005)
Constant	-0.008 (0.009)	-0.008 (0.009)
Observations	63	63
$R^2$	0.254	0.259

Notes: The dependent variable is the constructed  $slope_m$  component of monetary policy surprises. Bootstrap standard errors accounting for the extra sample variation stemming from the construction of  $slope_m$  are in parentheses. \* Indicates significance at the 0.1 level, \*\* at the 0.05 level and \*\*\* at the 0.01 level.

Results, given in Table 8, indicate that across all specifications, the main driver of the slope component is the change in the SNB's inflation forecast for the current year. The sign of the estimate is intuitive: An increase of the inflation forecast by one percentage point increases  $slope_m$  on average by around 0.622 to 0.670 percentage points depending on the pessimism measure used. In other words, financial market participants revise their expectations about the future path of the policy rate upwards due to an increase of the SNB's inflation forecast. Moreover, expectations about the future path of the policy rate are more strongly influenced on PE days where a press conference ( $pc_m$ ) is held to explain the reasons for the policy decision. This finding underlines the importance of SNB press conferences to influence market expectations about future policy rates beyond the news provided through press releases.

Changes in the SNB's outlook of economic activity ( $y_m^f$  and  $\Delta y_m^f$ ) do not significantly affect  $slope_m$ . This indicates that the SNB is credible in communicating its inflation forecast as its main indicator of policy rate changes. The medium-term inflationary pressure ( $d\pi_{23m}^f$ ), however, does not significantly affect  $slope_m$ . This might be due to the fact that  $slope_m$  is constructed

employing futures of 6 month of expiration. Therefore,  $slope_m$  represents changes in market expectations about the likely path of the policy rate for the next months but not for the next year. The degree of pessimism expressed in press releases (or conferences) might not affect  $slope_m$  because the constructed pessimism variable does not distinguish between forward and backward looking news. For instance, the degree of pessimism in a given press release might be high because the SNB sums up past negative economic events such as a crisis but this does not reflect the SNB's outlook on future developments. In this case, the degree of pessimism is uninformative for financial market expectations about the future path of the policy rate reflected in  $slope_m$ .

This is a shortcoming of the constructed pessimism measures. It would be interesting to see if pessimism affects  $slope_m$  for the case that pessimism was concentrated on forward looking statements. Unfortunately, the SNB's press releases are hard split into backward looking and forward looking statements.

## 6 Conclusion

Communication is an integral part of monetary policy to influence and steer market expectations. By extracting monetary policy news from SNB press releases and press conferences following a monetary policy decision, I show that asset prices respond not only to unexpected policy rate changes but also to communication on policy event days. Consistent with previous findings, I find that bonds are the most responsive assets indicating their close link to monetary policy. While unexpected policy rate changes affect short-term bond yields, communication affects medium and long-term bond yields, which is an important aspect of monetary policy transmission to financial markets.

In contrast to previous studies, I show which policy news of SNB communication matter. Medium and long-term bond yields respond to inflation and GDP forecasts as well as to the degree of pessimism expressed in press releases, while exchange rates mainly react to the SNB's update in its GDP forecast. Stocks show the smallest reaction to all investigated aspects of policy news indicating that they might be more valued due to equity risk premia and corporate-specific factors.

Furthermore, I bring together the indirect method of identifying the effect of monetary policy communication on asset prices via changes in medium-term futures prices and the direct method via textual analysis of press releases. The link of the two methods is able to contribute to a better understanding on how central bank talk affects policy expectations, i.e. expectations about the future path of the policy rate, and is therefore crucial for deriving an optimal communication design. While the indirect methods identify how central bank communication was perceived by market participants, the direct method can give a detailed description about which aspects of communication are crucial for market expectations to change. The results indicate that the SNB was successful in steering market expectations about the future path of the policy rate with communicating its conditional inflation forecast.

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# Appendix A

Table A1: Yield curve with  $Pess\_mixed_t$  and  $Pess\_sched_t$

VARIABLES	1Y	2Y	3Y	4Y	5Y	7Y	10Y	20Y	30Y
<b>Pess_mixed<sub>t</sub></b>									
$(PE_t)$	-0.011	0.005	0.010	0.010	0.007	0.002	-0.000	-0.010	-0.030***
$\Delta \tilde{r}_t^u$	0.203***	0.077***	0.089***	0.089***	0.085***	0.082***	0.077***	0.054***	0.040***
$\Delta \tilde{r}_t^u * (PE_t)$	0.678***	0.039	0.024	0.027	0.033	0.029	0.013	-0.010	-0.020
$Pess\_mixed_t$	0.006	-0.004	-0.006*	-0.006*	-0.005*	-0.003	-0.003	-0.003	-0.000
$\pi_{1m}^f$	-0.013	-0.030**	-0.034**	-0.030***	-0.025***	-0.017***	-0.008	0.005	0.007
$d\pi_{23m}^f$	0.012	0.007	0.006	0.006	0.006	0.000	-0.009	-0.021**	-0.017
$y_{1m}^f$	0.009	0.009***	0.011***	0.011***	0.010***	0.007**	0.002	-0.001	0.009*
$\Delta y_m^f$	-0.004	-0.000	-0.001	0.004	0.008	0.007	-0.003	-0.000	0.041***
$C_t$	-0.008*	0.001	-0.001	-0.000	0.001	-0.001	-0.001	-0.002	-0.002
$\Delta \tilde{r}_t^u * C_t$	0.013	0.055	0.015	-0.002	-0.008	-0.014	-0.012	-0.012	-0.041
$pc_t$	-0.008	0.017	0.014	0.010	0.010	0.006	0.002	-0.001	0.004
$S_t$	0.000	0.001	0.001**	0.002***	0.001**	0.001	0.000	-0.000	-0.000
$\Delta \tilde{r}_t^u * S_t$	-0.049**	-0.027***	-0.025***	-0.020**	-0.014*	-0.006	0.002	0.004	-0.000
Constant	0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
Observations	4,172	4,172	4,172	4,172	4,172	4,172	4,172	4,172	4,172
$R^2$	0.041	0.020	0.024	0.026	0.025	0.019	0.016	0.010	0.021
<b>Pess_sched<sub>t</sub></b>									
$(PE_t)$	-0.002	0.002	0.004	0.004	0.002	-0.002	-0.004	-0.013*	-0.029**
$\Delta \tilde{r}_t^u$	0.203***	0.077***	0.089***	0.089***	0.085***	0.082***	0.077***	0.054***	0.040***
$\Delta \tilde{r}_t^u * (PE_t)$	0.662***	0.056	0.051	0.052	0.052	0.042	0.025	0.002	-0.018
$Pess\_sched_t$	-0.006	-0.008**	-0.010**	-0.008***	-0.006**	-0.004*	-0.003	-0.003	-0.003
$\pi_{1m}^f$	-0.013	-0.030**	-0.035***	-0.030***	-0.026***	-0.018***	-0.009*	0.005	0.007
$d\pi_{23m}^f$	-0.006	-0.004	-0.006	-0.003	0.000	-0.003	-0.010	-0.024**	-0.022
$y_{1m}^f$	0.008	0.011***	0.014***	0.014**	0.012***	0.009***	0.003	0.000	0.009**
$\Delta y_m^f$	-0.011	-0.003	-0.003	0.003	0.007	0.007	-0.003	-0.000	0.039***
$C_t$	-0.008*	0.001	-0.001	-0.000	0.001	-0.001	-0.001	-0.002	-0.002
$\Delta \tilde{r}_t^u * C_t$	0.012	0.055	0.016	-0.001	-0.007	-0.013	-0.011	-0.011	-0.041
$pc_t$	-0.016	0.013	0.012	0.009	0.009	0.006	0.002	-0.001	0.002
$S_t$	0.000	0.001	0.001**	0.002***	0.001**	0.001	0.000	-0.000	-0.000
$\Delta \tilde{r}_t^u * S_t$	-0.049**	-0.027***	-0.025***	-0.020**	-0.014*	-0.006	0.002	0.004	-0.000
Constant	0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
Observations	4,172	4,172	4,172	4,172	4,172	4,172	4,172	4,172	4,172
$R^2$	0.041	0.021	0.026	0.027	0.025	0.019	0.016	0.010	0.021

Notes: Dependent variables are the one-day change of Swiss government bond yields from one (1Y) to thirty years (30Y) of maturity. \* Indicates significance at the 0.1 level, \*\* at the 0.05 level and \*\*\* at the 0.01 level.

Table A2: Exchange rates and stocks with  $Pess\_mixed_t$ ,  $Pess\_sched_t$  and without ECB PE

VARIABLES	CHF/Euro	CHF/Dollar	CHF/GBP	SPI	Banks
<b>Pess.mixed<sub>t</sub></b>					
$(PE_t)$	0.069	0.431**	0.180	-0.329	-0.119
$\Delta \tilde{r}_t^u$	-0.677***	-1.101***	-0.954***	2.422***	3.424***
$\Delta \tilde{r}_t^u * (PE_t)$	1.545***	4.829***	1.520	2.055	4.612*
$Pess\_mixed_t$	-0.019	-0.089*	-0.041	0.101	0.038
$\pi_{1m}^f$	-0.067	0.177	-0.076	0.184	0.365
$d\pi_{23m}^f$	0.160*	-0.153	0.019	-0.176	-0.304
$y_{1m}^f$	0.066	-0.094	-0.019	-0.039	-0.297
$\Delta y_m^f$	0.328**	0.379**	0.331*	0.053	0.039
$C_t$	0.009	0.054	-0.019	-0.153**	-0.292**
$\Delta \tilde{r}_t^u * C_t$	0.259	-0.609	-0.453	1.920	3.415
$pct$	0.126	-0.359**	-0.083	-0.222	-0.345
$S_t$	0.012*	0.036***	0.028**	-0.018	-0.017
$\Delta \tilde{r}_t^u * S_t$	0.020	0.334***	0.117	-0.506	-0.640
Constant	0.006	0.003	0.012	0.026	0.027
Observations	4,172	4,172	4,172	4,172	4,172
$R^2$	0.023	0.020	0.011	0.016	0.013
<b>Pess.sched<sub>t</sub></b>					
$(PE_t)$	0.050	0.330*	0.142	-0.164	-0.007
$\Delta \tilde{r}_t^u$	-0.677***	-1.102***	-0.954***	2.423***	3.426***
$\Delta \tilde{r}_t^u * (PE_t)$	1.630***	5.197***	1.714	1.773	4.644*
$Pess\_sched_t$	-0.032	-0.096*	-0.085**	-0.116	-0.271**
$\pi_{1m}^f$	-0.069	0.165	-0.081	0.200	0.374
$d\pi_{23m}^f$	0.123	-0.222	-0.092	-0.530	-0.871
$y_{1m}^f$	0.075	-0.059	0.002	-0.051	-0.273
$\Delta y_m^f$	0.322***	0.382**	0.309*	-0.077	-0.138
$C_t$	0.009	0.054	-0.020	-0.153**	-0.293**
$\Delta \tilde{r}_t^u * C_t$	0.262	-0.592	-0.447	1.890	3.392
$pct$	0.118	-0.360**	-0.112	-0.381	-0.564
$S_t$	0.012*	0.036***	0.028**	-0.018	-0.016
$\Delta \tilde{r}_t^u * S_t$	0.019	0.332***	0.116	-0.505	-0.639
Constant	0.006	0.003	0.012	0.026	0.027
Observations	4,172	4,172	4,172	4,172	4,172
$R^2$	0.023	0.020	0.012	0.017	0.014
<b>Without ECB PE</b>					
$(PE_t)$	0.043	0.379*	0.013	0.011	0.505
$\Delta \tilde{r}_t^u$	-0.681***	-1.110***	-0.962***	2.408***	3.396***
$\Delta \tilde{r}_t^u * (PE_t)$	1.982***	4.841***	1.175	1.157	4.564
$Pess_t$	-0.026	-0.124***	-0.095**	0.088	0.013
$\pi_{1m}^f$	-0.102	0.136	-0.112	0.030	0.025
$d\pi_{23m}^f$	0.159	-0.237	-0.144	0.040	0.111
$y_{1m}^f$	0.090	-0.049	0.047	-0.064	-0.335*
$\Delta y_m^f$	0.319***	0.358**	0.293*	0.014	-0.021
$C_t$	0.008	0.057	-0.019	-0.157**	-0.302**
$\Delta \tilde{r}_t^u * C_t$	0.355	-0.420	-0.280	2.196	4.004
$pct$	0.153	-0.360**	-0.058	-0.206	-0.250
$S_t$	0.012*	0.036***	0.028**	-0.018	-0.016
$\Delta \tilde{r}_t^u * S_t$	0.017	0.331***	0.115	-0.505	-0.643
Constant	0.006	0.003	0.012	0.026	0.028
Observations	4,164	4,164	4,164	4,164	4,164
$R^2$	0.025	0.020	0.013	0.014	0.012

Notes: Dependent variables are the one-day percentage change of the exchange rate of the Swiss Franc denominated in Euro, US-Dollar and British Pounds as well as the one-day percentage change of the Swiss Performance Index (SPI) as well as the ICB Supersector Index from SIX (here Supersector Banks). \* Indicates significance at the 0.1 level, \*\* at the 0.05 level and \*\*\* at the 0.01 level.

Table A3: Event study methodology (Yield Curve)

VARIABLES	1Y	2Y	3Y	4Y	5Y	7Y	10Y	20Y	30Y
$\Delta \tilde{r}_t^u$	0.861*** (0.167)	0.109* (0.065)	0.109* (0.063)	0.114** (0.055)	0.118** (0.051)	0.112* (0.058)	0.094 (0.064)	0.045 (0.072)	0.012 (0.086)
$Pess_t$	0.002 (0.008)	-0.006 (0.004)	-0.007* (0.004)	-0.006** (0.003)	-0.004* (0.002)	-0.003 (0.002)	-0.002 (0.002)	-0.003 (0.003)	-0.002 (0.003)
$\pi_{1m}^f$	-0.013 (0.015)	-0.032** (0.014)	-0.037*** (0.014)	-0.032*** (0.011)	-0.027*** (0.009)	-0.018*** (0.006)	-0.009 (0.006)	0.004 (0.006)	0.006 (0.007)
$d\pi_{23m}^f$	0.007 (0.032)	0.005 (0.011)	0.004 (0.011)	0.005 (0.009)	0.006 (0.008)	0.001 (0.007)	-0.008 (0.006)	-0.021** (0.009)	-0.019 (0.013)
$y_{1m}^f$	0.007 (0.007)	0.010*** (0.004)	0.012*** (0.004)	0.012*** (0.004)	0.011*** (0.004)	0.008** (0.003)	0.003 (0.003)	-0.001 (0.002)	0.009* (0.005)
$\Delta y_m^f$	-0.007 (0.009)	-0.002 (0.006)	-0.002 (0.006)	0.004 (0.004)	0.008 (0.005)	0.007 (0.006)	-0.003 (0.004)	0.000 (0.005)	0.040*** (0.012)
$pct$	-0.011 (0.020)	0.015 (0.013)	0.014 (0.013)	0.011 (0.011)	0.010 (0.010)	0.007 (0.010)	0.003 (0.009)	-0.000 (0.010)	0.003 (0.013)
Constant	-0.006 (0.040)	0.008 (0.010)	0.011 (0.009)	0.009 (0.007)	0.005 (0.006)	0.000 (0.007)	-0.003 (0.007)	-0.011 (0.007)	-0.029** (0.012)
Observations	78	78	78	78	78	78	78	78	78
$R^2$	0.388	0.286	0.357	0.393	0.379	0.273	0.179	0.159	0.386

Notes: Dependent variables are the one-day change of Swiss government bond yields from one (1Y) to thirty years (30Y) of maturity. Robust standard errors are in parentheses. \* Indicates significance at the 0.1 level, \*\* at the 0.05 level and \*\*\* at the 0.01 level.

Table A4: Event study methodology (Exchange rates and stock indices)

VARIABLES	CHF/Euro	CHF/Dollar	CHF/GBP	SPI	Banks
$\Delta \tilde{r}_t^u$	0.908* (0.475)	3.755*** (1.000)	0.532 (1.289)	4.227*** (1.577)	7.725*** (2.429)
$Pess_t$	-0.009 (0.034)	-0.092** (0.046)	-0.047 (0.049)	0.043 (0.107)	-0.039 (0.165)
$\pi_{1m}^f$	-0.071 (0.094)	0.147 (0.137)	-0.094 (0.117)	0.197 (0.212)	0.337 (0.409)
$d\pi_{23m}^f$	0.171* (0.092)	-0.163 (0.162)	0.004 (0.185)	-0.243 (0.400)	-0.388 (0.633)
$y_{1m}^f$	0.070 (0.065)	-0.078 (0.078)	-0.010 (0.077)	-0.060 (0.123)	-0.304 (0.233)
$\Delta y_m^f$	0.334** (0.133)	0.380** (0.172)	0.328* (0.176)	0.014 (0.156)	-0.010 (0.238)
$pct$	0.133 (0.136)	-0.355* (0.187)	-0.081 (0.180)	-0.260 (0.343)	-0.378 (0.545)
Constant	0.061 (0.164)	0.428** (0.209)	0.188 (0.251)	-0.219 (0.547)	0.012 (0.765)
Observations	78	78	78	78	78
$R^2$	0.287	0.367	0.133	0.093	0.121

Notes: Dependent variables are the one-day percentage change of the exchange rate of the Swiss Franc denominated in Euro, US-Dollar and British Pounds as well as the one-day percentage change of the Swiss Performance Index (SPI) as well as the ICB Supersector Index from SIX (here Supersector Banks). \* Indicates significance at the 0.1 level, \*\* at the 0.05 level and \*\*\* at the 0.01 level.

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Hamburg Institute of International Economics (HWWI)

Baumwall 7 | 20459 Hamburg | Germany

Phone: +49 (0)40 34 05 76 - 0 | Fax: +49 (0)40 34 05 76 - 776

[info@hwwi.org](mailto:info@hwwi.org) | [www.hwwi.org](http://www.hwwi.org)