NOTES D'ÉTUDES

ET DE RECHERCHE

MACROECONOMIC SURPRISES AND THE INFLATION COMPENSATION CURVE IN THE EURO AREA

Jérôme Coffinet and Sébastien Frappa

July 2008

NER - E # 220

BANQUE DE FRANCE

EUROSYSTÈME

DIRECTION GÉNÉRALE DES ÉTUDES ET DES RELATIONS INTERNATIONALES

DIRECTION GÉNÉRALE DES ÉTUDES ET DES RELATIONS INTERNATIONALES
DIRECTION DE LA RECHERCHE

MACROECONOMIC SURPRISES

AND THE INFLATION COMPENSATION CURVE

IN THE EURO AREA

Jérôme Coffinet and Sébastien Frappa

July 2008

NER - E # 220

Macroeconomic Surprises and the Inflation Compensation Curve in the Euro Area[#]

Jérôme Coffinet* and Sébastien Frappa**

(This Version: July 2008)

[#] We thank Béatrice Saes-Escorbiac for excellent research assistance. We would also like to thank Ibrahim Stevens (Bank of England), as well as participants at Banque de France seminar (Paris, 2007) and at the 25th Symposium on Money, Banking and Finance (Luxembourg, 2008), for useful comments. Any errors and omissions are our own responsibility. Views expressed in this article do not necessarily coincide with those of the Banque de France.

* Banque de France, Monetary Policy Research Unit, 1 rue de la Vrillière 75049 Paris cedex 01, France, email: jerome.coffinet@banque-france.fr. Tel: +33 1 42 92 49 18. Fax: +33 1 42 92 62 92.

** Banque de France, Monetary Policy Research Unit, 1 rue de la Vrillière 75049 Paris cedex 01, France, email: sebastien.frappa@banque-france.fr. Tel: +33 1 42 92 33 38. Fax: +33 1 42 92 62 92.

Abstract

Using daily data stemming from inflation-indexed markets, we analyse the effects of numerous macroeconomic surprises on inflation compensation data – the sum of inflation expectations, risk and liquidity premia – in the euro area between 2 January 2004 and 31 December 2007. Our results suggest that when gauging short and medium-term inflation compensations, market operators are sensitive to surprises related to real activity and prices. Interestingly, oil futures prices tend to impact at some point on the short- and medium-ends of the inflation compensation curve. Notwithstanding, long-term inflation compensations remain generally unresponsive to macroeconomic surprises, attesting the high ECB's credibility.

Keywords: inflation compensation, macroeconomic surprise, Eurosystem.
JEL Classification: E31, E44, E58.

Résumé

A partir de données journalières extraites des marchés indexés sur l'inflation de la zone euro pour la période 2 janvier 2004 - 31 décembre 2007, nous étudions l'incidence d'un ensemble large de surprises macroéconomiques sur les compensations d'inflation – sommes des anticipations d'inflation et des primes de risque et de liquidité – à différentes maturités. Nos résultats mettent en évidence un effet significatif à court et moyen termes des surprises liées à l'activité réelle et aux prix. En outre, les prix futurs du pétrole présentent un impact significatif sur les compensations d'inflation de court et moyen termes. Enfin, les compensations d'inflation de maturités longues réagissent peu aux surprises, ce qui atteste leur ancrage solide aux horizons de long terme, reflétant la crédibilité élevée de la BCE.

Mots-clés : compensation d'inflation, surprises macroéconomiques, Eurosystème.
Codes JEL : E31, E44, E58.

Non Technical Summary

This paper examines the effects of numerous macroeconomic surprises on inflation compensations data – the sum of inflation expectations, risk and liquidity premia – extracted from inflation-indexed markets in the euro area. The sample spans the period between 2 January 2004 and 31 December 2007. Given the presence of risk premia, inflation compensations can only be considered as an approximation of inflation expectations.

Inflation compensation measures in the euro area are extracted both from the inflation-linked swap market and the inflation-indexed bond market. Therefore, we use daily data of break-even rates (i.e. the spread between yields on nominal and real bonds) whose bonds matures in 2012, 2015 and 2032 and the implied forward inflation rates one-year forward one to ten years ahead, five-years forward five years ahead and ten-years forward ten years ahead embedded in inflation-linked swap data. The "surprise" is defined as the difference between the statistics outturn and the median forecast reported in the regular Bloomberg survey of market participants. These surprises are related to real activity, forward-looking indicators, prices, money and labour market data for the whole euro area, Germany, France, Italy and the United States. The estimation procedure implements econometrics methods stemming from GARCH financial methodology.

The main results are the following:

- First, it turns out that for maturities between 1 and 10 years, market operators are sensitive to surprises related to real activity and prices. Besides, oil futures prices tend to impact on the short- and medium-ends of the inflation compensations curve. This effect prove to be time-varying; in particular, it increases significantly at the end of the sample ;

- Second, long-term inflation compensations remain generally unresponsive to macroeconomic surprises, attesting an anchoring of long-term inflation compensations consistent with the definition of price stability and thus suggesting the high ECB's credibility.

Résumé non technique

Ce papier vise à étudier l'incidence d'un ensemble large de surprises macroéconomiques – à savoir les composantes non anticipées des publications économiques – sur la courbe des compensations d'inflation dans la zone euro au cours de la période 2 janvier 2004 – 31 décembre 2007. Etant donné la présence de primes (risques inflationniste et de liquidité) incluses dans ces mesures extraites des marchés indexés, nous ne pouvons considérer les compensations d'inflation que comme une approximation des anticipations d'inflation.

Les données de compensations d'inflation extraites des marchés se composent des points morts d'inflation d'échéances 2012, 2015 et 2032 ainsi que des taux *forward* 1 an dans respectivement 1 an à 9 ans, 5 ans dans 5 ans et 10 ans dans 10 ans issus du marché des *swaps* indexés sur l'inflation. Les surprises macroéconomiques sont calculées comme la différence entre les publications économiques d'une part et la médiane des anticipations issues de l'enquête de Bloomberg sur un panel de professionnels d'autre part. Ces surprises portent sur l'activité réelle, les prix, les salaires, l'emploi, et la monnaie, pour la zone euro dans son ensemble, l'Allemagne, la France, l'Italie et les Etats-Unis. L'estimation met en œuvre des méthodes économétriques issues de la famille de modélisation financière GARCH.

Les principaux résultats sont les suivants :

- en premier lieu, il apparaît, pour les maturités comprises entre 1 et 10 ans, une incidence significative aux surprises concernant l'activité réelle et les prix. En outre, les variations des *futures* sur prix du pétrole ressortent de manière significative pour des horizons de court et moyen termes. Cet effet est variable au cours du temps et a augmenté sur la fin de l'échantillon ;

- en second lieu, les maturités longues réagissent peu aux surprises. Ces résultats suggèrent que, du point de vue des opérateurs de marché, les compensations d'inflation sur ces horizons sont bien ancrées à des niveaux compatibles avec la stabilité des prix, reflétant une crédibilité élevée de la BCE.

1. Introduction

As rational economic agents perform in a way that optimally considers the future economic outlook, inflation expectations play a crucial role in macroeconomic developments. Hence, the European Central Bank (ECB) has a clear interest in being able to assess the private sectors short-, medium- and long-term inflation expectations when conducting its regular assessment of the risks to price stability. ECB's board members regularly claim that stabilising the private sector's inflation expectations is a prerequisite for monetary policy to achieve price stability (Trichet, 2007): "I confirm once again that we consider the anchoring of inflation expectations to be absolutely decisive. It is because inflation expectations are solidly anchored that we can put the European economy in a favourable environment in the medium and long run with sustainable growth and job creation".

In that respect, the ECB has often referred to *market-based* inflation expectations. In a recent introductory statement, the President of the ECB states that: "We will do what is necessary to continue to ensure solidly anchored inflation expectations. We are looking very carefully at all […] information we extract from the financial markets" (Trichet, 2007). Three main reasons are likely to motivate the importance given by the ECB to market-based inflation expectations. On the short-term, it is a way for the central bank to assess the reliability of other inflation expectations measures (e.g. survey-based measures[1]). Compared to other sources, market-based inflation expectations measures prove to be forward-looking and available at a high frequency for short, medium and long maturities. Given that inflation-linked instruments are priced continuously, *market-based* inflation expectations measures are supposed to react only to the marginal information contained in the data release. On the medium-term, they provide evidence on the extent to which shocks affecting inflation dynamics are perceived by market operators as persistent or transitory. This might also be seen as a way to evaluate the risks of second-round effects, which may jeopardize price stability. On the long-term, it helps assessing the credibility of the quantitative definition of price stability and finally that of the ECB, as perceived by financial markets.

Market-based inflation compensations measures (swap rates, break-even rates and forward rates) generally capture not only a "pure" inflation expectation, but also an inflation risk premium – that is the uncertainty surrounding the inflation expectation – and a liquidity premium - linked to the institutional characteristics of the markets. The sum of those three components is called *inflation compensation*, and is what is measured directly on the market. This is not the scope of the present paper to disentangle the various components of inflation compensation. On the one hand, the results of these econometrics investigation are not yet unambiguous (Kim and Wright, 2005; Hördahl, Tristani

[1] More details can be found on those measures in the July 2006 issue of the ECB's Monthly Bulletin.

and Vestin, 2006; D'Amico, Kim and Wei, 2008; Gurkaynak, Sack and Wright, 2008). On the other hand, one may consider that the aim of the ECB is not only to anchor inflation expectations, but also to make the uncertainty surrounding expected inflation as low as possible. Hence, as regards the objective of the ECB, reducing the "pure" inflation expectation and limiting risk premia go in the same way. For this purpose, we only consider in the present paper inflation *compensation* measures.

The recent developments in market-based inflation *compensation* measures – that is higher level and volatilities, especially at the end of 2007 - have questioned each of these issues. First, the high volatility of inflation *compensation* measures to unexpected macroeconomic press releases is likely to restrict their reliability as future inflation measure as, in the same time, survey-based inflation expectations remain well anchored. Second, the higher level of medium-term inflation compensation might suggest higher risks of wage developments transmission into inflation expectations, paving the way for second-round effects. Third, the increase in long-term inflation compensations may question the ECB's credibility. Indeed, if the central bank is credible enough, then macroeconomic surprises should have no systematic effect on long-term inflation compensations.

This paper seeks to assess the impact of a large dataset of macroeconomic surprises on euro area market-based inflation compensations derived from two sources, inflation-linked swaps (ILS) and inflation-linked bonds (ILB), which have recently regained attention in the euro area since time span is now long enough to allow for econometric investigation and related markets have reached significant levels of liquidity.

Our contribution is fourfold. First, we extend the analysis carried out in the related literature to a broader spectrum of maturities, especially to the short- and medium-end. Second, we use an extensive dataset of surprises variables which allows us to exhibit original results. Third, estimating an (E) GARCH model, we take into account possible heteroskedasticity and autocorrelation problems, as well as asymmetric responses of inflation compensations. Fourth, we estimate time-varying elasticities of inflation compensations with respect to surprises.

Our results suggest that when gauging short- and medium-term term inflation compensations market operators are sensitive to some news' related to real activity and prices. Interestingly, oil futures prices tend to impact on the short end of the inflation curve. However, the significance of this impact seems time-varying and increases at the end of the sample. Notwithstanding, long-term inflation compensations remain generally unresponsive to macroeconomic news, attesting the high ECB's credibility.

The remainder of the paper is structured as follows. Section 2 briefly reviews the literature; Section 3

illustrates the dataset; Section 4 presents our econometric investigation; Section 5 elaborates on our results and gives some interpretations; Section 6 concludes.

2. Related literature

Our paper derives from two strands of the recent empirical literature on financial market expectations. The first one analyses the reaction of interest rates to the unexpected component of data releases (Fleming and Remolona, 1997; Kuttner, 2001). The second one analyses the role of communication and credibility in anchoring inflation expectations (Ehrmann, Fratzscher, Gürkaynak and Swanson, 2007). However, only a very few studies have, so far, analysed the impact of macroeconomic news on inflation expectations.

Using daily bond yield data for the United Kingdom, Sweden and the United States, Gürkaynak, Levin and Swanson (2006) examine the relationship between inflation compensation measures, macroeconomic data releases and monetary policy announcements. They exhibit highly significant responses of forward inflation compensation to economic news' for the US and UK before 1997 - that is before the independence of the Bank of England. They reach the conclusion that a credible inflation target can help anchoring private sector views on long-run inflation expectations. Ehrmann, Fratzscher, Gürkaynak and Swanson (2007) exhibit unresponsiveness of inflation expectations to news' in the long run particularly for Italian and Spanish data. They interpret this result as a better anchoring of long-term inflation expectations since the beginning of EMU, supporting the view of a credible monetary policy.

Jansen and De Haan (2007) use daily data of inflation expectations extracted from French inflation-linked bond market over the period 2003-2007. In the framework of a GARCH model, they test the impact of ECB's communication on the ten-year maturity break-even inflation rate, controlling for some macroeconomic news'. They find a negative relationship between ECB's communication – measured as the frequency of the word 'vigilance' in ECB's statements – and changes in break-even rates. Nevertheless, this result is only found for the second half of 2005. Among the control variables, consumer prices in Germany and France, German IFO indicator, French GDP and producer prices prove to be statistically significant.

The paper that is the most closely related to ours is that of Beechey, Johannsen and Levin (2007). Using daily forward rates covering three maturities and an OLS estimation, they show that the impact of news' on inflation compensation, although it is tiny in both economies, is higher in the US than in the euro area. They also show that surprises in macroeconomic data have mainly significant impact on

short-term inflation compensation in the euro area and rather on long-term in the US. Among other significant variables, French data, especially CPI, but also business confidence and producer price index, play a key role.

Our paper seeks to extend these approaches in studying the impact of surprises on the whole inflation compensation curve, using data both from the inflation-linked swap market and from the bond market. We also use more surprises notably that related to wages and oil issues. Moreover, following Ehrmann and Fratzscher (2002) we use a GARCH model. This allows us, using rolling time-windows, to estimate time-varying coefficients.

3. Data description

3.1 Inflation compensation data

We employ two kinds of inflation indexed market data: break even inflation rates extracted from French inflation-indexed and conventional bonds and implied *forward* inflation rates extracted from inflation linked swap (ILS) zero-coupon contracts from 2 January 2004 to 31 December 2007. All the data are collected from Bloomberg[2] and Datastream.

The break-even inflation rate (BEIR) is defined as the yield spread between a conventional nominal bond and an inflation-indexed bond with the same maturity. This is the compensation for inflation that investors require to offset the yield spread between a nominal bond and an inflation-indexed bond (ILB) with the same characteristics. The BEIR provides a proxy of market participants' average inflation expectations over the residual maturity of the bonds.

The ILS market in the euro area is the most mature and largest inflation-swaps market. Contracts are typically structured as zero-coupon swaps and payments are exchanged at maturity based on a pre-agreed annual fixed rate against a floating rate linked to the euro area HICP index excluding tobacco. The fixed rate is known as *implied inflation rate* and compensates the holder of the contract for expected inflation over the life of the contract plus a premium (*cf.* appendix 1 for more details on the contract). The available maturities of ILS contracts range from 1 to 30 years. Some maturities are more traded than others in the euro-area contracts; indeed, market activity is concentrated in maturities up to ten years. As a consequence, inflation compensation data on short- and medium-term maturities seem more reliable (cf. appendix 2). There are several reasons supporting the use of

[2] Given that ILS market is over-the-counter, the dataset colleted from Bloomberg incorporates rates available across a selection of brokers.

inflation-linked swap data. Firstly, contrary to ILB data in the euro area, data on ILS contracts have a range of regular maturities from one to thirty years, and the availability of short-maturity contracts enables to assess short-term inflation compensation. Secondly, directly observing compensation rates also removes the need to tackle the issues of differences in time-to-maturity and coupon-payment structures of nominal and indexed bonds. In addition, the declining time to maturity of bonds makes the break-even rates from bond data more sensitive to a seasonality bias linked to the HICP (excluding tobacco) index.

Our sample period is particularly interesting insofar as it contains two different stances of the ECB's monetary policy. First, between January 2004 and December 2005, the ECB maintained its main refinancing rate at a level of 2%. During this period risks to price stability in the medium term rose, reflected by sharp increases in inflation compensations as derived from implied ILS rates showed in fugure 1 below. Second, from December 2005 onwards, the ECB has started to withdraw progressively the accommodative stance of its monetary policy by increasing its official interest rates from 2% in November 2005 to 4% in December 2007.

Figure 1: inflation compensations in the euro area

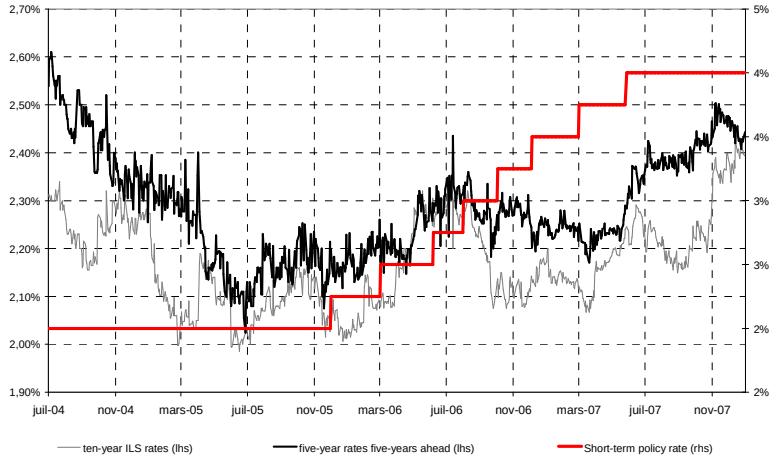


Figure 1 shows ten-year euro area implied inflation compensation rate (grey solid line), five-year forward implied ILS rate five-year ahead (black solid line) and the main refinancing rate (red line) between January 2004 and December 2007. After a decreasing trend in the second half of 2004, there are steep upward movements in inflation compensation in early 2006 and in the second half of 2007. Regarding the five-year forward implied ILS rate five years ahead, we observe an increase in the second half of 2007. But, as mentioned later on, it is rather complex to know exactly the contribution of the "pure" inflation expectation in the inflation compensation, given the presence of some premia.

3.1.1 Some caveats

Some caution is needed when using data on inflation compensation. The main reason is that the implied rate measured from an inflation-swaps contract, as well as the break-even extracted from bond data (and forward rates that can be computed) does not represent a "pure" inflation expectation but consists of a sum of expected inflation over a given horizon and a premium.

This premium can be considered as an inflation risk premium, that is, the premium required for uncertainty about future inflation rates over the lifetime of the instrument, plus a liquidity premium. Indeed, since inflation-linked instruments have recently been introduced in the euro area, investors may have demanded a liquidity premium for holding these instruments to compensate for their relative illiquidity. Nonetheless, we can wisely suppose that this premium is unlikely to change on a day-to-day basis since turnover in those markets has strongly increased in recent years. That is the reason why we do not take this effect into account in the remainder of the paper.

All in all, expected inflation and the inflation risk premium are the main components likely to react to macroeconomic surprises. When inflation compensation reacts to surprises, it could be either expected inflation or inflation risk premium, or both. From a central perspective, is all the more interesting to analyse this compensation insofar as the ECB's objective is to deliver price stability in the medium and long runs. If this commitment is viewed as credible by investors and agents, inflation compensations will remain anchored and investors will demand a low inflation risk premium. Therefore, the two components are (inversely) related to the perceived credibility of the monetary authority in controlling inflation. Thereafter, we use the term "inflation compensation" both for the ILS implied inflation rates and for the ILB break-even rates.

3.1.2 Computation of euro area inflation swap forward rates and break-even rates

Using forward rates presents two advantages in terms of interpretation. Firstly, it makes it possible to correct long-term inflation compensations for volatile variations in short-term inflation compensations so that the forward rates are much less noisy than the corresponding spot ILS rates. Secondly, it enables to study whether a surprise impacts on short, medium or long end of the compensation curve. That is why we compute here these forward rates for different maturities.

Let π_n be the inflation swap rate for maturity n and π_m be the inflation swap rate for maturity m. Then, assuming no arbitrage, the forward inflation swap rate ${}_m\pi^f{}_n$ between m and n is defined:

$$(1+\pi_n)^n = (1+\pi_m)^m \left(1+{}_m\pi^f{}_n\right)^{n-m}$$

Thus, the forward inflation swap rate between n and n + 1 is equal to:

$${}_n\pi^f{}_{n+1} = \frac{(1+\pi_{n+1})^{n+1}}{(1+\pi_n)^n} - 1$$

This definition does not involve any specific assumptions. Our choice is to work with those raw forward rates without using transformation (such as Nelson-Siegel methodology as in Beechey, Johannsen and Levin, 2007) that are likely to bias the results. Indeed, our purpose is to study the market reaction without modification of the signal provided by financial market data.

In addition, break-even inflation rates are computed as the difference between the yield-to-maturity of a nominal bond and that of a real bond or inflation-indexed bond presenting the same characteristics as regards the issuing country and the maturity. In the paper, we focus on break-even rates extracted from nominal and real French bond maturing in 2012, 2015 and 2032.

3.2 Surprises data

The data used to estimate the expected and actual outcome of macroeconomic data releases[3] have been collected from Bloomberg. The anticipated outcome of the macroeconomic releases consists of median expectations of the survey panellists.

Appendix 3 shows all macro announcements. Most euro area data macro announcements are released later than the US equivalents. The late outturn of euro area statistics is due to the compilation of statistics from euro area countries. As a result, they should contain less information as national releases. That is why we also consider national releases for France, Germany and Italy but also those of the US. Indeed, US announcements may be perceived as an early signal regarding euro area expected inflation and since US macro data are typically released earlier than equivalent euro area data, market participants may draw conclusions about the euro area economy from US data releases. An empirical examination is done to check whether survey data can be deemed unbiased predictors of the final outcome. It turns out that in most cases, survey data are found to be unbiased predictors. (see appendix 4 for detailed results).

[3] We do not take into account revisions since the market reaction occurs mainly on the first data release while the reactions after revisions are minor.

The surprise is measured in terms of a standardised surprise measure (Balduzzi et al., 2001), computed as:

$$S_{i,t} = \frac{R_{i,t} - C_{i,t}}{\sigma_{S_i}}$$

where $R_{i,t}$ and $C_{i,t}$ are the realization and the consensus (median expectations of a survey panellists) of data release i at time t, respectively, and σ_{Si} is the standard deviation of the forecast error of data release i. Dividing by the standard deviation makes data surprises comparable across macroeconomic announcements.

We also look into the frequency distribution of coincident surprises in macroeconomic annoucements. For example, in the sample period of 1066 trading days, there are 576 trading days on which there is no release. There are 209 trading days (19.7%) with more than one surprise.

In addition to macro announcements, the estimation also takes into account monetary policy decisions by the ECB. Applied to the ECB's actual monetary policy decisions, the unexpected content of the published decisions can be assessed in comparing actual outcomes of the ECB decisions in terms of the main refinancing rate with the median of analysts' survey-based expectations collected before the Governing Council meetings by Bloomberg. But on the sample period, market participants have perfectly anticipated the decisions taken by the ECB, and the surprise component (measured as the difference between the actual outcome and the median ECB watchers' expectations) has always been equal to zero but at the end of 2005 (beginning of the 'code words' episode). Similarly, we also take into account Federal Reserve monetary policy announcements. Nevertheless, the timing of the publication of the FOMC announcements is at 20:00 (Central European Time) and the surprise (if it exists) must be placed the day after since european indexed markets are closed at that hour.

4. Econometric investigation

As financial markets are assumed to be efficient, the expected component of macroeconomic data releases is assumed not to have any effect on market-based inflation compensations. Hence, only the unexpected component of the release – that is the "surprise" – might affect inflation compensations. A natural way to analyse the effect of various macroeconomic announcements is to include the full set of surprises in one single vector and to regress the change in inflation compensations on these explanatory variables, whose effects are in that way studied altogether.

As usual in this literature (Gürkaynak, Sack and Swanson, 2005), we regress, for each maturity, the day-to-day difference in spot break-even rates and forward inflation swap rates on its own lags, on the full set of surprises as well as on specifically financial day-of-the-week dummies, financial variables (oil futures prices[4]) and on the dummy capturing the effect of central bank communication.

The equation to be estimated is as follows:

$$\Delta R_t = \alpha + \sum_{i=1}^{L1} \beta_i \Delta R_{t-i} + \sum_{j=1}^{N} \gamma_j S_{j,t} + \sum_{k=1}^{K} \lambda_k \Delta \log FV_{k,t} + \varsigma D_{com,t} + \delta Mon + \phi Fri + \varepsilon_t \quad (1)$$

where:

- ΔR_t is the change from date t-1 to t of the inflation compensation (sport BEIR and forward swap rate)[5];
- α is a constant;
- ΔR_{t-1} are lags of the endogeneous variable to correct for possible autocorrelation;
- $S_{i,t}$ is the j-th component of the vector of macroeconomic surprises[6] at the date t;
- FV_k are financial variables such as oil futures prices, FTSE100, dollar/euro exchange rate, Dow Jones IA, Eurostoxx50;
- $D_{com,t}$ is a dummy variable accounting for the monetary policy communication of the ECB[7];
- Mon and Fri are calendar dummies to account for potential day-of-the week effects;
- ε_t the residuals.

GARCH techniques are used to estimate equation (1), which is in that case the conditional mean equation. Indeed, it turns out that the series exhibit volatility clustering as well as a non-normal empirical distribution (an excessive kurtosis suggesting that compensation series have fatter tails than a normal distribution). Moreover, the estimation of equation (1) using OLS exhibits heteroskedasticity in the residuals.

---

[4] Other variables such as FTSE100, dollar/euro exchange rate, Dow Jones IA, Eurostoxx50 have been tested. None has been found statistically significant except oil futures prices (Crude Oil-Brent 3Mth future).

[5] We carried out unit root tests that could not conclusively rule out the hypothesis that inflation compensations are I(1), that is why we worked with the first difference.

[6] Different surprises may be released on the same day. However, it turns out that the number of days on which this happens is rather limited (see appendix 4 table 3).

[7] As highlighted by Blinder & al. (2008), since central bank's communication has been an important driver of financial markets, it seems relevant to take into account that effect. Given the communication on inflationary developments over the sample period, a dummy variable tracking the ECB's communication has been considered. We construct a dummy variable accounting for the main communication channels of the ECB (press conferences, publication date of the Monthly Bulletin, testimonial hearings, speeches and interviews). Nevetheless, this effect is not significant.

The regressions[8] are thus performed for one-year forward rates ending one to nine years ahead (and also for 5-year forward 5 years ahead ILS rates and 10-year forward 10 years ahead ILS rates) and for spot break-even inflation rates with maturities 2012, 2015 and 2032. The specification of the model is chosen according to the Schwarz information criterion (typically, we get L1=3).

The equation for the conditional variance σ_t^2 is the following:

$$\sigma_t^2 = \omega + \sum_{i=1}^{p} \rho_i \varepsilon^2_{t-i} + \sum_{i=1}^{q} \tau_i \sigma^2_{t-i} + \sum_{j=1}^{N} \beta n_{j,t} + \theta_1 Mon + \theta_2 Fri \quad (2)$$

The series of $n_{j,t}$ correspond to dummies with $n_{j,t}=1$ if the news j is released at the date t and $n_{j,t}=0$ otherwise.

In some cases, we find evidence of heteroskedasticity remaining in the residuals. As a result, we employ an EGARCH model (as in Nelson and Cao (1992)) as we consider that the effect of surprises may be non-linear[9]. An advantage of this approach is that it does not require us to impose nonnegativity constraints on the coefficients of the conditional second moments. In this case, the equation (2') for conditional variance is as follows:

$$\log \sigma_t^2 = \omega + \rho \log \sigma_{t-1}^2 + \tau \left| \frac{\varepsilon_{t-1}}{\sigma_{t-1}} \right| + \gamma \frac{\varepsilon_{t-1}}{\sigma_{t-1}} + \sum_{j=1}^{N} \beta n_{j,t} + \theta_1 Mon + \theta_2 Fri \quad (2')$$

The parameters are finally estimated using maximum likelihood algorithm. We include dummy variables for Mondays and Fridays[10] in both the conditional mean equation and the conditional variance equation of the GARCH model. This inclusion of dummy variables in both the conditional mean and conditional variance equations in GARCH models is supported by Doornik and Ooms (2003), who show that adding the same dummy variable both in the conditional mean equation and the conditional variance equation of the GARCH model is likely to solve the problem of multimodality of the likelihood.

[8] The estimations are carried out using a normal distribution or, alternatively, a t-distribution if the Jarque-Bera statistic rejects normality in the residuals.

[9] We run regressions using EGARCH estimation techniques to account for potential asymmetric effects of surprises on inflation compensation rates in cases where asymmetric effects were exhibited.

[10] We also test for other day-of-the-week effects, but only the coefficients for the Friday and Monday dummies were found significant.

5. Empirical results

Appendix 5 and 6 presents the surprise effects on compensation rates (spot and forward) for 20 macroeconomic surprises and two monetary policy surprises for the full sample period of 2 January 2004 – 31 December 2007.

5.1 Break-even rates (maturities 2012, 2015 and 2032)

Overall, most of the variables[11] exhibit a coefficient whose sign is consistent with the intuition: a more optimistic release than expected raises inflation compensation rates.

5.1.1 BEIR 2012

Overall, French surprises prove to be more important in driving BEIR developments than other surprises (see Appendix 5 Table 4), which is not surprising given that bond data are extracted from the French bond market.

Surprises coming from price indexes for France, Italy and the Flash HICP released by Eurostat impact positively on inflation compensation, which appears natural in the sense that a higher than expected inflation release is likely to be transmitted to future price dynamics in the short run. The surprise in euro area HICP has the same order of magnitude than the surprise in French CPI, which stands at 0.01.

Real activity surprises such as French industrial production have a significant positive impact. This is a common view that an improvement of the economic outlook is likely to result in a higher inflation. One notices that national data (Italian and French) appear as much as or even more significant that aggregated European data[12]. This could be explained by the fact that national data are released before European ones, as the latter is the result of the aggregation of the former. Once the European data are published after that of France, Italy and Germany, the surprise component of the euro area release is only marginal.

[11] Monetary policy (ECB and Fed) surprises do not appear statistically significant. Similarly, the dummy ECB's communication in the mean equation is insignificant in all cases.

The positive impact of French non farm payroll surprises tends to attest that job creation in France would result in higher inflation compensations on that maturity. This is not surprising in that sense that increasing job creation today is likely to put pressure on wages and to impact on the future prices developments, in accordance with common views about wages-prices loop. On the short-run, this is not worrying as far as it can be considered as transitory.

Finally, U.S. GDP in advance has a statistically significant effect at short term horizons. Unexpectedly higher growth rate in the United States today is associated with higher inflation compensation in the euro area. The magnitude of the coefficient may be explained by the fact that announcements on those data is made very early compared to European data.

5.1.2 BEIR 2015

Soft data such as IFO business surveys impact positively on inflation compensation rates on that maturity. This might be explained by the fact that IFO is one of the best leading indicators of the euro area growth. Indeed, the surprises on that indicator are known to be strongly market-moving as mentioned by Coffinet and Gouteron (2007). A higher than expected future growth is likely to increase inflationary pressures.

Regarding oil futures prices, their impact is significantly positive on the 2015 maturity. This effect is not marginal and might reflect the transmission of oil prices developments into medium-term inflation expectations. This result sheds a new light on the risks for price stability arising from oil prices developments. It turns out that the elasticity coefficient is not only significant on the whole sample, but also stronger and much more significant at the very end of the period. This may prove that risks to price stability in the medium-term stemming from oil prices have become higher in the most recent period.

5.1.3 BEIR 2032

Inflation compensation rates extracted from bonds that mature in 2032 respond significantly to few surprises: French CPI and French industrial production with slight significance and M3 surprises.

[12] We have tested whether the inclusion of other euro area surprises might improve the fit of the model. We could not detect any variable that could add explanatory power.

Surprises coming from the price index for France and industrial production France impact positively at respectively 10% and 5% level. Given that the BEIR 2032 is the expected average inflation over remaining time to maturity - i.e. the year 2032-, one could infer that these effects are due to the short end of the compensation curve (cf. 5.1.1).

Regarding the impact of M3 surprises, the significance depends on the sample considered as we will see in section 5.3. Nonetheless, the negative effect is not intuitive. In essence, the effect of M3 developments on the inflation compensation should depend on the markets' beliefs about the central bank's monetary policy reaction function. The ECB has always emphasized the importance of M3 growth for its medium-term oriented strategy. If the ECB is perceived by market operators to react to M3 growth, then an unexpected rise in M3 is likely to lead to an expectation of interest rate hike and so to a downward revision of inflation compensation rates. Of course, this interpretation should be taken with caution since this impact is low and the significance is at 5% level.

5.2 Forward rates

In this section, we extend our analysis to forward compensation rates extracted from ILS spot rates since we want to analyse precisely the term structure effect of surprises. Overall, the results do confirm the picture gained in the preceding section. Almost all the coefficients are of the expected sign, with stronger-than-expected inflation or activity passing on higher inflation compensation rates.

5.2.1 Short-term forward inflation compensations (1-3 years ahead)

One year forward inflation compensation one, two and three-years ahead respond significantly to the surprise component of several data releases: non-farm payroll France, business climate indicator France, GDP Italy, ZEW and Chicago PMI. Each have the expected sign that is to say a stronger-than expected annoucement raises forward inflation compensation rates, probably because of a revision in market operator's beliefs at that horizon:

- Soft data indicators such as French business climate indicator and German ZEW impact on short term forward rates. This seems consistent with results for short-term BEIR. Indeed, an unexpected improvement in business conditions in the euro area is likely to cause upward pressure on expected inflation and, thereby, inflation compensation;

- Surprises on price indexes for France and Germany are statistically significant and positive, which means that an unexpected increase in the inflation of the main economies of the euro area would be transmitted into inflation compensation rates for the whole euro area. This result is not surprising since Germany and France together make up nearly 50 percent in the euro area HICP calculation;

- US Chicago PMI surprises impact positively on short term inflation compensations in the euro area. This suggests that market operators consider that a better economic situation in the US would result in a higher inflation in the euro area, probably because the United States are perceived by investors as being one of the main engine for global growth and inflation;

- Oil future prices tend to impact positively the change in one-year forward compensation two-years ahead which is intuitive. Indeed, greater pressure on oil futures prices causes markets to revise their short-term inflation expectations upwards.

5.2.2 Medium-term forward inflation compensations (4-9 years ahead) [13]

On the medium-term, few surprises prove to be statistically significant[14]. This concerns essentially:

- European real activity indicators (German IFO) and price indexes (French and German CPI), as well as US CPI impacts medium-term forward inflation compensation. The interpretation remains identical to that carried out in the short -term end of the inflation compensation curve;

- Unemployment rate France impact significantly medium term forward rates with a negative sign, since higher than expected unemployment should eventually lead to an easing in expectations of future price pressures. This result reflects a common view, in particular related to the Phillips curve;

- Similarly, it appears that oil future prices impact the change in one-year forward compensation five-years ahead. This result is consistent with that for BEIR 2015 and illustrates that market operators do believe that oil developments will impact on realized medium-term inflation.

[13] For this analysis, we performed regressions for every one year forward compensation rate between one year and nine years ahead but for the sake of concision, we do not present the estimates for which the results are consistent with those of comparable maturity.

5.2.3 Long-term forward inflation compensations (10 years rate 10 years ahead)

On the long-term, the forward inflation compensation rate ten years to ten-years ahead is statistically unresponsive to macroeconomic surprises. These results mirror that of Beechey, Johannsen and Levin (2007) who prove that long-term inflation compensations in the euro area do not react to any macroeconomic surprise. This tends to prove that long-term inflation expectations in the euro area are well-anchored and hence that the ECB credibility remains strong given its objective of price stability.

As a robustness check, we compute Ljung-Box Q statistics for the standardized residuals and it turns out that we cannot reject the null hypothesis that there is no serial correlation (for all the orders). The *Q* statistics of order 1 are presented in tables 4-7 of appendix 5/6. Although these regressions explain, in the best cases, only about one-third of the variance of compensation rate change (see adjusted R^2 cf. appendix 5/6), their performance in that respect is comparable to other estimates in the literature (Jansen and De Haan 2007).

5.3 Variation over time of elasticities for long-term inflation compensations

The results above are likely to be time-dependent, that is the reason why further investigation allowing for time-variation of the elasticities is necessary. We investigate whether the effects of some surprises were different in some periods by estimating rolling - window regressions. Appendix 7 presents the time-variation of elasticities of inflation compensations extracted from bonds with respect to identified macroeconomic surprises (euro area flash HICP, CPI France, non farm-payroll France, IFO Business Survey and M3).

The first window comprises the sample spanning the period January 2004 to June 2005. Subsequently, this window is moved in monthly steps. Then, we run the regressions over the window and stack the coefficients. Accordingly, we can estimate the model for 31 windows, with the last one covering a sample from July 2006 to December 2007[15]. The estimated coefficients of these regressions are shown in appendix 7. Each graph contains the estimated parameters for one surprise variable, with their evolution over the time-windows on the x-axis. The parameters are shown with 95% confidence bands.

[14] The estimations yield two counterintuitive results. Nevertheless, when it happens the level of significance is at 10% level. This is the case for the surprise "industrial production DE" which impacts negatively at 10% level the 1y forward rate 1y ahead and for the surprise "CPI FR" which impacts negatively at 10% level the 5y forward rate 5y ahead.

[15] However, it should be noted that the time-window is not large enough (only 18 months) to ensure the statistical reliability of the results. This is the reason why the conclusions stemming from this analysis should be taken with caution.

Looking at the time-varying estimates of parameters in the mean equation for the three BEIR (2012, 2015 and 2032), the following points emerge:

- Regarding surprises in euro area HICP, the effects are estimated to be rather stable over time in particular on the second half of the sample. The coefficients are in a range of 0.01 to 0.02 ;

- There is some evidence of increasing trend in the effects of French CPI surprises over time. In particular, for 2032 maturity, the point estimate of this parameter is increasing from a very low level of 0 for the first window (January 2004 - June 2005). Towards the end of the sample, in the last window, it stands at 0.012, and has now reached the same order of magnitude than short maturities BEIR, which stood in a range of 0.01 to 0.02 (see charts 7.3);

- The coefficients of oil futures prices are following an upward trend, at increasing levels of significance particularly at the end of the sample. This increasing effect is particularly noticeable since the beginning of 2007. This higher BEIR sensitivity to oil futures prices data may be linked to market participants growing concerns about the impact of oil price increases on future inflation;

- The effects of IFO surprises are estimated to be broadly stable over the estimation window; at the end of the sample, standard error bands tend to widen, probably reflecting the uncertain impact of the IFO index on the inflation expectations of financial markets in times of increased uncertainty regarding the future path of the economy;

- Looking at the effects of M3 surprises on the BEIR 2032, somewhat surprisingly, we detect a significant negative response of compensation rates to surprises in the euro area M3. We provided an explanation of those results before. But this effect became more significant at the end of the sample, probably due to the record level reached for M3 growth at that time and the communication of the ECB regarding that level. Indeed, during the course of the year 2007, in the Introductory Statements of the press conference, the Governing Council expressed a marked concern about the highest rate of M3 growth and the upside risks to price stability at medium to longer horizons which are related. As a consequence, market participants may have interpreted these news in M3 press release as having implications for monetary policy decisions and so for future inflation in the euro area in that particular period. This result is consistent with Coffinet and Gouteron (2007) who show that the relationship between interest rates at medium-term maturities and M3 surprises depends on the ECB communication on its own monetary analysis.

6. Conclusion

The determinants of market-based inflation expectations in the euro area are not very well known. In this paper, we address this question by using daily data of inflation compensation — the compensation required for expected inflation and inflation risk over the life of the indexed instrument (swap or bond) — extracted from the euro area ILS market and ILB market. This approach has allowed us to address two closely related questions. First, the paper has analysed how short and medium term inflation compensation rates react to the occurrence of some macroeconomic surprises. Second, the paper has investigated whether long term inflation compensation rates in the euro area were deemed anchored on the sample considered. Overall, we found that inflation compensation responds differently to surprises depending on the maturity considered.

Our contribution is fourfold. First, we extend the analysis carried out in the related literature to a broader spectrum of maturities, especially to the short and medium ends of the compensation curve. Second, we use an extensive dataset of surprise variables. Third, we consider the potentially asymmetric responses of inflation compensations. Fourth, we estimate time-varying elasticities of inflation compensations with respect to surprises.

Our results suggest that when gauging short- and medium-term term inflation compensations market operators are sensitive to some surprises related to real activity and prices. In particular, there is evidence that euro area inflation compensations react more strongly to French surprises. Interestingly, the rolling window regressions reveal that oil futures prices have become more important over time on the short and medium end of the compensation curve. Notwithstanding, long-term inflation compensations remain generally unresponsive to macroeconomic surprises, attesting the high ECB's credibility on the sample considered.

There are a number of questions for future research to address. To begin with, it may be interesting to investigate this issue at higher frequencies with intraday data when it will be available. It would also be worthwhile to investigate the impact of surprises on each component of the inflation compensation and as a matter of fact to be able to decompose this measure since the inflation risk premium is time-varying.

References

1) Balduzzi P., Elton, E.J., and Green, T.C. (2001): "Economic news and bond prices: Evidence from the US Treasury market", *Journal of Financial and Quantitative Analysis*, 36, 523-543.

2) Beechey M., Johannsen B. and Levin A. (2007): "Are long-run inflation expectations anchored more firmly in the euro area than in the United States?", *CEPR Discussion Paper*, no 6536.

3) Blinder A., Ehrmann M., de Haan J. and Fratzscher M. "Central Bank communication and monetary policy: a survey of theory and evidence", *European Central Bank Working Paper*, n°898.

4) Coffinet J. and Gouteron S. (2007): "Euro area market reactions to the monetary developments press release", *European Central Bank Working Paper*, n°792.

5) D'Amico S., Kim D., Wei M. (2008): "TIPS from TIPS: The Informational Content of Treasury Inflation-Portected Security Prices", Finance and Economics Discussion Series, Federal Reserve Board of Governors, June.

6) Deacon M. and Derry A. (1998): "Inflation-indexed securities", Prentice Hall Europe.

7) Doornik J. and Ooms M. (2003): "Multimodality in the GARCH Regression Model", 2003-W20 in Nuffield Economics Working Papers.

8) ECB (2006): "Measures of inflation expectations in the euro area." , *Monthly Bulletin*, July.

9) Ehrmann M., Fratzscher M., Gürkaynak R. and Swanson E. (2007): "Convergence and Anchoring of Yield Curves in the Euro Area", *European Central Bank Working Paper* no. 817.

10) Ehrmann M. and Fratzscher M. (2002): "Interdependence between the euro area and the US: What role for EMU?", *European Central Bank Working Paper* No. 200.

11) Fleming M. and Remolona E. (1997): "What moves the bond market?", Research Paper 9706, Federal Reserve Bank of New York.

12) Gurkaynak R., Levin A. and Swanson E. (2006): "Does inflation targeting anchor long-run inflation expectations? Evidence from long-term bonds in the U.S, U.K. and Sweden", *Federal Reserve Bank of San Francisco Discussion Paper*, no. 2006-09.

13) Gurkaynak R., Sack B. and Swanson E. (2005): "Do Actions Speak Louder than Words? The Response of Asset Prices to Monetary Policy Actions and Statements**",** Macroeconomics 0504013, EconWPA.

14) Gurkaynak R., Sack B. and Wright J. (2008): "The TIPS Yield Curve and Inflation Compensation", Finance and Economics Discussion Series, Federal Reserve Board of Governors, May.

15) Hördahl P., Tristani O. and Vestin D. (2006): "The term structure of inflation risk premia and macroeconomic dynamics", Computing in Economics and Finance 2006 203, Society for Computational Economics.

16) Joyce M. and Read V. (1999): "Asset Price Reactions to RPI Announcements", *Bank of England*

Working Paper, no. 94.

17) Jansen J. and de Haan J. (2007): "The Importance of Being Vigilant: Has ECB communication Influenced Euro Area Inflation Expectations?", *DNB Working Paper*, No. 148, October.

18) Kim D. and Wright J. (2005): "An Arbitrage-Free Three-Factor Term Structure Model and the Recent Behavior of Long-Term Yields and Distant-Horizon Forward Rates", FEDS Paper, 2005-33.

19) Kuttner K.N. (2001): "Monetary policy surprises and interest rates: evidence from the Fed Funds Futures market", *Journal of Monetary Economics*, 47, 523-544.

20) Nelson D. and Cao, C. (1992): "Inequality constraints in the univariate GARCH model", Journal of Business & Economic Statistics, 10, 229-235.

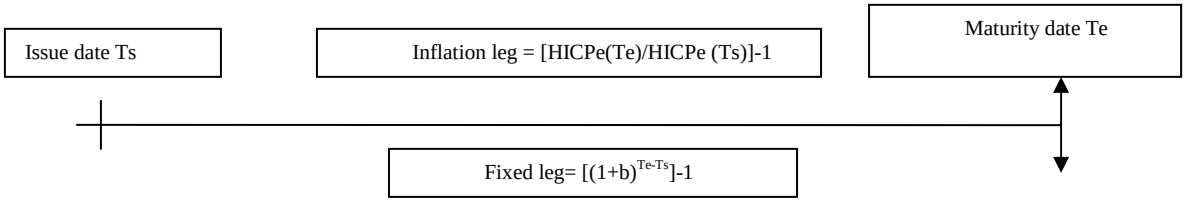
21) Trichet J.-C. (2007): "Introductory Statement", 8 November.

Appendix

Appendix 1: Description and characteristics of a zero coupon inflation swap[16]

Principle of an inflation swap contract: a zero coupon inflation-linked swap is a bilateral contractual agreement (arranged OTC) in which two parties agree to exchange at maturity a floating-rate payments linked to inflation measured with HICP excluding tobacco party (payed by the "inflation payer") against a predetermined fixed-rate payments (payed by the "inflation receiver"). Insofar as at the trade date, the inflation index value is not known because of a delay in the publication, the two parties take a lagged value of the index (three months in the Euro area). The cash flows are presented in Figure 2. The inflation leg refers to the net increase in reference index (HICPe) from *Ts* to *Te*. The fixed leg refers to a fixed amount which is written as an accumulated rate, *b*. The rate b is quoted and called the *inflation swap rate*. This rate will differ depending on the current time and the maturity considered.

Figure 2: Cash flows of zero coupon inflation swap



The rates used in this study represent the fixed rate paid by the inflation receiver (the fixed rate agents are willing to pay in order to receive the cumulative rate of inflation during the life of the swap). The quoted rate is considered as a proxy of expected inflation over the life of the swap.

[16] For more details on the ILS contracts, see Deacon and Derry (1998).

Appendix 2: descriptive statistics for the inflation compensations measures

BEIR 2012					
	2004-2007	**2004**	**2005**	**2006**	**2007**
Mean	2.14	2.19	2.09	2.13	2.19
Median	2.14	2.19	2.08	2.14	2.20
Maximum	2.39	2.39	2.28	2.26	2.37
Minimum	1.93	2.00	1.93	2.00	1.96
Std. Dev.	0.08	0.08	0.07	0.05	0.08
Skewness	0.07	-0.16	0.09	-0.10	-0.07
Kurtosis	2.63	2.21	1.99	2.31	2.46
Jarque-Bera	6.28	7.92	11.31	5.49	3.38
Probability	0.04	0.01	0.00	0.06	0.18
Observations	1045	262	261	261	261

BEIR 2015					
	2004-2007	**2004**	**2005**	**2006**	**2007**
Mean	2.13	NA	2.07	2.15	2.19
Median	2.14	NA	2.06	2.15	2.18
Maximum	2.40	NA	2.40	2.30	2.33
Minimum	1.90	NA	1.90	2.05	2.05
Std. Dev.	0.07	NA	0.08	0.04	0.05
Skewness	-0.40	NA	0.91	0.11	0.52
Kurtosis	3.85	NA	5.32	2.87	2.69
Jarque-Bera	39.47	NA	85.87	0.74	12.98
Probability	0.00	NA	0.00	0.68	0.00
Observations	757	0	235	261	261

BEIR 2032					
	2004-2007	**2004**	**2005**	**2006**	**2007**
Mean	2.33	2.47	2.24	2.30	2.36
Median	2.32	2.46	2.23	2.29	2.35
Maximum	2.65	2.65	2.43	2.43	2.52
Minimum	2.07	2.33	2.07	2.20	2.22
Std. Dev.	0.10	0.06	0.07	0.04	0.07
Skewness	0.36	0.35	0.27	0.28	0.31
Kurtosis	2.83	2.59	2.28	2.86	2.26
Jarque-Bera	23.34	7.20	8.71	3.72	10.21
Probability	0.00	0.02	0.01	0.15	0.00
Observations	1045	262	261	261	261

1x1 forward					
	2004-2007	**2004**	**2005**	**2006**	**2007**
Mean	2.13	2.08	2.12	2.15	2.16
Median	2.14	2.11	2.12	2.16	2.15
Maximum	2.48	2.42	2.42	2.46	2.48
Minimum	1.73	1.73	1.93	1.92	1.73
Std. Dev.	0.13	0.18	0.08	0.12	0.13
Skewness	-0.37	-0.24	0.37	-0.08	-0.19
Kurtosis	3.18	1.9	3.14	2	3.77
Jarque-Bera	25.96	15.54	6.23	11.06	8.05
Probability	0.00	0.00	0.04	0.00	0.01
Observations	1043	262	260	260	261

1x2 forward					
	2004-2007	**2004**	**2005**	**2006**	**2007**
Mean	2.18	2.24	2.11	2.14	2.22
Median	2.17	2.24	2.12	2.12	2.2
Maximum	2.51	2.51	2.34	2.42	2.45
Minimum	1.86	2.01	1.86	1.96	1.92
Std. Dev.	0.1	0.1	0.06	0.08	0.09
Skewness	0.4	0.03	-0.22	0.48	0.29
Kurtosis	2.76	2.47	4	2.36	2.52
Jarque-Bera	30.31	3.1	13.02	14.73	6.2
Probability	0.00	0.21	0.00	0.00	0.04
Observations	1043	262	260	260	261

1x3 forward					
	2004-2007	2004	2005	2006	2007
Mean	2.21	2.34	2.11	2.15	2.25
Median	2.2	2.33	2.09	2.14	2.27
Maximum	2.66	2.66	2.48	2.5	2.43
Minimum	1.88	2.14	1.89	1.88	2.01
Std. Dev.	0.12	0.09	0.08	0.06	0.09
Skewness	0.44	0.67	1.08	0.61	-0.13
Kurtosis	2.74	3.21	5.69	5.35	1.84
Jarque-Bera	37.93	20.18	129.63	76.4	15.32
Probability	0.00	0.00	0.00	0.00	0.00
Observations	1043	262	260	260	261

1x4 forward					
	2004-2007	2004	2005	2006	2007
Mean	2.24	2.38	2.11	2.17	2.28
Median	2.21	2.36	2.11	2.17	2.29
Maximum	2.77	2.69	2.57	2.77	2.53
Minimum	1.81	2.17	1.9	1.81	2.04
Std. Dev.	0.13	0.1	0.08	0.07	0.09
Skewness	0.5	0.65	1.14	1.67	-0.03
Kurtosis	2.96	2.89	6.67	20.01	1.87
Jarque-Bera	44.86	18.83	202.74	3257.46	13.84
Probability	0.00	0.00	0.00	0.00	0.00
Observations	1043	262	260	260	261

1x5 forward					
	2004-2007	2004	2005	2006	2007
Mean	2.24	2.36	2.13	2.2	2.29
Median	2.23	2.35	2.13	2.2	2.29
Maximum	2.64	2.64	2.54	2.36	2.47
Minimum	1.63	2.09	1.63	1.83	2.1
Std. Dev.	0.12	0.1	0.1	0.07	0.08
Skewness	0.09	0.12	0.15	-0.61	-0.04
Kurtosis	3.24	2.77	6.18	4.69	1.75
Jarque-Bera	4.16	1.24	110.63	47.89	16.87
Probability	0.12	0.53	0.00	0.00	0.00
Observations	1043	262	260	260	261

1x6 forward					
	2004-2007	2004	2005	2006	2007
Mean	2.3	2.44	2.2	2.23	2.32
Median	2.28	2.42	2.18	2.23	2.34
Maximum	3.34	2.89	3.05	3.34	2.55
Minimum	1.63	1.91	1.88	1.63	2.06
Std. Dev.	0.14	0.11	0.11	0.11	0.1
Skewness	0.79	0.13	2.45	3.07	-0.03
Kurtosis	6.07	4.25	16.17	37.6	2.06
Jarque-Bera	519.82	17.85	2141.71	13383.37	9.61
Probability	0.00	0.00	0.00	0.00	0.00
Observations	1043	262	260	260	261

1x7 forward					
	2004-2007	2004	2005	2006	2007
Mean	2.31	2.45	2.19	2.26	2.35
Median	2.3	2.45	2.18	2.26	2.34
Maximum	2.99	2.77	2.55	2.99	2.61
Minimum	1.54	1.57	1.68	1.54	2.06
Std. Dev.	0.15	0.13	0.11	0.1	0.11
Skewness	-0.05	-1.4	-0.04	-0.12	0.23
Kurtosis	4.32	9.73	4.59	17.94	2.41
Jarque-Bera	76.56	582.12	27.71	2419.97	6.15
Probability	0.00	0.00	0.00	0.00	0.04
Observations	1043	262	260	260	261

1x8 forward					
	2004-2007	2004	2005	2006	2007
Mean	2.34	2.51	2.21	2.28	2.36
Median	2.33	2.52	2.19	2.28	2.37
Maximum	3.55	3.55	2.61	3.17	2.58
Minimum	1.72	2.09	1.75	1.72	2.07
Std. Dev.	0.16	0.12	0.12	0.11	0.1
Skewness	0.55	1.67	0.21	1.65	-0.05
Kurtosis	6.13	19.79	4.39	19.53	2.14
Jarque-Bera	480.22	3202.85	23.01	3082.24	8.05
Probability	0.00	0.00	0.00	0.00	0.01
Observations	1043	262	260	260	261

1x9 forward					
	2004-2007	2004	2005	2006	2007
Mean	2.35	2.51	2.24	2.29	2.38
Median	2.34	2.53	2.22	2.3	2.38
Maximum	2.9	2.9	2.74	2.76	2.71
Minimum	1.72	1.78	1.91	1.72	2.11
Std. Dev.	0.16	0.14	0.12	0.1	0.13
Skewness	0.33	-0.44	0.9	-1.21	0.52
Kurtosis	3.23	4.26	4.84	9.64	2.53
Jarque-Bera	21.6	25.85	72.41	541.59	14.09
Probability	0.00	0.00	0.00	0.00	0.00
Observations	1043	262	260	260	261

5x5 forward					
	2004-2007	2004	2005	2006	2007
Mean	2.3	2.44	2.19	2.25	2.33
Median	2.28	2.46	2.17	2.26	2.36
Maximum	2.63	2.63	2.41	2.43	2.54
Minimum	2.02	2.25	2.02	2.13	2.17
Std. Dev.	0.12	0.09	0.07	0.05	0.09
Skewness	0.43	-0.07	0.63	0	0.15
Kurtosis	2.36	1.89	2.63	2.56	1.8
Jarque-Bera	49.6	13.65	18.7	2.06	16.67
Probability	0.00	0.00	0.00	0.35	0.00
Observations	1043	262	260	260	261

10x10 forward					
	2004-2007	2004	2005	2006	2007
Mean	2.48	2.72	2.38	2.38	2.45
Median	2.44	2.73	2.36	2.38	2.46
Maximum	2.89	2.89	2.65	2.54	2.6
Minimum	2.21	2.44	2.21	2.26	2.28
Std. Dev.	0.16	0.1	0.09	0.05	0.08
Skewness	0.83	-0.53	0.7	0.14	-0.16
Kurtosis	2.63	2.49	2.75	2.59	1.97
Jarque-Bera	125.84	15.07	21.94	2.74	12.76
Probability	0.00	0.00	0.00	0.25	0.00
Observations	1043	262	260	260	261

Appendix 3: surprises data

Table 1: Surprises data for the Euro area, France/Germany/Italy and the US

	Euro area data	National data (FR/GE/IT)	US data
FORWARD-LOOKING		Business climate indicator FR IFO GE ZEW GE	Chicago PMI
EMPLOYMENT		Unemployment rate FR Unemployment rate GE	
ACTIVITY		GDP FR GDP IT GDP GE Industrial Production IT Industrial Production GE Industrial Production FR	US GDP advance
PRICES	Flash HICP	Consumer Price Index FR Consumer Price Index IT Consumer Price Index GE	Consumer Price Index US
WAGES		Hourly wages IT	
MONEY	M3		
INTEREST RATES	ECB repo rate		Fed Funds rate

Appendix 4: Unbiasedness test and frequency distribution of survey data

We follow Joyce and Read (1999) in the method of testing for the unbiasedness of the median forecasts of economic indicator releases. Simple regressions of the type below are estimated for all data releases:

$$R_{i,t} = c + \beta C_{i,t} + \varepsilon_t$$

Where $R_{i,t}$ and $C_{i,t}$ are defined as the realization and the expectation/consensus regarding data release i at time t, respectively. We test for unbiasedness by testing the hypothesis that c = 0 and β = 1, using a Wald test to test this joint hypothesis. The results are presented in Table 2. For the majority of national data releases, the null hypothesis of unbiased expectations cannot be rejected at the 5 percent level, which suggests that the survey expectations are of good quality. However, for a number of data releases this assumption is rejected. See table 2 hereafter.

Table 2: Results for the bias test						
EURO AREA	**Constant**	**Beta**	**R²**	**DW**	**Wald test**	**P-value**
Flash HICP	-0.28	1,136	90%	1,73	4.23	0,01
M3	0,135	1,005	93%	2,22	5,15	0,008
FRANCE	**Constant**	**Beta**	**R²**	**DW**	**Wald test**	**P-value**
Business climate indicator	-0,59	1,057	91%	1,73	0,75	0,47
Unemployment rate	-0,12	1,01	98%	1,61	2,32	0,09
GDP	0,01	0,98	92%	2,17	0,23	0,79
Industrial Production	-0,147	0,879	48%	2,44	2,61	0,08
Consumer Price Index	-0,0008	1,002	88%	2,02	0,03	0,97
GERMANY	**Constant**	**Beta**	**R²**	**DW**	**Wald test**	**P-value**
IFO	0,425	0,999	96%	1,71	2,38	0,105
ZEW	-1,703	1,009	91%	1,09	0,84	0,43
Industrial Production	1,126	0,746	57%	2,27	2,21	0,12
GDP	-0,04	1,04	96%	2,2	1,18	0,31
Unemployment rate	0,09	0,98	97%	1,45	0,70	0,49
Consumer Price Index	0.08	0.95	90%	2.24	0.71	0.49
ITALY	**Constant**	**Beta**	**R²**	**DW**	**Wald test**	**P-value**
Consumer Price Index	0,124	0,932	84%	1,75	2,29	0,11
GDP	0,018	0,985	89%	1,84	0,02	0,97
Industrial Production	0,102	1,171	61%	2,15	0,72	0,49
Hourly wages	0.009	0.99	79%	1.94	0.003	0.99
UNITED STATE	**Constant**	**Beta**	**R²**	**DW**	**Wald test**	**P-value**
Consumer Price Index	-0,02	0,81	35%	2,73	1,99	0,14
Chicago PMI	17,52	0,711	28%	2,34	3,27	0,04
US GDP advance	-0.07	1.0007	91%	2.02	0.63	0.53

Wald-test for constant=0 and beta=1

Table 3: Frequency distribution of data releases

Number of data release(s)	Trading days	Trading days (in % of the total)
0	576	54,0%
1	281	26,4%
2	0	0,0%
3	132	12,4%
4	40	3,8%
5	0	0,0%
6	18	1,7%
7	0	0,0%
8	15	1,4%
9	4	0,4%
Total	1066	1066

Appendix 5: results of the estimations – BEIR

Table 4

	BEIR 2012			BEIR 2015			BEIR 2032		
Mean equation (1)	**Coeff.**		se	**Coeff.**		se	**Coeff.**		se
ΔRt-1	**-0,4043**	***	0,0407	**-0,4005**	***	0,0387	**-0,4586**	***	0,0358
ΔRt-2	**-0,2022**	***	0,0426	**-0,2800**	***	0,0388	**-0,2293**	***	0,0396
ΔRt-3	**-0,0992**	**	0,0407	**-0,1031**	**	0,0379	**-0,1229**	**	0,0375
Flash HICP (EA)	**0,0126**	***	0,0032	**0,0090**	*	0,0049	0,0082		0,0052
M3 (EA)	-0,0044		0,0033	-0,0010		0,0029	**-0,0058**	**	0,0026
Business climate indicator (FR)	**0,0103**	*	0,0059	0,0042		0,0044	-0,0015		0,0040
Unemployment rate (FR)	-0,0031		0,0039	-0,0016		0,0027	-0,0021		0,0036
GDP (FR)	-0,0004		0,0056	0,0034		0,0091	-0,0028		0,0069
Industrial Production (FR)	**0,0069**	**	0,0030	-0,0021		0,0034	**0,0058**	**	0,0026
Consumer Price Index (FR)	**0,0125**	***	0,0044	**0,0152**	***	0,0041	**0,0068**	*	0,0038
Non Farm Payroll (FR)	**0,0067**	*	0,0036	-0,0013		0,0082	0,0032		0,0045
IFO (DE)	0,0056		0,0039	**0,0059**	*	0,0032	0,0029		0,0025
ZEW (DE)	-0,0026		0,0038	0,0034		0,0045	0,0010		0,0047
Industrial Production (DE)	0,0016		0,0062	0,0060		0,0099	0,0007		0,0058
GDP (DE)	-0,0003		0,0088	0,0019		0,0107	-0,0051		0,0086
Consumer Price Index (DE)	0,0022		0,0045	0,0024		0,0022	0,0035		0,0036
Consumer Price Index (IT)	**0,0076**	*	0,0044	0,0080		0,0069	0,0074		0,0048
GDP (IT)	-0,0044		0,0103	-0,0064		0,0080	-0,0011		0,0115
Industrial Production (IT)	0,0041		0,0057	0,0066		0,0046	0,0033		0,0046
Hourly wages (IT)	-0,0007		0,0035	-0,0020		0,0040	-0,0013		0,0037
Consumer Price Index (US)	-0,0047		0,0037	-0,0046		0,0045	-0,0060		0,0042
Chicago PMI (US)	0,0032		0,0032	0,0009		0,0032	0,0028		0,0041
US GDP (US)	**0,0111**	**	0,0044	0,0080		0,0066	0,0021		0,0046
Oil Futures Prices	-0,0139		0,0555	**0,1086**	**	0,0493	-0,0141		0,0463
Variance equation (2)									
ω0	0,0006	***	0,0001	-1,5942	***	0,3175	0,0005	***	0,0001
ρ1	0,0735	*	0,0387	0,8161	***	0,0418	0,0428	*	0,0212
τ1	0,5561	***	0,1209	0,5513	***	0,0561	0,5316	***	0,1109
γ Asymetric effect (EGARCH)				0,1074	***	0,0400			
Adjusted R-squared	0,14			0,03			0,21		
Log likelihood	2318,83			1652,63			2413,82		
Schwarz criterion	-4,09			-4,26			-4,53		
Ljung-Box Q statistic (p-values)	0,47			0,74			0,61		

Notes: This table presents the results for the regression in equations (1) and (2). The table shows coefficient estimates (**in bold**) and standard errors of the response of inflation compensation data from the surprises. (EA) denotes euro area; (DE) denotes Germany and (FR) denotes France. */**/*** denotes significance at the 10/5/1 % level.

Appendix 6: results of the estimations – forward ILS rates: short-term end

Table 5

	1y forward 1y ahead			1y forward 2y ahead			1y forward 3y ahead		
Mean equation (1)	**Coeff.**		Se	**Coeff.**		Se	**Coeff.**		Se
ΔRt-1	**-0,4800**	***	0,0428	**-0,5249**	***	0,0413	**-0,5518**	***	0,0394
ΔRt-2	**-0,2742**	***	0,0455	**-0,2689**	***	0,0467	**-0,3317**	***	0,0442
ΔRt-3	**-0,1063**	**	0,0418	**-0,1220**	***	0,0434	**-0,1595**	***	0,0389
Flash HICP (EA)	0,0025		0,0064	0,0084		0,0094	0,0073		0,0081
M3 (EA)	0,0037		0,0118	0,0036		0,0044	0,0006		0,0095
Business climate indicator (FR)	**0,0281**	***	0,0092	0,0065		0,0104	-0,0009		0,0079
Unemployment rate (FR)	-0,0027		0,0108	-0,0009		0,0086	-0,0130		0,0104
GDP (FR)	-0,0014		0,0164	-0,0068		0,0157	-0,0061		0,0102
Industrial Production (FR)	0,0048		0,0090	-0,0001		0,0077	-0,0042		0,0061
Consumer Price Index (FR)	0,0132		0,0103	0,0052		0,0105	**0,0187**	**	0,0091
Non Farm Payroll (FR)	**0,0188**	**	0,0079	-0,0048		0,0082	0,0096		0,0081
IFO (DE)	-0,0030		0,0070	0,0017		0,0060	-0,0033		0,0062
ZEW (DE)	0,0046		0,0070	**0,0184**	***	0,0058	0,0054		0,0079
Industrial Production (DE)	**-0,0176**	*	0,0092	-0,0028		0,0134	0,0052		0,0085
GDP (DE)	0,0002		0,0131	-0,0057		0,0139	-0,0179		0,0130
Consumer Price Index (DE)	**0,0164**	*	0,0099	0,0042		0,0084	0,0040		0,0096
Consumer Price Index (IT)	0,0076		0,0119	-0,0003		0,0135	0,0113		0,0090
GDP (IT)	**0,0199**	***	0,0063	0,0039		0,0078	-0,0028		0,0085
Industrial Production (IT)	0,0022		0,0108	0,0028		0,0080	0,0004		0,0067
Hourly wages (IT)	-0,0071		0,0071	0,0010		0,0074	0,0007		0,0093
Consumer Price Index (US)	0,0046		0,0116	0,0021		0,0080	0,0064		0,0087
Chicago PMI (US)	**0,0221**	***	0,0082	0,0005		0,0095	0,0109		0,0080
US GDP (US)	0,0036		0,0111	0,0046		0,0111	0,0007		0,0114
Oil Futures Prices	0,0954		0,1275	**0,1999**	*	0,1149	-0,0078		0,1246
Variance equation (2)									
ω0	0,0028	***	0,0005	0,0021	***	0,0003	0,0024	***	0,0004
ρ1	0,0895	***	0,0305	0,0606	**	0,0249	0,0873	***	0,0287
τ1	0,5691	***	0,0877	0,5607	***	0,0441	0,5642	***	0,0817
γ Asymetric effect (EGARCH)									
Adjusted R-squared	0,20			0,22			0,25		
Log likelihood	1591,42			1719,36			1683,59		
Schwarz criterion	-2,95			-3,20			-3,13		
Ljung-Box Q statistic (p-values)	0,34			0,24			0,15		

Notes: This table presents the results for the regression in equations (1) and (2). The table shows coefficient estimates (**in bold**) and standard errors of the response of inflation compensation data from the surprises. (EA) denotes euro area; (DE) denotes Germany and (FR) denotes France. */**/*** denotes significance at the 10/5/1 % level.

Appendix 6: results of the estimations – forward ILS rates: medium-term end

Table 6

	1y forward 4y ahead			1y forward 5y ahead			1y forward 7y ahead		
Mean equation (1)	**Coeff.**		se	**Coeff.**		se	**Coeff.**		se
ΔRt-1	**-0,5428**	***	0,0511	**-0,6155**	***	0,0337	**-0,6243**	***	0,0546
ΔRt-2	**-0,3855**	***	0,0523	**-0,3224**	***	0,0370	**-0,3919**	***	0,0612
ΔRt-3	**-0,2059**	**	0,0535	**-0,1955**	***	0,0314	**-0,2079**	**	0,0520
Flash HICP (EA)	0,0149		0,0110	-0,0076		0,0094	-0,0099		0,0166
M3 (EA)	0,0010		0,0080	-0,0056		0,0057	-0,0093		0,0166
Business climate indicator (FR)	-0,0152		0,0105	-0,0080		0,0056	0,0196		0,0261
Unemployment rate (FR)	0,0135		0,0117	**-0,0142**	**	0,0065	**-0,0298**	**	0,0141
GDP (FR)	0,0018		0,0131	-0,0037		0,0060	0,0057		0,0177
Industrial Production (FR)	-0,0023		0,0147	0,0049		0,0082	-0,0073		0,0184
Consumer Price Index (FR)	**0,0245**	*	0,0133	0,0026		0,0076	0,0105		0,0186
Non Farm Payroll (FR)	0,0003		0,0069	-0,0034		0,0045	0,0001		0,0157
IFO (DE)	0,0128		0,0095	-0,0024		0,0049	0,0061		0,0128
ZEW (DE)	0,0098		0,0127	0,0020		0,0120	-0,0062		0,0243
Industrial Production (DE)	-0,0081		0,0191	-0,0053		0,0069	-0,0123		0,0259
GDP (DE)	-0,0040		0,0232	-0,0087		0,0120	-0,0141		0,0300
Consumer Price Index (DE)	-0,0010		0,0093	**0,0101**	*	0,0056	-0,0012		0,0177
Consumer Price Index (IT)	-0,0173		0,0125	0,0099		0,0115	-0,0018		0,0162
GDP (IT)	-0,0060		0,0204	0,0093		0,0113	0,0162		0,0306
Industrial Production (IT)	-0,0121		0,0103	0,0026		0,0067	0,0098		0,0293
Hourly wages (IT)	-0,0039		0,0096	**0,0151**	***	0,0055	-0,0180		0,0147
Consumer Price Index (US)	0,0013		0,0109	**0,0079**	**	0,0067	-0,0099		0,0197
Chicago PMI (US)	-0,0085		0,0093	0,0179		0,0075	0,0140		0,0148
US GDP (US)	0,0099		0,0112	-0,0092		0,0087	-0,0150		0,0190
Oil Futures Prices	0,0794		0,1633	**0,1787**	***	0,0659	-0,0824		0,2508
Variance equation (2)									
ω_0	0,0030	***	0,0005	-0,3477	***	0,0668	0,0082	***	0,0014
ρ_1	0,0792	*	0,0379	0,9647	***	0,0084	0,1312	***	0,0335
τ_1	0,5751	***	0,1050	0,3031	***	0,0396	0,5695	***	0,0889
γ Asymetric effect (EGARCH)				-0,118	***	0,029			
Adjusted R-squared	0,24			0,28			0,31		
Log likelihood	1521,94			1594,42			1077,01		
Schwarz criterion	-2,82			-2,96			-1,97		
Ljung-Box Q statistic (p-values)	0,13			0,24			0,87		

Notes: This table presents the results for the regression in equations (1) and (2). The table shows coefficient estimates (**in bold**) and standard errors of the response of inflation compensation data from the surprises. (EA) denotes euro area; (DE) denotes Germany and (FR) denotes France. */**/*** denotes significance at the 10/5/1 % level.

Appendix 6: results of the estimations – forward ILS rates: medium-term end

Table 7

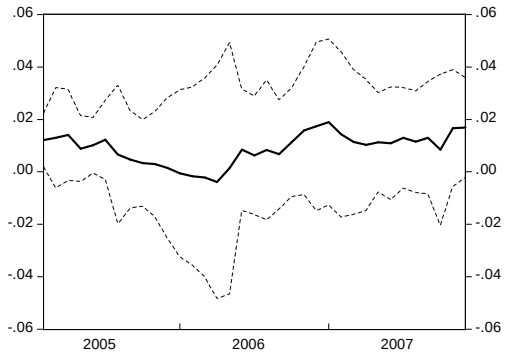
	1y forward 8y ahead			5y forward 5y ahead			10y forward 10y ahead		
Mean equation (1)	**Coeff.**		se	**Coeff.**		se	**Coeff.**		se
ΔRt-1	-0,6859	***	0,0573	**-0,4040**	***	0,0394	**-0,3815**	***	0,0423
ΔRt-2	-0,3855	***	0,0678	**-0,2264**	***	0,0443	**-0,1910**	***	0,0433
ΔRt-3	-0,1640	***	0,0503	**-0,1312**	***	0,0425	**-0,0990**	**	0,0452
Flash HICP (EA)	0,0047		0,0194	0,0049		0,0046	0,0028		0,0038
M3 (EA)	-0,0026		0,0194	-0,0028		0,0032	-0,0018		0,0035
Business climate indicator (FR)	-0,0155		0,0183	0,0052		0,0046	-0,0007		0,0062
Unemployment rate (FR)	**-0,0658**	***	0,0114	-0,0065		0,0044	0,0037		0,0035
GDP (FR)	-0,0020		0,0218	-0,0012		0,0088	-0,0034		0,0070
Industrial Production (FR)	0,0056		0,0144	0,0003		0,0039	0,0014		0,0026
Consumer Price Index (FR)	-0,0271		0,0231	**-0,0081**	*	0,0045	0,0008		0,0039
Non Farm Payroll (FR)	-0,0113		0,0268	0,0013		0,0053	-0,0019		0,0032
IFO (DE)	**0,0259**	**	0,0128	0,0016		0,0029	-0,0005		0,0038
ZEW (DE)	0,0010		0,0281	0,0022		0,0043	-0,0034		0,0037
Industrial Production (DE)	0,0151		0,0194	0,0026		0,0049	-0,0033		0,0047
GDP (DE)	-0,0198		0,0273	-0,0120		0,0075	0,0013		0,0087
Consumer Price Index (DE)	-0,0081		0,0159	0,0001		0,0032	-0,0001		0,0040
Consumer Price Index (IT)	-0,0270		0,0209	0,0019		0,0057	-0,0056		0,0049
GDP (IT)	0,0044		0,0213	0,0019		0,0058	-0,0035		0,0091
Industrial Production (IT)	-0,0023		0,0228	0,0075		0,0057	0,0030		0,0050
Hourly wages (IT)	**0,0270**	**	0,0108	-0,0029		0,0046	0,0043		0,0047
Consumer Price Index (US)	0,0182		0,0237	0,0019		0,0043	0,0019		0,0035
Chicago PMI (US)	**0,0258**	**	0,0121	**0,0120**	***	0,0037	0,0047		0,0035
US GDP (US)	0,0149		0,0261	-0,0012		0,0035	-0,0038		0,0060
Oil Futures Prices	-0,0104		0,2643	0,0381		0,0599	0,0922		0,0575
Variance equation (2)									
ω0	0,0082	***	0,0013	0,0006	***	0,0001	0,0006	***	0,0001
ρ1	0,1418	***	0,0231	0,0707	**	0,0325	0,1007	***	0,0292
τ1	0,5744	***	0,0714	0,5635	***	0,1100	0,5689	***	0,0865
γ Asymetric effect (EGARCH)									
Adjusted R-squared	0,35			0,14			0,12		
Log likelihood	1023,95			2355,71			2408,10		
Schwarz criterion	-1,87			-4,42			-4,52		
Ljung-Box Q statistic (p-values)	0,94			0,76			0,95		

Notes: This table presents the results for the regression in equations (1) and (2). The table shows coefficient estimates (**in bold**) and standard errors of the response of inflation compensation data from the surprises. (EA) denotes euro area; (DE) denotes Germany and (FR) denotes France. */**/*** denotes significance at the 10/5/1 % level.

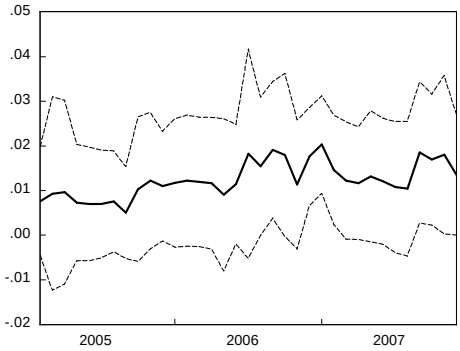
Appendix 7: Rolling window parameter estimates for the mean equation[17]

Charts 7.1: Rolling regression: BEIR 2012

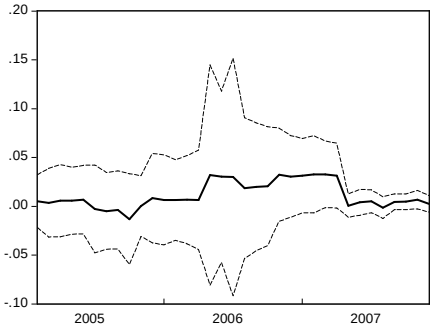
Elasticity of BEIR2012-rates to HICP



Elasticity of BEIR2012-rates to CPI FR

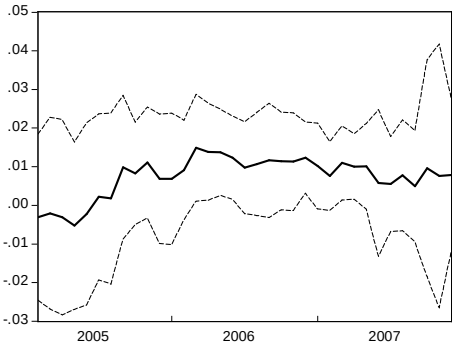


Elasticity of BEIR2012-rates to NFPR FR



Elasticity of BEIR2012-rates to oil futures

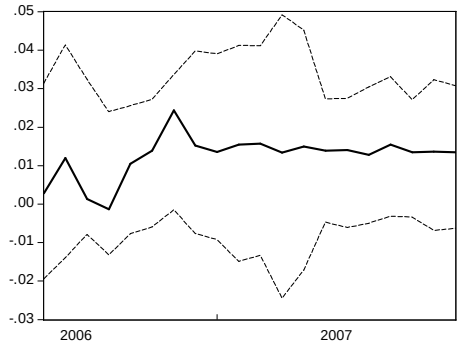
Elasticity of BEIR2012-rates to IFO



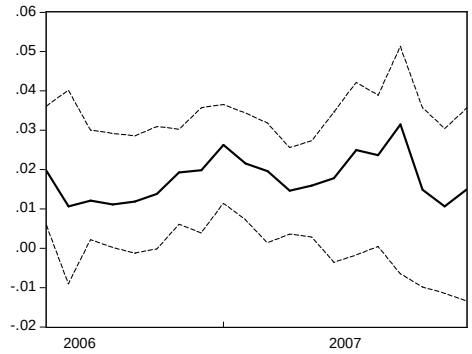
[17] Note: Solid lines are estimated coefficients and dashed lines are 95% onfidence interval.

Charts 7.2: Rolling regression: BEIR 2015

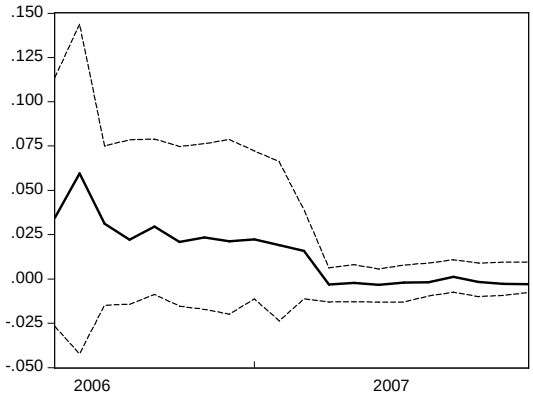
Elasticity of BEIR2015-rates to HICP



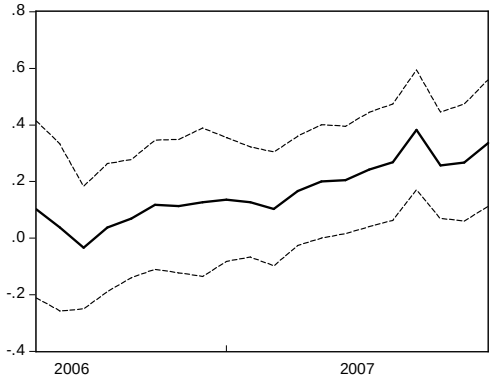
Elasticity of BEIR2015-rates to CPI FR



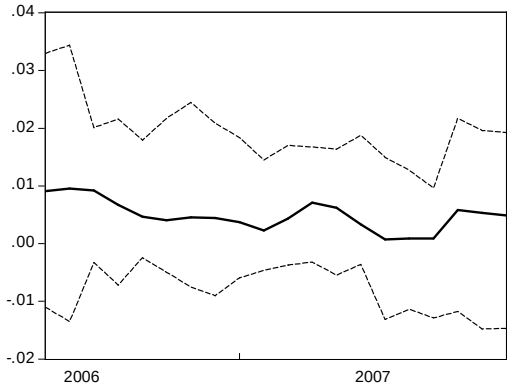
Elasticity of BEIR2015-rates to NFPR FR



Elasticity of BEIR2015-rates to oil futures



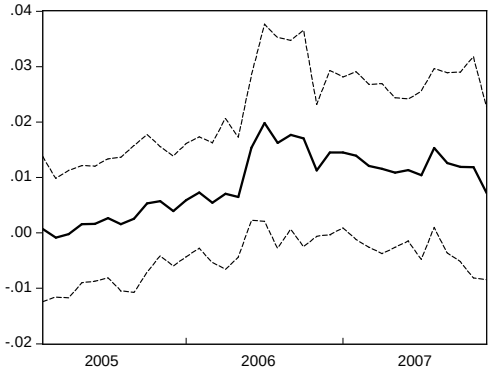
Elasticity of BEIR2015-rates to IFO



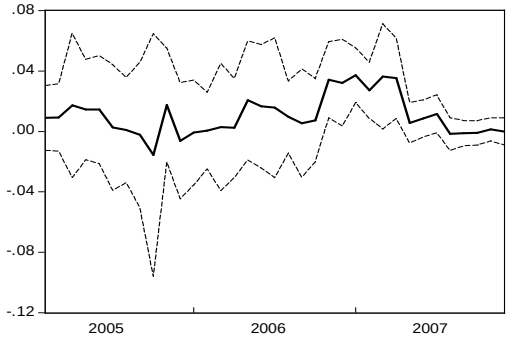
Charts 7.3: Rolling regression: BEIR 2032

Elasticity of BEIR2032-rates to HICP

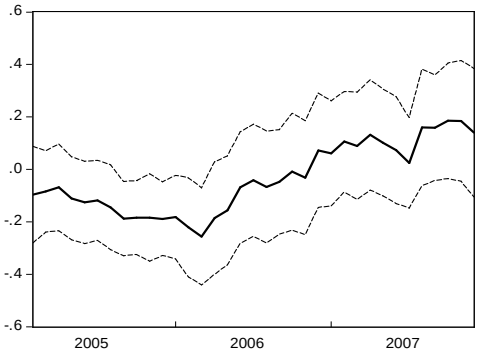
Elasticity of BEIR2032-rates to CPI FR



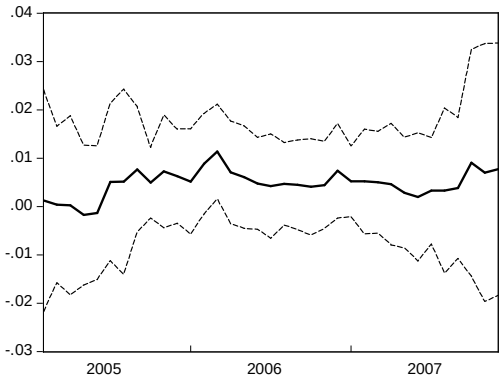
Elasticity of BEIR2032-rates to NFPR FR



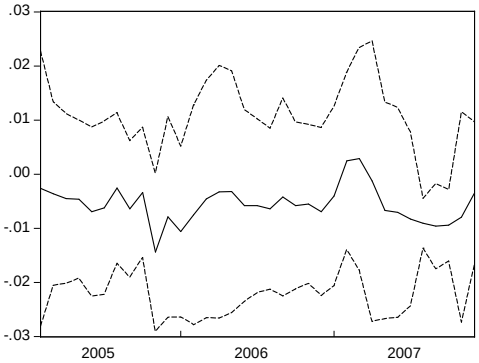
Elasticity of BEIR2032-rates to oil futures



Elasticity of BEIR2032-rates to IFO



Elasticity of BEIR2032-rates to M3



Notes d'Études et de Recherche

191. V. Chauvin and A. Devulder, “An Inflation Forecasting Model For The Euro Area,” January 2008.

192. J. Coffinet, « La prévision des taux d’intérêt à partir de contrats futures : l’apport de variables économiques et financières », Janvier 2008.

193. A. Barbier de la Serre, S. Frappa, J. Montornès et M. Murez, « La transmission des taux de marché aux taux bancaires : une estimation sur données individuelles françaises », Janvier 2008.

194. S. Guilloux and E. Kharroubi, “Some Preliminary Evidence on the Globalization-Inflation nexus,” January 2008.

195. H. Kempf and L. von Thadden, “On policy interactions among nations: when do cooperation and commitment matter?,” January 2008.

196. P. Askenazy, C. Cahn and D. Irac “On “Competition, R&D, and the Cost of Innovation, February 2008.

197. P. Aghion, P. Askenazy, N. Berman, G. Cette and L. Eymard, “Credit Constraints and the Cyclicality of R&D Investment: Evidence from France,” February 2008.

199. C. Poilly and J.-G. Sahuc, “Welfare Implications of Heterogeneous Labor Markets in a Currency Area,” February 2008.

200. P. Fève, J. Matheron et J.-G. Sahuc, « Chocs d’offre et optimalité de la politique monétaire dans la zone euro », Février 2008.

201. N. Million, « Test simultané de la non-stationnarité et de la non-linéarité : une application au taux d’intérêt réel américain », Février 2008.

202. V. Hajivassiliou and F. Savignac, “Financing Constraints and a Firm’s Decision and Ability to Innovate: Establishing Direct and Reverse Effects,” February 2008.

203. O. de Bandt, C. Bruneau and W. El Amri, “Stress Testing and Corporate Finance,” March 2008.

204. D. Irac, “Access to New Imported Varieties and Total Factor Productivity: Firm level Evidence From France,” April 2008.

205. D. Irac, “Total Factor Productivity and the Decision to Serve Foreign Markets: Firm Level Evidence From France,” April 2008.

206. R. Lacroix, “Assessing the shape of the distribution of interest rates: lessons from French individual data,” April 2008.

207. R. Lacroix et Laurent Maurin, « Désaisonnalisation des agrégats monétaires : Mise en place d’une chaîne rénovée », Avril 2008.

208. T. Heckel, H. Le Bihan and J. Montornès, “Sticky Wages. Evidence from Quarterly Microeconomic Data,” April 2008.

209. R. Lacroix, « Analyse conjoncturelle de données brutes et estimation de cycles. Partie 1 : estimation de tests »," Avril 2008.

210. R. Lacroix, « Analyse conjoncturelle de données brutes et estimation de cycles. Partie 2 : mise en œuvre empirique »," Avril 2008.

211. E. Gautier, « Les ajustements microéconomiques des prix : une synthèse des modèles théoriques et résultats empiriques »," Avril 2008.

212. E. Kharroubi, "Domestic Savings and Foreign Capital: the Complementarity Channel," April 2008.

213. K. Barhoumi and J. Jouini, "Revisiting the Decline in the Exchange Rate Pass-Through: Further Evidence from Developing Countries," July 2008

214. P. Diev and W. Hichri, "Dynamic voluntary contributions to a discrete public good: Experimental evidence," July 2008

215. K. Barhoumi, G. Rünstler, R. Cristadoro, A. Den Reijer, A. Jakaitiene, P. Jelonek, A. Rua, K. Ruth, S. Benk and C. Van Nieuwenhuyze, "Short-term forecasting of GDP using large monthly datasets: a pseudo real-time forecast evaluation exercise," July 2008

216. D. Fougère, E. Gautier and H. Le Bihan, "Restaurant Prices and the Minimum Wage," July 2008

217. R. Krainer, "Portfolio and financing adjustements for US banks: some empirical evidence," July 2008

218. J. Idier, "Long term vs. short term comovements in stock markets: the use of Markov-switching multifractal models," July 2008.

219. J. Barthélemy, L. Clerc and M. Marx, "A Two-Pillar DSGE Monetary Policy Model for the Euro Area," July 2008.

220. J. Coffinet and S. Frappa, "Macroeconomic Surprises and the Inflation Compensation Curve in the Euro Area," July 2008.

Pour accéder à la liste complète des Notes d'Études et de Recherche publiées par la Banque de France veuillez consulter le site : http://www.banque-france.fr/fr/publications/ner/ner.htm

For a complete list of Working Papers published by the Banque de France, please visit the website: http://www.banque-france.fr/gb/publications/ner/ner.htm

Pour tous commentaires ou demandes sur les Notes d'Études et de Recherche, contacter la bibliothèque de la direction de la recherche à l'adresse suivante :

For any comment or enquiries on the Working Papers, contact the library of the Research Directorate at the following address :

BANQUE DE FRANCE
41- 1404 Labolog
75049 Paris Cedex 01
tél : 0033 (0)1 42 92 49 55 ou 62 65
fax :0033 (0)1 42 92 62 92
email : thierry.demoulin@banque-france.fr
jeannine.agoutin@banque-france.fr