Relative Excess Bond Premium and Economic Activity

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Abstract

Credit spreads may be jointly driven by an unobserved systematic component, which is demanded to hedge against adverse economic fluctuations. Using either yield-to-maturity spreads or asset swap spreads for 2345 Eurobonds across euro area non-financial industries, we estimate the relative excess bond premium - a function of the unobserved systematic component -, which can predict real economic activity, the stock market and survey-based economic sentiment. This premium predicts the financial crisis and the two recessions.

Keywords: Corporate credit spreads, excess bond premium, forecasts.

JEL classification: C32, F36, G12, G15

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1 Introduction

Corporate credit spreads are often used as leading indicators for economic activity due to the relation between the quality of borrowers' balance sheets and their access to external finance. Through the financial accelerator mechanism (Bernanke and Gertler, 1989; Kiyotaki and Moore, 1997), if profits decline, balance sheets deteriorate, bond investors realise that the expected future cash flows may not meet fully the current debt obligations and credit spreads rise.[1] The literature shows that risk shocks, typically generated by changes in macroeconomic fundamentals, can have an important adverse impact on economic activity (Gertler and Karadi, 2011; Jermann and Quadrini, 2012; Christiano, Motto and Rostagno, 2014).

Besides a large fraction of corporate credit spreads are driven by a single common factor, which cannot be explained by standard macroeconomic and financial variables (Collin-Dufresne, Goldstein and Martin, 2001). This is a puzzle, unless bond investors price a change in the current state of the economy.[2]

Using individual bond data, we estimate the relative excess bond premium, that is the duration-adjusted credit spreads in excess of justified credit spreads as a percentage of justified credit spreads, where the justified credit spreads are the investors' compensation for idiosyncratic risk and observable systematic risk. The larger is the unobservable systematic risk relative to the justified credit spreads, the higher the premium demanded by bond investors to hedge against unexpected adverse macroeconomic fluctuations. We find that 12-18% of the variance of credit spreads is explained by an unobserved systematic component and this can predict economic activity.

Gilchrist, Yankov and Zakrajšek (2009), Gilchrist and Zakrajšek (2012) and Faust, et al. (2013) have shown that an increase in both duration-adjusted credit spreads and

[1]The financial accelerator simply describes a propagation mechanism under the hypothesis that market efficiency is satisfied: an adverse change in aggregate economic activity causes an immediate decline in the net worth of economic agents, which then increases the external finance premium and as a result causes a further reduction in investment, consumer spending and production.

[2]Fluctuations in credit spreads may also reflect the effective risk-bearing capacity of households and corporate sectors with credit spreads steadily declining in periods of economic euphoria and sharply increasing with waves of pessimism (Schularick and Taylor, 2012; Jorda, Schularick, and Taylor, 2013; Krishnamurthy and Muir, 2015; Mian, Sufi, and Verner, 2015; López-Salido, Stein and Zakrajšek, 2016). The downturns in market sentiment can tight the financing conditions with significant adverse consequences for the macroeconomy. The asset valuation shock in Gertler and Karadi (2011) is a news-shock, which triggers a financial crisis and a sharp fall in economic activity.

excess bond premia (in their definition, credit spreads in excess of the usual compensation for risk correlated with expected defaults) in the non-financial sector predict a significant reduction in economic activity.[3] Darracq-Paries and De Santis (2015) and Bleaney, Mizen and Veleanu (2017) find similar results for Europe.[4] Instead Gilchrist and Mojon (2017) focus their analysis on duration-adjusted credit spreads of the four largest euro area countries (Germany, France, Italy and Spain), confirming their leading indicator properties. However, in these studies, the predictability could be driven by the observable systematic component characterising corporate spreads and country risk is particularly important in Europe. Moreover, none of these studies conducted multi-step out-of-sample forecasts with the exception of Faust, et al. (2013) in the case of the US and none of these studies investigated the relationship with the stock market and economic sentiment.

Although conceptually elegant, the structural models, where default is triggered when the firm's asset value falls below a pre-specified boundary level, have had limited success in matching with empirical data. In fact, a large part of the risk on corporate bonds is systematic rather than diversifiable (Elton et al., 2001; Campbell and Taksler, 2003; Duffie et al., 2009). In other words, fluctuations in credit spreads are associated with changes in the risk profile of a company (i.e. credit risk), but also to variations in the macroeconomic outlook of a country where the company domiciles (i.e. systematic risk).

Moreover, there are many market idiosyncratic developments (i.e. news about mergers and acquisitions, expected earnings, report publications, liquidity premia) that cannot be controlled with specific regressors. We treat credit risk, idiosyncratic shocks and the observable systematic risk as part of the justified component of credit spreads.

Given the role of country risk in the euro area and given the two important recessions since 2008, these make the euro area a good study case. Specifically, we use yield-to-maturity (yield) spreads or asset swap (ASW) spreads at security level (2345 Eurobonds) and exploit the heterogeneity of the panel across the largest nine euro area countries,

[3]Credit spreads amount to the sum between expected default and the associated risk premium. The term structure (Pan and Singleton, 2008) and vector autoregression (Nozawa, 2017) literature aims at disentangling these two effects computing the expected probability of default given the loss rate. Under the hypothesis that the risk premium is positively correlated with the expected default risk, the estimated excess bond premium à la Gilchrist and Zakrajšek is lower than the market risk premium.

[4]Darracq-Paries and De Santis (2015) employ yield spreads of 1200 bonds from October 1999 to December 2011 covering 11 euro area countries. Bleaney, Mizen and Veleanu (2016) use yield spreads of 269 bonds from October 2001 until May 2011 of seven euro area countries and the Great Britain.

industries and credit ratings spanning 16 years on a monthly basis (i.e. 92144 observations). To our knowledge, this is the first study that investigates the determinants of corporate spreads employing both individual yield spreads and ASW spreads for the euro area.

We follow closely Gilchrist, Yankov and Zakrajšek (2009) and Gilchrist and Zakrajšek (2012), in that we use prices of individual unsecured corporate bonds traded in the secondary market. However, we control for both observable credit and systematic risks. Credit ratings, distance to default or the expected default frequency (EDF), stock market volatility and other bond characteristics all together can explain 26-44% of the variance in credit spreads depending upon the data specification, while observable systematic risk - proxied by the monetary policy rate, the countries' real-time macroeconomic forecasts used as a benchmark by asset managers and the uncertainty around such forecasts - can explain an additional 14-27%. Depending upon whether focusing on all bonds, investment grade (IG) bonds or high yield (HY) bonds, observable credit and systematic risks account for 49-63% of the variance of credit spreads, while idiosyncratic shocks account for 26-35%. The unobservable systematic component accounts for 12-18%. It could be argued that this unobserved common component is driven by omitted observable variables. However, the likelihood of such inaccuracy is minor given the use of credit risk proxies and macroeconomic forecasts, which should take into account all factors influencing the cash flow of a firm.[5]

The estimated unobserved systematic components are employed to construct the relative excess bond premium. The latter was highly negative in the euro area over the entire period March 2003 - June 2007 before the financial crisis unfolded, rose sharply and become positive in the summer 2007, reaching the peak at the beginning of 2008 before the economic recession. Market-wide risk was highly positive in the euro area not only before Lehman's bankruptcy, but also during the euro area sovereign debt crisis pointing towards a forthcoming decline in economic activity. The results also suggest that the

[5]Given that we are interested at all factors influencing the cash flow of a firm, we also control for correlations among asset prices that could be driven by correlated fundamentals. Therefore, we condition on the volatility of the stock market and, by constructing credit spreads, on the risk free rate, which implies a portfolio reallocation from corporate bond to stocks or risk-free sovereign yields. Moreover, the forecasting equation controls for additional asset prices including global factors, such as the US VIX.

relative excess bond premium was negative in the IG segment for most of the 2012-2015 period, but it remained much lower than that estimated in 2003-2007 period. Moreover, the relative excess bond premium in the HY segment was close to zero in 2014 and 2015. This suggests that bond investors expected a contained boost to economic activity, as it turned out, despite the low credit spreads.

The relative excess bond premium has considerable predictive power for economic activity in-sample and out-of-sample, even after controlling for the survey-based economic sentiment and other financial variables, such as the dividend yield, interest rates and US VIX. We also show that a 100% unanticipated increase in the relative excess bond premium leads to a significant reduction in real economic activity over the next several quarters, with the level of real GDP bottoming out about 3 percent below trend three years after the shock and the unemployment rate increasing by about 16 percent above trends two years after the shock. As pointed out by Philippon (2009), bond prices perform better than stock prices in forecasting, because the latter are more volatile, more subject to bubbles and more affected by the announcements of new projects that can generate noise.

In addition to real economic activity, we can also predict the stock market and survey-based economic sentiment, which is not the case when using the Gilchrist and Zakrajšek's measures applied to the euro area. These results and the loose link between the bond premia and the credit supply conditions support our main argument that the estimated unobserved systematic component can be used as an additional tool to assess the macroeconomic environment. All the results are independent whether using yield spreads or ASW spreads. This implies that ASW spreads can be used without the need to construct a risk free yield curve and match the duration of the corporate bonds.

The remaining sections of the paper are structured as follows. Section 2 derives the relative excess bond premium. Section 3 defines the duration-adjusted credit spreads. Section 4 describes the regressors and the dataset. Section 5 presents the empirical results. Section 6 assesses whether credit spreads contain information about economic activity. Section 7 concludes.

2 The Model

The model is constructed following closely the approach suggested by Gilchrist, Yankov and Zakrajšek (2009) and Gilchrist and Zakrajšek (2012), in that the log of the credit spread on bond i at time t is assumed to be related linearly to bond characteristics, which measure credit risk.[6] However, given the key role of systematic risk in the dynamics of credit spreads, we extend the model by including systematic risk. The model specification takes the following form:[7]

$$\ln(y_{i,c,t}) = \overbrace{\mathbf{x}'_{i,c,t}\beta}^{\text{credit risk}} + \overbrace{\mathbf{z}'_{c,t}\gamma}^{\text{systematic risk}} + \overbrace{\nu_{i,c,t}}^{\text{"pricing error"}}, \; E(\nu_{i,c,t}) = 0, \tag{1}$$

where $y_{i,c,t}$ denote the credit spreads of bond i in country c at time t, $\mathbf{x}_{i,c,t}$ the vector of time-varying bond characteristics and $\mathbf{z}_{c,t}$ the vector of country-specific macro fundamentals. We have n_c bonds in each country c and $N = \sum_c n_c$ is the total number of bonds.[8]

The "pricing error" $\nu_{i,c,t}$ can provide useful information if it is market-wide. Therefore, $\nu_{i,c,t}$ is disaggregated to disentangle the common shocks from the idiosyncratic shocks:

$$\nu_{i,c,t} = \overbrace{\eta_t + \lambda_{c,t}}^{\text{systematic shocks}} + \overbrace{\xi_{i,c,t}}^{\text{idiosyncratic shocks}}, \; E(\xi_{i,c,t}) = 0, \tag{2}$$

where η_t is a vector of random factors common to all bonds and $\lambda_{c,t}$ is a vector of random factors that generates country effects. $\xi_{i,c,t}$ is the idiosyncratic credit spread on the ith asset, which is assumed to have zero mean and finite variance, and to be sufficiently independent across securities so that idiosyncratic risk can be eliminated in large, well-diversified portfolios. $\xi_{i,c,t}$ is not observable at time t and it is an important component of the justified credit spreads capturing idiosyncratic news, such as mergers and acquisitions,

[6] A large body of empirical literature employs the log-specification to take into account the fat tails in the estimation (see e.g. Duffee, 1998; Campbell and Taksler, 2003; Huang and Kong, 2003; Longstaff, Mthal and Neis, 2005; Cavallo and Valenzuela, 2010; Dick-Nielsen, Feldhütter and Lando, 2012; Gilchrist and Zakrajzek, 2012).

[7] For simplicity, the notation in this session does not include the industry dimension and the industry fixed effects.

[8] n_c is time varying, but for simplicity we do not include the time dimension.

expected earnings, report publications or liquidity premia.[9]

Therefore, $\mathbf{x}'_{i,c,t}\beta + \xi_{i,c,t}$ provides the contribution of the idiosyncratic component, while $\mathbf{z}'_{c,t}\gamma + \eta_t + \lambda_{c,t}$ provides the contribution of the systematic risk.

As pointed out by Thomson (2011), if we use time dummies,[10] we cannot include macroeconomic variables in the regression, since they are collinear with the dummies. Similarly, dummies can significantly increase the standard errors when the covariate does not vary much along in our case the country dimension. The approach suggested to simultaneously handling time and country effects is to cluster along both dimensions. The structure (1)-(2) correspond to equations (1) and (2) in Thomson (2011), which provides formulas for standard errors that cluster by both countries and time.

Equations (1) and (2) imply that the log of the justified credit spreads, which are independent from market-wide shocks, compensates bond investors for observable credit and systematic risks and idiosyncratic shocks:

$$\ln\left(y^F_{i,c,t}\right) = \ln\left(y_{i,c,t}\right) - \left(\eta_t + \lambda_{c,t}\right) = \mathbf{x}'_{i,c,t}\beta + \mathbf{z}'_{c,t}\gamma + \xi_{i,c,t}, \tag{3}$$

and the resulting market-wide shocks respectively at country and regional level are representative of the entire maturity spectrum and the range of credit quality in the corporate market:

$$S_{c,t} = \frac{1}{n_c}\sum_i \ln\left(\frac{y_{i,c,t}}{y^F_{i,c,t}}\right) = \eta_t + \lambda_{c,t}, \tag{4}$$

$$S_t = \frac{1}{N}\sum_c\sum_i \ln\left(\frac{y_{i,c,t}}{y^F_{i,c,t}}\right) = \eta_t + \sum_c n_c\lambda_{c,t}/N. \tag{5}$$

By using (4)-(5), the relative excess bond premium, that is the duration-adjusted credit spreads in excess of justified credit spreads calculated as a percentage of the justified

[9]The results would be similar if the country dummies $\widetilde{\eta}_t$ and $\widetilde{\lambda}_{c,t}$ are included in the first stage, i.e. $\ln\left(y_{i,c,t}\right) = \mathbf{x}'_{i,c,t}\beta + \widetilde{\eta}_t + \widetilde{\lambda}_{c,t} + \xi_{i,c,t}$, the estimated dummies are regressed on $\mathbf{z}'_{c,t}$ in the second stage and the residuals are used to compute the unobserved systematic component.

[10]Common shocks can also be identified using principle component analysis, which takes into account the covariance structure among observations. However, the unbalance nature of the panel does not allow to use this method.

credit spreads, $y^F_{i,c,t} = e^{\left(x'_{i,c,t}\beta+\mathbf{z}'_{ct}\gamma+\xi_{i,c,t}\right)}$, can be written as

$$REBP_{c,t} = \frac{1}{n_c}\sum_i \frac{y_{i,c,t} - y^F_{i,c,t}}{y^F_{i,c,t}} = e^{(\eta_t+\lambda_{c,t})} - 1, \tag{6}$$

$$REBP_t = \frac{1}{N}\sum_c\sum_i \frac{y_{i,c,t} - y^F_{i,c,t}}{y^F_{i,c,t}} = e^{\left(\eta_t+\sum_c n_c\lambda_{c,t}/N\right)} - 1. \tag{7}$$

Notice that if $y^F_{i,c,t}$ are on average close to zero, which is the case when the justified corporate bond yields are close to the risk free curve, the relative excess bond premium can be very large. This property makes the indicators (6)-(7) very useful, because financial risks can build up when the justified credit spreads are relatively small, as it happened before the financial crisis.

Then, the excess bond premium due to common shocks in percentage points is simply

$$EBP^S_{c,t} = \frac{1}{n_c}\sum_i \left(y_{i,c,t} - y^F_{i,c,t}\right) = \frac{1}{n_c}\sum_i \left[y^F_{i,c,t}\left(e^{\eta_t+\lambda_{c,t}} - 1\right)\right], \tag{8}$$

$$EBP^S_t = \frac{1}{N}\sum_c\sum_i \left(y_{i,c,t} - y^F_{i,c,t}\right) = \frac{1}{N}\sum_c\sum_i \left[y^F_{i,c,t}\left(e^{\eta_t+\lambda_{c,t}} - 1\right)\right]. \tag{9}$$

and it can be rationalised as a risk premium demanded by bond investors to hedge against unexpected adverse macroeconomic fluctuations.

Finally, we compare (8)-(9) with the measure suggested by Gilchrist and Zakrajšek (2012), which excludes systematic risk and therefore $\epsilon_{i,c,t} = \mathbf{z}'_{c,t}\gamma + \nu_{i,c,t}$,

$$EBP^{GZ}_{c,t} = \frac{1}{n_c}\sum_i \left[y_{i,c,t} - e^{\left(x'_{i,c,t}\widehat{\beta}+\widehat{\sigma}^2_\epsilon/2\right)}\right] \tag{10}$$

$$EBP^{GZ}_t = \frac{1}{N}\sum_c\sum_i \left[y_{i,c,t} - e^{\left(x'_{i,c,t}\widehat{\beta}+\widehat{\sigma}^2_\epsilon/2\right)}\right] \tag{11}$$

and its extension, which includes systematic risk,

$$EBP^{E-GZ}_{c,t} = \frac{1}{n_c}\sum_i \left[y_{i,c,t} - e^{\left(x'_{i,c,t}\widehat{\beta}+\mathbf{z}'_{c,t}\widehat{\gamma}+\widehat{\sigma}^2_\nu/2\right)}\right] \tag{12}$$

$$EBP^{E-GZ}_t = \frac{1}{N}\sum_c\sum_i \left[y_{i,c,t} - e^{\left(x'_{i,c,t}\widehat{\beta}+\mathbf{z}'_{c,t}\widehat{\gamma}+\widehat{\sigma}^2_\nu/2\right)}\right]. \tag{13}$$

3 Corporate Credit Spreads

The Bank of America Merrill Lynch is a leading fixed income index provider serving to establish benchmarks for asset managers and investors. The Merrill Lynch Global Corporate Indices track the performance of investment grade (G0BC) and high yield (HW00) corporate debt publicly issued in the major markets. Focusing on the euro-denominated bonds issued by euro area firms, qualifying securities must satisfy the following requirements to be included in the indices: (i) EUR 250 million minimum size,[11] (2) a rating issued by Moody's, S&P or Fitch, (3) above one year maturity and (4) a fixed coupon schedule.[12]

We collected data on a monthly frequency, specifically the last Friday of the month. We exclude from the dataset (i) the secured bonds; (ii) the bonds issued by Luxemburg, which are typically international bonds, (iii) the relative small number of bonds issued by Greece, Portugal and other small euro area countries and (iv) the bonds maturing before the 4th quarter of 1999 due to a limited number of issuers in many countries. We kept in the dataset (i) the euro denominated bonds; (ii) the bonds issued by non-financial corporations and (iii) the bonds with duration between 1 and 30 years. Finally, to reduce the effect of possibly spurious outliers, we winsorise the dataset at 99% of the distribution.

By focusing on unsecured non-financial corporate bonds, we end up with 2345 bonds and 91106 observations over the period October 1999 and March 2015 (see Table 1), more than three quarters being of IG type, with the largest number of bonds issued in France (790), Germany (576), the Netherlands (470), followed by Italy (230) and Spain (177), while a smaller fraction is issued in Belgium (63), Austria (48), Ireland (46) and Finland (44).

[Insert Table 1, here]

[11] An alternative to the Merrill Lynch database is the iBoxx database provided by Markit. However, the former is more comprehensive, because the iBoxx benchmark indices consist of bonds with a minimum amount outstanding of at least EUR 500 million.

[12] The Merrill Lynch constituencies are rebalanced on the last calendar day of the month, based on information available up to and including the third business day before the last business day of the month. Bond issues that meet the qualifying criteria are included in the Merrill Lynch constituencies for the following month. Issues that no longer meet the criteria during the course of the month remain in the Merrill Lynch constituencies until the next month-end rebalancing, at which point they are removed.

3.1 Yield Spreads

Following the methodology of Gilchrist and Zakrajšek (2012), we use individual security level data to construct duration adjusted security-specific credit spreads. Specifically, for each security, the credit spread $y^{yield}_{i,c,t}(d)$ on corporate bond i with duration d, in country c and month t is constructed by subtracting from the yield to maturity $R_{i,c,t}(d)$ the overnight index swap (OIS) rate of a similar duration $OIS_t(d)$:[13]

$$y^{yield}_{i,c,t}(d) = R_{i,c,t}(d) - OIS_t(d).$$

The mean and median credit spreads are relatively similar across countries and over time. To save space, we report the mean value for the entire sample period in Table 1 and the time-varying mean for all, IG and HY bonds for the euro area as a whole (i.e. $\overline{\overline{y}}_t(d) = \sum_i \sum_c y^{yield}_{i,c,t}(d)/N$) in Figure 1 and for each country (i.e $\overline{y}_{c,t}(d) = \sum_i y^{yield}_{i,c,t}(d)/n_c$) in Appendix A.

[Insert Figure 1, here]

Over the last 16 years, the average yield spreads in the euro area amounted to 133 basis points for the IG bonds and 530 basis points for HY bonds and are characterised by a large cross-country variation. The average yield spreads for IG bonds range between 113 basis points for the Netherlands and 199 basis points for Ireland. The average yield spreads for HY bonds range between 454 basis points for France and 738 basis points for Spain. Focusing on all securities, the time-varying cross-country developments of the sample mean shows that: (1) corporate spreads in all countries and sectors had a declining trend from 2003 and were contained before the inter-bank credit crisis in August 2007;

[13] An OIS is a financial contract between two counterparties to exchange a fixed interest rate against a geometric average of overnight interest rates (in the euro area, the EONIA) over the contractual life of the swap. Today there are two main types of euro-denominated interest rate swap, the main distinguishing feature of which is the exposure of the variable rate: (i) OIS, with a variable rate which is the average of the EONIA rates, and (ii) EURIBOR-based swaps, with a variable rate of one of the EURIBOR rates (e.g. the three-month or six-month EURIBOR). The appeal of interest rate swaps is that the user can easily manage interest rate risk. An important distinction from bonds is that swaps are non-investible, i.e. they do not serve as a store of value. Therefore, there is no initial payment and, on interest payment dates, the value of the swap only deviates from zero if the interest rate for the remaining time to maturity differs from the agreed fixed swap rate. The market for interest rate swaps is over the counter (OTC), but many maturities up to 30 years are quoted on various trading platforms, providing a reliable signal about market expectations regarding future EONIA rates.

(2) they started to increase steadily after the inter-bank credit crisis; (3) the majority of corporate spreads reached the maximum just after Lehman's bankruptcy in September 2008, while some reached the maximum after September 2001 attacks to the United States; (4) all corporate spreads picked up again with the exacerbation of the euro area sovereign debt crisis in 2011 and 2012 and (5) declined after the "whatever it takes" speech by Mario Draghi on 26 July 2012. The trends described by the country-specific mean in yield spreads are in line with expectations. Gilchrist and Mojon (2017) carried out a similar exercise and the results are broadly similar.

3.2 ASW Spreads

An asset swap is a synthetic structure over-the-counter (OTC) derivative which allows an investor to swap fixed rate payments on a bond (i.e. coupons) to floating rate payments (EURIBOR plus an agreed ASW spread) while maintaining the original credit exposure to the fixed rate bond. Since the discounted value computation of the cash flow is based on the coupon, the ASW spreads are primarily driven by the credit quality of the issuer. ASW spreads are economically comparable to bond yield spreads, with the advantage that, together with the effective yields and prices, they are available on the Bloomberg screen timely for traders to make educated decisions. Most importantly, ASW spreads are less confounded by tax and various market microstructure effects, because the bond is not sold and investment banks' business model rotate around swap contracts.

An ASW enables an investor to hedge out the interest rate risk by swapping the fixed payments to floating. The ASW buyer does not transfer the credit risk of the bond. If the bond defaults, the ASW buyer loses the par redemption of the bond, receiving whatever recovery rate the bond issuer pays, and has to continue paying on the swap — which can no longer be funded with the coupon from the bond — or the swap can be closed out at market value. In economic terms, the purpose of the ASW spread is to compensate the ASW buyer for taking these credit risks, while hedging against interest rate risks (O'Kane, 2000).

The asset swap spread is derived by valuing a bond's cash flows via the swap curve's implied zero rates. At $t = 0$, the mathematical expression of such synthetic structure is the following:[14]

$$(100-P)+\sum_{m=1}^{M} C z_{t_m}=\sum_{m=1}^{M}\left(L_{t_{m-1},t_m}+y^{ASW}\right) z_{tm}, \cdots\cdots m=1,2,+++,M \qquad (14)$$

where $100-P$ is the up-front payment to purchase asset in return to a full price of par, P is the full market price of the bond, M is the residual maturity of the bond, L_{t_{m-1},t_i} is the forward EURIBOR rate between the two cash flow dates t_{m-1} and t_m, y^{ASW} is the constant ASW spread, C is the annual paid coupon and z_{t_m} is the discount factor. This identity is solved for y^{ASW}. A graphical representation is depicted in Appendix B.

Over the last 16 years, the average ASW spreads in the euro area amounted to 94 basis points for the IG bonds and 450 basis points for HY bonds. ASW spreads are characterised by a large cross-country variation. The average ASW spreads for IG bonds range between 81 basis points for Austria and 156 basis points for Ireland. The average ASW spreads for HY bonds range between 388 basis points for France and 634 basis points for Spain.

To compare the ASW spread with the yield spread, we construct a second measure of yield spread by subtracting from the yield to maturity $R_{i,c,t}(d)$ the Euribor rate of a similar duration $Euribor_t(d)$:

$$\widetilde{y}_{i,c,t}^{yield}(d)=R_{i,c,t}(d)-Euribor_t(d).$$

The mean of ASW spreads $y_{i,c,t}^{ASW}$ and yield spreads $\widetilde{y}_{i,c,t}^{yield}$ are highly correlated and relatively homogenous across countries and over time, except when there are tensions in the markets as in 2008 in the IG segment and in many other cases in the HY segment (see Figures 1-2). Typically, during stressed periods $\sum_c \sum_i \widetilde{y}_{i,c,t}^{yield}/N > \sum_c \sum_i y_{i,c,t}^{ASW}/N$ possibly because liquidity premia in the ASW markets are smaller. Therefore, the joint analysis of the two instruments with the same methods is a useful exercise to address the key issues under investigation.

[14] For simplicity we assume that all payments are annual and are made on the same dates.

4 Regressors and Data Sources

Structural models build on Merton (1974) suggest that the pricing of credit risk depends upon firms' fundamentals. According to this approach, a default can only occur when the firm value falls under a certain threshold. Therefore, we test the determinants of credit spreads employing proxies of credit risks. These credit risk measures are then complemented with business cycle measures, because firms' output depends upon the state of the economy.

4.1 Credit Risk and Other Term Premia

Investors most often use credit ratings to help assess credit risk and to compare different issuers when making investment decisions and managing their portfolios. Therefore, the first proxy of credit risk is credit ratings, which are available for each issued bond. We use the average credit rating reviews associated with the bond, as carried out by Moody's, S&P and Fitch, the three largest credit rating agencies. The composite ratings are calculated by assigning a numeric equivalent to the ratings in each agency's scale. The average of the numeric equivalents for each agency that rates a bond is rounded to the nearest integer and then converted back to an equivalent composite rating using the scale in Appendix C.[15]

The second proxy of credit risk is the EDF or alternatively the distance-to-default provided by Moody's.[16] The distance to default of the firm issuing the bond does not necessarily reflect the credit risk underlying the bond, because the entire corporate own-

[15]If only two of the designated agencies rate a bond, the composite rating is based on an average of the two. Likewise, if only one of the designated agencies rates a bond, the composite rating is based on that one rating. The composite ratings are updated once a month as part of the rebalancing process. Composite rating changes take effect on the last calendar day of the month based on information available up to and including the rebalancing lock-out date (the third business day prior to the last business day of the month). Rating upgrades or downgrades occurring after that day will not be considered in the current month rebalancing and will get incorporated at the following month's rebalancing. For example, assuming there are no global holidays in between, if August 31 fell on a Friday the rebalancing lock-out date would occur on August 28. Therefore, a bond that was downgraded to below investment grade on August 28 would transition from the investment grade index to the high yield index at the August 31 rebalancing. Conversely, if the bond was downgraded on August 29, it would remain in the investment grade index for the month of September and transition to high yield at the September 30 rebalancing.

[16]EDFs are a function of distance to default and are computed by matching the historical evidence about default rates through empirical calibration. Moody's launched the EDFs to depart from the assumption of normality characterising distance to default. In addition, EDFs take into account "jump to default", which are very rare and unpredictable events. All the results described in the paper do not change when using distance to default.

ership structure, which is typically quite complex, ought to be known. In other words, the credit risk measured by the distance to default of the firm issuing the bond might be very different from the credit risk of the conglomerate to which the firm belongs to, which is relevant for the analysis. The complexity arises particularly from the time dimension of the panel and the large number of mergers and acquisitions that have occurred since 1999. In order to make use of the entire database and not focus only on a number of listed companies, we exploit the sectoral and the country dimensions.

The Merrill Lynch database uses a four-tier classification schema for its constituent securities (see Table D1 in Appendix D): level 1 comprises the asset class, in our case corporate; level 2 provides the sector group, level 3 and level 4 give the category and sub-category, respectively. We employ the median of the EDF and of the distance to default at the level of the sub-category sector (level 4). Given that Merrill Lynch and Moody's sector names are slightly different, the name of each sector for the Merrill Lynch sub-category (level 4) is followed by its corresponding chosen Moody's code in the last column of Table D1, which is in turn described in detail in Table D2. All in all, 40 different sub-sectors for each country (that is, 360 different EDF and distance to default measures) are included in the analysis exactly matching the date of the Bloomberg extraction. The number of firms in the database is 625. Therefore, the sector- and country-specific EDFs amount to 56.7% of the firms' number. All in all, the coverage is comprehensive.

We also construct the realised volatility based on the daily stock returns of the previous 22 business days collected for the 40 sectors described in Appendix D for each euro area country, matching the date of the Bloomberg extraction. The stock market data are provided by Thomson Reuters DataStream.

By doing so, we control for time-varying EDF or distance-to-default and stock market volatility at sectoral level in each country, which together with the bond-specific credit rating reviews should well capture the underlying credit risk associated with the portfolio investment decision. In addition, we include sector fixed effects to capture constant unobserved credit risk heterogeneity across industries.

Following Gilchrist and Zakrajšek (2012), we also control for other bond-specific characteristics provided by Merrill Lynch, such as the outstanding amount, the coupon and the duration of the bonds.[17]

4.2 Systematic Risk

To proxy for systematic risk we employ 1st and 2nd moment conditions of the business cycle. The 3-month OIS rate and expected real GDP growth and inflation proxy for the 1st moment conditions. The disagreement about such forecasts proxy for the 2nd moment conditions. We also considered the growth rate in countries' industrial production, unemployment rate and consumer price indices, but they were found to be redundant.

The 3-month OIS rate is treated as the euro area risk free rate, because the underlying interbank lending contract only involves the exchange among 'prime banks' of net payments and no principal; in contrast with the EURIBOR, which is the rate at which euro area banks lend to each other and implicates the capital transfer. The OIS rate is expected to be negatively related to default risk, as a higher risk free rate implying a macroeconomic expansion is associated with a rise in future firms' cash flows, which increases the risk-neutral growth rate of the firms' assets and lowers the probability of default (Longstaff and Schwartz, 1995; Duffee, 1998).

Real GDP growth is expected to be negatively related to corporate spreads, as an expanding business cycle tends to reduce the probability of default. Conversely, inflation is expected to be positively related to corporate spreads, as inflationary pressure can lead to a tighter monetary policy, which tends to increase the probability of default by increasing the cost of borrowing and by counteracting the business cycle. Consensus Economics, which is a survey among professional forecasters, allows us to have a set of expectations by market participants for all euro area countries for the current and the following year, which are not revised, by the middle of each month. Using this information, we construct country-specific 1-year ahead forecast for real GDP growth and inflation. It is important to stress that Consensus Economics asks the professional forecasters their year-on-year forecast at the end of the current year and at the end of the following year. Following Dovern, Fritsche and Slacalek (2012), by simple interpolation we construct the Consensus Economics forecast one year ahead using the following formula

[17] See also Sarig and Warga (1989); Houweling, Mentink and Vorst (2005); Longstaff, Mthal and Neis (2005); Dick-Nielsen, Feldhütter and Lando (2012).

to construct the weight $[(1+1/12)-w/12]$, where w is the number of months required to reach the end of the year. For example, if the Consensus forecast is collected in January, then $w = 12$ and the weight is 0.083333. In other words, the estimated Consensus forecast one year ahead is equal to the year-on-year December forecast for the current year multiplied by 0.916667 plus the year-on-year December forecast for the subsequent year multiplied by 0.083333.

As a measure of market uncertainty, we consider the disagreement among professional forecasters as reported by Consensus Economics about country-specific expected inflation and real GDP growth 1-year ahead. Specifically, to proxy for second moment conditions of systematic risk, we compute the cross-sectional standard deviation among such forecasts at time t.

5 The Empirical Results

We now turn to the estimation of the credit-spread model, first estimating expression (1) without the systematic risk component; thereby, replicating the model of Gilchrist and Zakrajšek (2012). Specifically, we regress the logarithm of credit spreads on bond i in month t, on the expected default frequency, while also controlling for bond-specific characteristics that could influence bond yields, such as the bond's duration, the amount outstanding, the fixed coupon rate. The estimation is carried out for all corporate bonds and separately for IG and HY bonds. The regressions also include the industry fixed effects to control for any systematic (time-invariant) differences in expected recovery rates across industries, and credit ratings dummies, which capture the information regarding the firm's financial wealth. As shown in Table 2, we confirm that the market-based measure of default risk is a good predictor of the log credit spreads also for the euro area, independently whether using yield spreads or ASW spreads, and independently whether looking at investment grade or high yield bonds.

[Insert Table 2, here]

To assess the role of credit risk and systematic factors in explaining corporate spreads, we perform different regressions with stepwise inclusion of the control variables starting from a benchmark specification which includes the coupon, duration, amount outstanding and industry dummies.[18]

The results in terms of R^2 are reported in Table 2. Individual credit ratings, EDF, stock market volatility and other bond characteristics all together can explain 26-44% of the variance in credit spreads. Therefore, we confirm for the euro area the results obtained by the literature for the United States (i.e. Collin-Dufresne, Goldstein and Martin, 2001) that structural models have limited success in matching with empirical data.

Firm level outputs critically depend on the state of the economy. Hence, when controlling also for the macroeconomic conditions proxied by the monetary policy rate, expected real GDP growth and inflation 1-year ahead and the dispersion among professional forecasters of such macroeconomic forecasts, the adjusted R^2 of all specifications increases by 14-27 percentage points. All in all, firms' level variables and 1st and 2nd moments of systematic risk can explain about 49-63% of the variance of corporate spreads, depending upon the market segment considered. Therefore, as pointed out by Jarrow and Turnbull (2000), incorporating macroeconomic variables improve reduced-form models.

Finally, the adjusted R^2 increases further by 12-18 percentage points due to unobservable systematic risk computed adding the country-specific time dummies (see Panel B of Table 2), which implies that 26-35% of variation in corporate credit spreads is driven by idiosyncratic shocks. Taking into account the effects of the macro variables and depending upon the chosen market segment, we can argue that idiosyncratic risk and systematic risk account for 55-70% and 30-45% of the variance of corporate spreads, respectively.

It is useful to point out that the results in terms of R^2 are very similar if the benchmark model included only the country-specific time dummies (see Panel B of Table 2). This outcome reconciles with the Collin-Dufresne, Goldstein and Martin (2001)'s finding that corporate credit spreads are mostly driven by a single common factor. However, in contrast with their views, we are able to identify key macroeconomic and financial variables that can partly explain developments in corporate credit spreads.

[18]We employ standard errors that are clustered across countries and across time as suggested by Cameron, Gelbach and Miller (2011) and Thomson (2011). The first cluster allows for hybrid correlation among corporate spreads within countries. The second cluster allows for cross-sectional correlation of corporate spreads over time.

Finally, similar results are obtained when using ASW spreads as a measure of credit spreads.

[Insert Table 3, here]

5.1 The Estimated Coefficients

The estimation of the complete model (1) is reported in Table 4. Most of the variables have some ability to explain developments in corporate spreads with the expected sign. We summarise the major findings below:

- Credit risk measures, such as credit ratings, are strongly statistically significant with the estimated coefficients on the credit rating dummies increasing with the worsening of the credit rating review, as one would expect. For example a rating shift from AAA to BBB1 or CCC1 implies, *ceteris paribus*, an average increase in yield spreads by 50% (0.003-(-0.497)) or 139% (0.890-(-0.497)) from the AAA average level, respectively. The increase in ASW spreads is estimated to be even larger amounting to 110% (0.061-(-1.035)) in case of change from AAA to BBB1 and to 199% (0.957-(-1.035)) in case of change from AAA to CCC1. Please notice that the yield (ASW) spread average in the sample is 64 (29) basis points for AAA bonds, 150 (110) basis points for BBB1 bonds and 766 (657) basis points for CCC1 bonds. Therefore, empirical results are consistent. Individual stock market volatility is also highly statistically significant and with the positive sign. Credit spreads increase with rising uncertainty, because the firm's true credit quality becomes more ambiguous (Duffie and Lando, 2001) or investors become concerned about the liquidity in financial markets (Dick-Nielsen, Feldhütter and Lando, 2012). The coefficients on EDF are not statistically significant because collinear with stock market volatilities and the first moment of systematic risk. If we dropped the latter, the EDF's coefficient would be significant as reported in Table 2.

- In line with the empirical findings of Longstaff and Schwartz (1995), Duffee (1998) and Collin-Dufresne, Goldstein and Martin (2001), we find that an increase in the risk free rate lowers credit spreads for all bonds, as a higher rate is associated with an increase in firms' cash flow, which decreases the probability of default (Longstaff and Schwartz, 1995; Duffee, 1998).

- The coefficients on expected real GDP growth (inflation) are negatively (positively) related to corporate spreads. This is because an expanding business cycle tends to reduce the probability of default and an increase in expected inflation can lead to a tighter monetary policy, which can be contractionary.
- Aggregate uncertainty measured with the dispersion among professional forecasters of real GDP growth forecasted 1-year ahead is highly statistically significant and with the correct positive sign.

[Insert Table 4, here]

5.2 Relative Excess Bond Premia

The "pricing errors" are risk premia that can be driven by unobservable market-wide and idiosyncratic shocks. The market-wide shocks are the component of bond premia that can provide insights on the perception of systematic risks not embedded in macroeconomic data.

Therefore, in a second step regression, given the unbalanced nature of the panel, in order to further separate the systematic risk from the idiosyncratic risk, we estimate (2) using time dummies. Specifically, if the interest lies on country-wide shocks $\lambda_{c,t}$, the "pricing errors" can be regressed on a regional intercept and time-varying country-specific dummies:

$$\widehat{\nu}_{i,c,t} = \eta + \lambda_{c,t} + \xi_{i,c,t}. \tag{15}$$

If instead the interest rests on regional market-wide shocks, (2) can be estimated regressing the "pricing errors" on a time-varying regional dummies and country-specific intercepts:

$$\widehat{\nu}_{i,c,t} = \eta_t + \lambda_c + \xi_{i,c,t}. \tag{16}$$

The vectors $\widehat{\lambda}_{c,t}$ in (15) and $\widehat{\eta}_t$ in (16) fluctuate around zero. If $\widehat{\lambda}_{c,t} < 0$ (> 0), investors demand a lower (higher) compensation for unobserved macro risk in country c. If $\widehat{\eta}_t < 0$ (> 0), investors demand a lower (higher) compensation for unobserved regional risk. The estimated coefficients in (15) and (16) are used to compute the relative excess bond premia (6) and (7), respectively.

It is important to stress that the OLS estimates provide the correct values for η_t and $\lambda_{c,t}$, because we use the residuals from a supplementary regression as a dependent variable. However, given that the use of generated dependent varibales can induce heteroskedasticity, we estimate (15) and (16) using the White's heteroscedasticity-consistent estimator (HAC).

The estimation of β, γ and $\xi_{i,c,t}$ allows the computation of the justified credit spreads using (3) and of the relative excess bond premia using (6)-(7).

First we discuss the results based on (16) and report $\widehat{\eta}_t$ with the robust standard errors and REBP_t in Figure 2. REBP_t fell to a historically low level in the latter part of 2003 and remained low during the following several years, the period that, at least in retrospect, has been characterised by excessive credit growth in some countries (i.e. Spain and Ireland) and unsustainable asset price appreciation, with excess bond premia reaching in 2007 about -40% as a percentage of the justified credit spreads. The global inter-bank credit crisis during the summer 2007 precipitated a sharp increase in the relative excess bond premium, which continued to increase through the subsequent financial crisis up to Lehman's bankruptcy in September 2008, reaching 60% of the justified credit spreads. Although conditions in the financial markets improved somewhat in 2009, investors' concern about the fiscal situation in Greece and the contagion to other weak economies led to another surge in the relative excess bond premium. Clearly, the relative excess bond premium increased significantly prior the two recessions dated ex-post by the Centre for Economic Policy Research (CEPR). It sharply declined after the launch of the 3-year long-term refinancing operations (LTROs) in December 2011 and has been in negative territory until end 2013, a pattern consistent with the easing of strains in financial markets. The developments in 2014 and 2015 are somewhat volatile suggesting that the improved economic outlook was not clear-cut.

[Insert Figure 2, here]

The comparison between the results obtained with yield spreads and ASW spreads and between IG and HY segment is reported in Figure 3. The results confirm that the relative excess bond premium was highly negative in the euro area before the financial crisis unfolded over the entire period 2003-2007, reaching in 2007 about -40% in the IG segment and -50% in the HY segment, as a percentage of justified credit spreads. Then, the relative excess bond premium rose sharply and become positive in the second half of 2007 and was highly positive in the euro area before Lehman's bankruptcy and during the euro area sovereign debt crisis. Overall, these excess risk premia are estimated to be positive in both bond segments over almost the entire financial crisis period between August 2007-December 2011, when the adjustment took place after the launch of the 3-year LTROs in December 2011. The results also suggest that relative excess bond premium was negative in the IG segment in the second half of 2012 and 2013, after the "whatever it takes speech " by Mario Draghi and the launch of the OMTs in the summer of 2012. The relative excess bond premium was negative in the IG segment since August 2014, when the probability of the launch of the PSPP by the ECB became more likely, after the speech of Mr. Draghi at the Jackson Hall. The risk, however, has remained much lower than that estimated in 2003-2007 period. Moreover, there is no evidence of excess premia in the HY segment. Taken at face value, this could suggest that the relative excess bond premium was relatively modest compared to the pre-crisis period. These results are independent whether measuring corporate spreads using yield spreads or ASW spreads.

[Insert Figure 3, here]

The same exercise is carried out to assess risk across countries, by estimating (15). Given the limited number of bonds available in some countries, we employ quarterly time dummies to be sure about the identification of the market-wide shocks even in countries with fewer bond issuances. However, the estimated market-wide shocks are simply less volatile than the monthly estimates. $\widehat{\lambda}_{c,t}$ and $\text{REBP}_{c,t}$ are reported in Appendix E. The results using ASW spreads are very similar. Corporate spreads in all, IG and HY segments were characterised by sizeable negative relative excess bond premia before the financial crisis started in August 2007 in France, Germany, Italy, Netherlands and Spain, which account for 90% of the issued bonds. Between the interbank-credit crisis in August 2007 and before Lehman's bankruptcy in September 2008, the relative excess bond premia in the IG and HY segments were positive in all euro area countries under analysis. The adjustment took place after the launch of the 3-year LTROs in December 2011. The relative excess bond premia in the IG segment were subsequently in 2012 and 2013 negative in many countries except Austria and Italy to revert back in line with the model determinants at the end of 2013. Conversely, the relative excess bond premia in the HY segment fluctuated more frequently after Lehman in many countries. The only exception are the negative values in Germany, Ireland, Spain and the Netherlands in 2012 and 2013, the countries that subsequently recorded higher economic growth. More recently, the relative excess bond premia have been negative in all bonds since August 2014, when the probability of the launch of the PSPP by the ECB became more likely, except in Austria, Italy and Spain suggesting some tensions in these countries. Conversely Germany, France and the Netherlands recorded negative relative excess bond premia pointing to an improvement in their economic outlook.

5.3 Excess Bond Premia

The excess bond premia due to the unobservable systematic risk can be easily computed using (8)-(9). In addition, we can compare (8)-(9) with the approach and measures suggested by Gilchrist and Zakrajšek (2012), which excludes systematic risk (10)-(11), and with its extended version that includes observable systematic risk (12)-(13).

The results are described in Figure 4 for the euro area. The country results using yield and ASW spreads are very similar (see Appendix F). The differences between the excess bond premia à la Gilchrist and Zakrajšek (2012) and the premia computed controlling for observable systematic risk are large, while the two premia that control for observable systematic risk are very similar mainly because the cross-sectional average of unobservable idiosyncratic risks is relatively small. We will show in the next section that the relative excess bond premium and the two excess bond premia that control for observable systematic risks better predict economic activity in the euro area and therefore they are preferred measures at least for the euro area.

The narrative underlying the excess bond premium is similar to that described in the previous section, but with a less volatile dynamics. The excess bond premia fell to a historically low level in the latter part of 2003 and remained low during the following several years. The tensions in the financial markets during the summer 2007 reflected in the excess bond premium, which continued to increase reaching record high of 120 basis points in September 2008 with the bankruptcy of Lehman. Although conditions in the financial markets improved somewhat in 2009, the sovereign debt crisis developed and this brought another surge in the excess bond premia. The euro area premia declined after the launch of the 3-year LTROs in December 2011, have been in negative territory until end 2013 and have been volatile in 2014 and 2015.

[Insert Figure 4, here]

6 Credit Spreads and Economic Activity

Do credit spreads contain information about economic activity that is not already embedded in macroeconomic data?

Given the monthly frequency of the sample covering the period October 1999-March 2015, real economic activity is proxied by the unemployment rate or industrial production in the univariate forecasting specification and the euro area VAR. Conversely, real GDP is used in the panel VAR model with quarterly frequency.

A simple bivariate analysis suggests that the relative excess bond premium can lead the real economic activity, the stock market returns and the growth in survey-based economic sentiment by several months. Conversely, the link with euro area HICP inflation is rather weak (see Figure 5). This is confirmed by the forecasting models and the VARs.

[Insert Figure 5, here]

In this section, the stock market prices, dividend yields and the US VIX that are provided by Reuters DataStream; the term spread, the EONIA rate, the unemployment rate, industrial production, real GDP, GDP deflator and HICP are provided by the ECB and the euro area survey-based economic sentiment is provided by the European Commission.[19] Data are seasonally adjusted.

6.1 Univariate Forecasting Specification: In-Sample Analysis

To assess the predictive ability of credit spreads, we estimate the following univariate forecasting specification, which controls for current macroeconomic and financial conditions:

$$\Delta^h Y_{t+h} = \beta_0 + \beta_1 \Delta Y_t + \beta_2 SENT_t + \beta_3 DY_t + \beta_4 VIX_t + \beta_5 TS_t + \beta_6 REONIA_t + \gamma CS_t + \zeta_{t+h}, \tag{17}$$

where $\Delta^h Y_{t+h} = \frac{1200}{h} \ln\left(\frac{Y_{t+h}}{Y_t}\right)$, $h = 1, ...H$ is the forecast horizon and the scaling constant takes the value of 1200 for monthly data and ζ_{t+h} is the forecast error. The macroeconomic conditions are captured by the endogenous variable at time t, Y_t, and the growth rate in euro area survey-based economic sentiment, $SENT_t$. The financing conditions are proxied by the dividend yield, DY_t; the US VIX, VIX_t; the term spread defined as the difference between the 10-yr euro area AAA sovereign yield minus the EONIA rate, TS_t; the real EONIA rate defined as the difference between the EONIA rate and annual HICP inflation, $REONIA_t$; the credit spreads or the bond premia, CS_t. The forecasting regression is estimated by ordinary least squares with one lag according to the Akaike Information Criterion (AIC).

The MA(h) structure of the error term induced by overlapping observations is taken into account by estimating in addition a reverse regression as suggested by Hodrick (1992):

$$\Delta Y_{t+1} = \mu^h + \mathbf{x}_t^{(h)'} \gamma^h + u_{t+1}, \tag{18}$$

[19] The Directorate General for Economic and Financial Affairs (DG ECFIN) of the European Commission conducts regular harmonised surveys for different sectors of the economies in the European Union (EU) and in the applicant countries. The indicators of confidence and economic sentiment (ESI) are addressed to representatives of the industry (manufacturing), the services, retail trade and construction sectors, as well as to consumers.

where $\mathbf{x}_t^h = \mathbf{x}_t + \mathbf{x}_{t-1} + ... + \mathbf{x}_{t-h+1}$ and $\mathbf{x}_t$ denote the vector of the regressors described above. We report the P-value of the Wald test with the null hypothesis that γ^h associate to the credit spreads or bond premia is equal to zero.

The results are reported in Table 5 for the stock market return, Table 6 for the growth rate in survey-based economic sentiment, Table 7 for the growth rate in unemployment rate, Tables 8 for the growth rate in industrial production and Table 9 for HICP inflation. The benchmark regression is the specification (17) without the credit spread variable for which we report only the adjusted R^2 in the first row of each table. To appreciate the results, we also show the regressions using the standard BBB-AA long-term industrial corporate bond spread and the micro derived credit spreads ($\overline{\overline{y}}_t (d) = \sum_i \sum_c y_{i,c,t} (d) /N$).

The section of the tables highlighted in yellow provides the results when using the relative excess bond premium computed for the yield and the ASW spreads as well as for the investment grade and the high yield bonds. The raw highlighted in orange presents the results obtained using the excess bond premium à la Gilchrist and Zakrajšek (2012).

[Insert Tables 5-9, here]

Starting from the forecast of the stock market, stock returns can be even predicted one month ahead when using all risk premia which control for observable systematic risk. The set of indicators that cannot predict the euro area stock market at any horizon are the excess bond premia à la Gilchrist and Zakrajšek (2012), the BBB-AA spread and the ASW spreads. The statistical significant coefficients have the correct sign and the regression with the relative excess bond premium based on yield spreads for all bonds have broadly the largest adjusted R^2, which for $h = 1$ is zero in the benchmark regression and 9.7% when adding the relative excess bond premium, for $h = 3$ is 9.6% in the benchmark regression and 28.5% when adding the relative excess bond premium, and for $h = 12$ is 32.2% in the benchmark regression and 56.6% when adding the relative excess bond premium. A 25% increase of the adjusted R^2 when including the relative excess bond premium is very informative about its predictive role.

Credit spreads can also forecast the growth rate in euro area survey-based economic sentiment, unemployment rate and industrial production. Although the short-term forecast of the various indicators is not convincing, because the adjusted R^2 are very similar to the benchmark regression, the 12-month ahead forecast indicates almost a 20 percentage point increase in adjusted R^2 relative to the benchmark when adding the relative excess bond premium. The coefficients are strongly statistically significant and accurately positive for the growth rate of the unemployment rate and negative for the growth rate of the survey-based economic sentiment and industrial production.

The excess bond premium à la Gilchrist and Zakrajšek (2012) can also predict industrial production, but only in sample.

The set of indicators that cannot predict the growth rate in real economic activity are the BBB-AA spread, the duration-adjusted yield spreads and the ASW spreads. This implies that controlling for idiosyncratic risk and observable systematic risk is paramount at least for the euro area.

Finally, when considering the euro area HICP inflation, the adjusted R^2 do not differ much from the benchmark regression in all specifications, suggesting that the leading role of our variables vis-à-vis the inflation rate is very weak, as also graphically summarised in Figure 5.

6.2 Univariate Forecasting Specification: Out-of-Sample Analysis

In addition, we test the statistical forecasting performance of the alternative indicators based on out-of-sample forecast errors over the 40 month period December 2011 - March 2015. The only study, which carries out out-of-sample forecasts using the excess bond premium is applied to the US (Faust, et al. (2013)). The specification (17) is estimated recursively by adding one observation at the time starting from December 2011. This implies that the parameters are re-estimated every period $t = t_1, ..., T$ and forecast at various horizons are collected at each run. The forecasting performance of each alternative indicator is compared with specification (17) that uses the standard BBB-AA corporate spreads, which are based on composite indices not adjusted by duration. The statistics used for the forecasting evaluation are standard measures, such as the root mean squared forecast error (RMSFE) and the statistics of the Diebold-Mariano test.

Specifically, the last two columns of each Tables 5-9 show (i) the ratio between the RMSFE from a direct regression of the model specification (17) with CS_t being the corresponding indicator listed in the first column and the MSFE of the model estimated with the BBB-AA corporate spreads and (ii) the Diebold-Mariano test. In addition, we report with stars the statistical significance of the Diebold-Mariano test. We show only the forecast performance 1-year ahead, because the Diebold-Mariano test is not statistically significant at 1- and 3-month horizons in none of the cases.

All in all, the results corroborate that the relative excess bond premium is a useful measure for forecasting real economic activity, the stock market and consumer confidence. The relative RMSFE is less than 0.7 in the case of the unemployment rate and industrial production and less than 0.8 in the cases of the stock market and survey-based economic sentiment. The respective Diebold-Mariano statistics are relatively large. The results are invariant when using as benchmark the model that does not control for BBB-AA corporate spreads.

6.3 Euro Area VAR and Panel VAR

In order to study the macroeconomic consequences of shocks to the various measures of bond risk premia, we add one by one these measures to a standard VAR that takes two forms: a single country VAR for the euro area as a whole using monthly data and a panel VAR with the nine countries in the sample using quarterly data.

The euro area VAR includes the following endogenous variables: (i) log-difference of euro area unemployment rate, (ii) log-difference of euro area HICP, (iii) log-difference of euro area survey-based economic sentiment, (iv) US VIX, (v) log-difference of euro area stock market price, (vi) the ten-year (nominal) AAA euro area yield, (vii) the EONIA rate, (viii) credit spreads or alternative measures of euro area excess bond premia.

The country panel VAR includes the following endogenous variables: (i) log-difference of countries' real GDP, (ii) log-difference of countries' GDP deflator, (iii) log-difference of euro area survey-based economic sentiment, (iv) US VIX, (v) log-difference of countries' stock market price, (vi) ten-year (nominal) AAA euro area yield, (vii) the EONIA rate,

(viii) credit spreads or alternative measures of countries' excess bond premia.

As in Gilchrist and Zakrajšek (2012), we use a recursive ordering but with the bond risk premia ordered last. This assumption is very restrictive, because stock market prices and survey-based economic sentiment also reflect expectations regarding current and future income. The VAR is estimated using one lag of each endogenous variable, as suggested by the AIC information criterion.

The results of the euro area and panel VAR are reported in Figures 6 and 7, respectively. The first raw describes the impulse response functions of a shock to the micro-derived yield spreads, which is the measure used by Gilchrist and Mojon (2017). The second raw describes a response to the relative excess bond premium shock, which is our preferred measure. The third raw describes the response of a shock to the difference between credit spreads and justified credit spreads (i.e. the excess bond premium due to common or market-wide shocks). The fourth raw describes the response of a shock to the excess bond premium extending Gilchrist and Zakrajšek (2012) by including observable systematic risk. The fifth raw describes the response of a shock to the excess bond premium à la Gilchrist and Zakrajšek (2012). All shocks are orthogonalized and normalised.

An unanticipated increase of 100% in the relative excess bond premium (1 standard deviation amounts to 16.2% in the panel VAR and 9.8% in the single country VAR) is associated with a significant reduction in real economic activity with an increase in unemployment and a significant fall in output over the next several quarters. The macroeconomic consequences of this adverse financial shock are substantial and protracted with the unemployment rate increasing by 16% after two years and real GDP declining by 3% after three years. The resulting economic slack can lead to a substantial disinflation over time. In response to these adverse economic developments, monetary policy is eased significantly, as evidenced by the decline in the EONIA rate. Despite the reduction in the overnight policy rate, survey-based economic sentiment deteriorates and the stock market experiences a significant drop, with cumulative decline of about 40% in the single country VAR and 25% in the panel VAR specification.

Similar results are obtained using the difference between credit spreads and justified credit spreads. All the other measures produce only some of these results, in some cases responses are statistically insignificant and in other cases they have the wrong sign. In particular, we replicate the Gilchrist and Zakrajšek indicator for the euro area and show that such a shock generates a fall in economic activity (the level of real GDP and GDP deflator bottom out about 0.8 and 0.6 percent point below trend two and four years after the shock, respectively),[20] but at the same time a boom in survey-based economic sentiment and stock market which is not theoretically consistent (see Figure 7).

[Insert Figures 6-7, here]

As a robustness check, we study the response of credit spreads and risk premia to shocks originated in the sovereign bond market and stock markets (see Appendix G). The response is typically not statistically significant suggesting that excess bond risk premia are exogenous and therefore the results should not be affected by alternative identification schemes.

6.4 Excess Bond Premia and Credit Supply Conditions

Gilchrist and Zakrajšek (2012) interpret the excess bond premium as a gauge of credit supply conditions. They reach this conclusion showing the tight link between the excess bond premium and the changes in bank lending standards obtained from the Federal Reserve's quarterly Senior Loan Officer Opinion Survey on Bank Lending Practices. Panel A of Figure 8 shows the same correlation applied to the euro area bank lending survey available from 2002Q4 and the excess bond premium à la Gilchrist and Zakrajšek (2012) and the relative excess bond premium. The correlation with the bank lending survey is high only in the 2007-2009 period, when the interbank-market froze. Before and after, the excess bond premia adjusted for the developments in credit standards, obtained by regressing the excess bond premia against the credit standards and subtracting its contribution from the bond premia, tightly comove with the excess bond premia. This implies

[20]Gilchrist and Zakrajšek (2012) find that, over the sample period 1973-2010, an unanticipated increase of 100 basis points in the excess bond premium causes a significant reduction in real economic activity over the next several quarters in the United States, with the level of real GDP bottoming out about 2 percent below trend five quarters after the shock and GDP deflator bottoming out about 3 percent below trend twenty quarters after the shock.

that the excess bond premia are not simply a proxy for credit tightening.

[Insert Figure 8, here]

If the bond premia are indicators of credit supply conditions, then one should also expect a negative correlation between the excess bond premia and the profitability of the banking sector, as measured by its return on equity, in that an increase in risk should imply lower loan growth and, as a result, lower profits for financial intermediaries.[21] Also in this case the comovement is weak (see Panel B of Figure 8), particularly during the 2007-2009 period.

Darracq-Paries and De Santis (2015) study in detail the correlation between credit supply shocks and credit spreads shocks. They find that the correlation is nil suggesting that credit supply shocks are more related to quantity constraints. All in all, the excess bond premia for the euro area provide additional information, and do not reflect only the credit supply conditions of an economy.

7 Conclusions

Important fluctuations of output and employment have characterised the global economy during the last ten years with financial shocks playing a key role. This paper proposes an indicator, which is by construction orthogonal to the state of the economy as we control for idiosyncratic risk and observable macroeconomic fundamentals. Specifically, the relative excess bond premium, that is the duration-adjusted credit spreads in excess of justified credit spreads as a percentage of justified credit spreads, where the latter are the investors' compensation for idiosyncratic risk and observable systematic risk, plays a key role in forecasting macroeconomic and asset price fluctuations, because bond investors demand a positive risk premium to hedge against forthcoming unexpected adverse macroeconomic fluctuations.

This time-varying market-wide shock is constructed employing an extensive micro-

[21]The (trailing) ROE, which is based on the sample of all 33 euro area banks included in the Euro STOXX index, is the weighted average (by market capitalization) of individual ROEs in percent.

level dataset of secondary market yields of senior unsecured bonds issued by euro area non-financial corporations. Compared to other indicators, the relative excess bond premium is a robust predictor of future economic activity across a variety of economic indicators including the stock market and survey-based economic sentiment. Innovations to the relative excess bond premium are associated with substantial and protracted contractions in economic activity and, as a consequence, a decline in the stock market and survey-based economic sentiment.

We show that the estimated relative excess bond premia are in line with the expected narrative, namely negative before the financial crisis unfolded over the entire period 2003-2007 and positive before Lehman's bankruptcy and during the euro area sovereign debt crisis, thereby predicting the two double deep recessions of this decade.

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Table 1. Number of Bonds, Observations, Mean and Variance of Non-Financial Corporations' Credit Spreads by Country and Sectors (Sample period: October 1999-March 2015)

			Yield spreads				ASW spreads				
	ISIN	Obs.	Mean (bps)	Std. Dev. (bps)	Min (bps)	Max (bps)	Mean (bps)	Std. Dev. (bps)	Min (bps	Max (bps)	Sample Period
					All						
EA	2345	91106	209	238	3	1423	162	203	1	1093	Oct 99 - Mar 15
AT	48	2279	197	230	6	1423	151	194	1	1093	Oct 99 - Mar 15
BE	63	2513	207	264	10	1423	154	218	3	1093	Jun 01 - Mar 15
DE	576	20555	206	236	3	1423	157	203	1	1093	Oct 99 - Mar 15
ES	177	6067	280	279	5	1423	226	239	1	1093	Oct 99 - Mar 15
FI	44	2013	218	271	14	1423	172	224	5	1093	Oct 99 - Mar 15
FR	790	31605	170	183	3	1423	129	158	1	1093	Oct 99 - Mar 15
IE	46	1285	399	305	34	1423	329	259	2	1093	May 00 - Mar 15
IT	230	8984	270	246	3	1423	219	211	1	1093	Jun 00 - Mar 15
NL	470	15805	212	280	3	1423	169	233	1	1093	Oct 99 - Mar 15
					Investment Grade						
EA	1780	73811	133	108	3	1423	94	92	1	1093	Oct 99 - Mar 15
AT	35	1835	119	88	6	909	81	74	1	737	Oct 99 - Mar 15
BE	54	2122	131	103	10	968	88	91	3	727	Jun 01 - Mar 15
DE	417	15646	121	89	3	1423	79	78	1	1093	Oct 99 - Mar 15
ES	132	4997	182	130	5	1423	138	110	1	1093	Oct 99 - Mar 15
FI	35	1602	133	98	140	1099	98	84	5	914	Oct 99 - Mar 15
FR	674	27461	127	99	3	1423	89	84	1	1093	Oct 99 - Mar 15
IE	17	584	199	144	34	743	156	129	2	645	May 00 - Mar 15
IT	164	6682	189	146	3	1423	143	118	1	1093	Jun 00 - Mar 15
NL	347	12882	113	101	3	1423	84	88	1	1093	Oct 99 - Mar 15
					High yields						
EA	712	17295	530	349	3	1423	450	280	4	1093	Oct 99 - Mar 15
AT	15	444	521	331	163	1423	442	255	118	1093	Oct 99 - Mar 15
BE	15	391	619	435	86	1423	509	334	53	1093	Apr 02 - Mar 15
DE	183	4909	480	331	34	1423	405	271	9	1093	Oct 99 - Mar 15
ES	47	1070	738	329	149	1423	634	253	125	1093	Jan 06 - Mar 15
FI	16	411	549	429	32	1423	491	399	21	1093	Sep 00 - Mar 15
FR	178	4144	454	314	15	1423	388	255	4	1093	Oct 99 - Mar 15
IE	29	701	566	303	76	1423	473	252	45	1093	Dec 00 - Mar 15
IT	98	2302	505	316	15	1423	439	260	7	1093	Jan 06 - Mar 15
NL	136	2923	646	382	3	1423	542	296	4	1093	Oct 99 - Mar 15

Note: Yield spreads are computed as the mean of the individual yield-to-maturity minus the OIS rate with the same duration. The individual securities (ISINs) are provided by Bank of America Merrill Lynch and include investment-grade (G0BC Global Broad Market Corporate Index from Bloomberg) and high yields bonds (HW00 High Yield bonds from Bloomberg). Qualifying securities: 1) fixed coupon schedule; 2) EUR 250 million minimum size requirement; 3) EUR currency; 4) unsecured bonds; 5) duration between 1 and 30 years; 6) observations are winsorized at 99% of the distribution to drop extreme outliers.

Table 2. Corporations' Credit Spreads and Expected Default Frequency *(OLS, 2-way cluster)*

	Yield Spreads			ASW spreads		
VARIABLES	All	IG	HY	All	IG	HY
EDF (j,c,t)	0.040***	0.050***	0.020**	0.046***	0.058***	0.019**
	(0.007)	(0.009)	(0.009)	(0.008)	(0.010)	(0.010)
Coupon (i,j,c,t)	0.141***	0.131***	0.159***	0.200***	0.204***	0.180***
	(0.008)	(0.011)	(0.013)	(0.010)	(0.013)	(0.014)
Duration (i,j,c,t)	0.062***	0.063***	0.049***	0.093***	0.097***	0.052***
	(0.005)	(0.005)	(0.012)	(0.006)	(0.006)	(0.013)
Outstanding amount (i,j,c,t)	-0.007	0.010	-0.045	-0.027	-0.018	-0.068
	(0.023)	(0.026)	(0.041)	(0.026)	(0.030)	(0.044)
Observations	91,106	73,811	17,295	91,106	73,811	17,295
Adj. R-squared	0.378	0.180	0.300	0.432	0.273	0.305
Industry FE	YES	YES	YES	YES	YES	YES
Credit rating dummies	YES	YES	YES	YES	YES	YES
Clusters: Time and security	YES	YES	YES	YES	YES	YES

Note: This table shows the panel regressions' OLS coefficients and robust standard errors of yield spreads and ASW spreads. Standard errors are robust to arbitrary correlation across time (clustering on security) and to arbitrary contemporaneous cross-panel correlation (clustering on time), as proposed by Cameron, Gelbach and Miller (2011) and Thompson (2011). All, IG and HY include all, investment grade and high yields bonds, respectively. "I" is the bond dimension, "j" is the industry dimension, "c" is the country dimension and "t" is the time dimension. Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1. Sample period: October 1999 – March 2015.

Table 3. Corporate Credit Spreads: The Explanatory Role of Factors

	Yield spreads			ASW spreads		
	(1)	(2)	(3)	(4)	(5)	(6)
	All	IG	HY	All	IG	HY
Observations	91,109	73,782	17,327	91,109	73,782	17,327
Number of id	2,346	1,781	712	2,346	1,781	712
Industry fixed effects	YES	YES	YES	YES	YES	YES
Panel A: OLS without country-specific time dummies						
Starting regression: coupon, duration and amount outstanding						
Adj. R-squared	0.229	0.082	0.272	0.258	0.124	0.285
plus individual EDF						
Adj. R-squared	0.237	0.097	0.277	0.265	0.138	0.289
plus individual credit ratings						
Adj. R-squared	0.379	0.181	0.301	0.428	0.270	0.305
plus individual market volatility						
Adj. R-squared	0.438	0.263	0.358	0.476	0.336	0.346
plus systematic risk 1st moments						
Adj. R-squared	0.613	0.522	0.482	0.604	0.518	0.458
plus systematic risk 2nd moments						
Adj. R-squared	0.627	0.537	0.493	0.621	0.536	0.470
Panel B: OLS with country-specific time dummies						
Starting regression: Coupon, duration, outstanding amount and time-varying country specific fixed effects						
Adj. R-squared	0.652	0.668	0.625	0.590	0.575	0.593
plus individual EDF, credit ratings, market volatility and systematic risk						
Adj. R-squared	0.745	0.714	0.655	0.706	0.664	0.616

Note: This table shows the adjusted R-squared of panel regressions for yield spreads and ASW spreads with industry fixed effects including one by one a sub-set of variables. Coupon, duration, amount outstanding and credit ratings are available at ISIN level, individual EDF is the expected default frequency and individual market volatility is the realised stock market volatility both available for 40 industries in each country. Systematic risk 1st moments include expected real GDP growth and expected inflation 1-year ahead for each country and the 3-month OIS rate. Systematic risk 2nd moments include the standard deviation among professional forecasters of expected inflation and of expected real GDP growth 1-year ahead. The regressions with country-specific country dummies include the interaction between the country dummy and the time dummy. The regressions are estimated using OLS. Standard errors are robust to arbitrary within country correlations (clustering on country) and to arbitrary contemporaneous cross-panel correlation (clustering on time) as proposed by Cameron, Gelbach and Miller (2011) and Thompson (2011). All, IG and HY include all, investment grade and high yields bonds, respectively. Sample period: October 1999 – March 2015.

Table 4. The Determinants of Non-Financial Corporations' Credit Spreads *(OLS, 2-way cluster)*

	Yield Spreads			ASW spreads		
VARIABLES	All	IG	HY	All	IG	HY
Expected real GDP growth (c,t)	-0.154***	-0.161***	-0.122***	-0.198***	-0.214***	-0.134***
	(0.019)	(0.026)	(0.023)	(0.016)	(0.022)	(0.025)
Expected HICP (c,t)	0.251***	0.292***	0.091**	0.246***	0.298***	0.059
	(0.032)	(0.036)	(0.046)	(0.027)	(0.030)	(0.051)
3-month OIS rate (t)	-0.184***	-0.195***	-0.132***	-0.157***	-0.163***	-0.128***
	(0.017)	(0.018)	(0.019)	(0.018)	(0.018)	(0.020)
GDP forecast uncertainty (c,t)	0.561***	0.669***	0.186	0.514**	0.628**	-0.017
	(0.177)	(0.199)	(0.253)	(0.241)	(0.277)	(0.246)
HICP forecast uncertainty (c,t)	0.544	0.569	0.341**	0.711*	0.774	0.323
	(0.370)	(0.427)	(0.157)	(0.417)	(0.471)	(0.224)
Real. volatility (j,c,t)	0.373***	0.368***	0.376***	0.398***	0.405***	0.352***
	(0.043)	(0.048)	(0.047)	(0.040)	(0.039)	(0.057)
EDF (j,c,t)	0.002	0.002	0.003	0.005	0.007	0.004
	(0.009)	(0.011)	(0.007)	(0.011)	(0.014)	(0.007)
AAA (i,j,c,t)	-0.497***	-0.488***		-1.035***	-1.022***	
	(0.062)	(0.059)		(0.087)	(0.085)	
AA1 (i,j,c,t)	-0.537***	-0.553***		-0.863***	-0.870***	
	(0.136)	(0.138)		(0.140)	(0.145)	
AA2 (i,j,c,t)	-0.419***	-0.434***		-0.777***	-0.777***	
	(0.092)	(0.104)		(0.113)	(0.123)	
AA3 (i,j,c,t)	-0.367***	-0.375***		-0.590***	-0.595***	
	(0.109)	(0.115)		(0.156)	(0.158)	
A1 (i,j,c,t)	-0.297***	-0.313***		-0.448***	-0.455***	
	(0.078)	(0.085)		(0.096)	(0.104)	
A2 (i,j,c,t)	-0.207**	-0.221***		-0.296***	-0.300***	
	(0.083)	(0.081)		(0.088)	(0.082)	
A3 (i,j,c,t)	-0.119*	-0.136*		-0.158***	-0.165***	
	(0.071)	(0.072)		(0.057)	(0.057)	
BBB1 (i,j,c,t)	0.003	-0.013		0.061	0.054	
	(0.068)	(0.070)		(0.081)	(0.079)	
BBB2 (i,j,c,t)	0.066	0.056		0.185***	0.187***	
	(0.048)	(0.049)		(0.053)	(0.051)	
BBB3 (i,j,c,t)	0.267***	0.254***		0.432***	0.427***	
	(0.038)	(0.043)		(0.045)	(0.050)	
BB1 (i,j,c,t)	0.475***		0.497***	0.646***		0.633***
	(0.074)		(0.072)	(0.068)		(0.071)
BB2 (i,j,c,t)	0.409***		0.453***	0.544***		0.569***
	(0.066)		(0.057)	(0.078)		(0.067)
BB3 (i,j,c,t)	0.625***		0.633***	0.737***		0.759***
	(0.052)		(0.038)	(0.045)		(0.043)
B1 (i,j,c,t)	0.591***		0.566***	0.664***		0.654***
	(0.067)		(0.046)	(0.073)		(0.049)
B2 (i,j,c,t)	0.706***		0.666***	0.732***		0.736***
	(0.097)		(0.084)	(0.107)		(0.086)
B3 (i,j,c,t)	0.720***		0.665***	0.725***		0.739***
	(0.078)		(0.072)	(0.081)		(0.075)
CCC1 (i,j,c,t)	0.890***		0.828***	0.957***		0.952***
	(0.103)		(0.084)	(0.115)		(0.096)
CCC2 (i,j,c,t)	1.080***		1.029***	1.043***		1.067***
	(0.145)		(0.132)	(0.163)		(0.145)
CCC3 (i,j,c,t)	0.988***		0.990***	1.046***		1.048***
	(0.200)		(0.211)	(0.206)		(0.222)
CC (i,j,c,t)	1.184***		1.170***	1.053***		1.153***
	(0.288)		(0.259)	(0.367)		(0.316)
C & D (i,j,c,t)	1.127***		1.147***	1.002***		1.137***
	(0.246)		(0.215)	(0.295)		(0.263)
Coupon (i,j,c,t)	0.150***	0.141***	0.167***	0.204***	0.206***	0.193***
	(0.011)	(0.010)	(0.012)	(0.007)	(0.008)	(0.013)
Duration (i,j,c,t)	0.077***	0.078***	0.074***	0.109***	0.113***	0.080***
	(0.006)	(0.006)	(0.007)	(0.010)	(0.011)	(0.008)
Outstanding amount (i,j,c,t)	-0.092***	-0.070**	-0.132***	-0.123***	-0.111***	-0.162***
	(0.022)	(0.030)	(0.019)	(0.029)	(0.037)	(0.025)
Observations	91,106	73,811	17,295	91,106	73,811	17,295
Adj. R-squared	0.627	0.537	0.493	0.621	0.536	0.470
Industry FE	YES	YES	YES	YES	YES	YES
Clusters: Time and Country	YES	YES	YES	YES	YES	YES

Note: This table shows the panel regressions' OLS coefficients and robust standard errors of yield spreads and ASW spreads. Standard errors are robust to arbitrary within country correlations (clustering on country) and to arbitrary contemporaneous cross-panel correlation (clustering on time), as proposed by Cameron, Gelbach and Miller (2011) and Thompson (2011). All, IG and HY include all, investment grade and high yields bonds, respectively. "I" is the bond dimension, "j" is the industry dimension, "c" is the country dimension and "t" is the time dimension. Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1. Sample period: October 1999 – March 2015.

Table 5. Credit Spreads and Stock Markets

(in-sample and out-of-sample analysis)

Growth rate in Stock Prices	Forecast horizon: 1 month Spreads coef	Reverse P value	R^2	Forecast horizon: 3 months Spreads coef	Reverse P value	R^2	Forecast horizon: 1 year Spreads coef	Reverse P value	R^2	RMSFE ratio 1-year	DM test 1-year
Bench	-	-	0.0	-	-	9.6	-	-	32.2	-	-
BBB-AA	0.079	0.60	-0.4	0.093	0.52	11.1	-0.016	0.74	33.7	-	-
YTM all	-0.128	0.12	0.2	-0.062	0.59	9.6	-0.077	0.97	34.2	1.06	0.02
YTM IG	-0.345*	0.05	1.2	-0.216	0.18	11.0	-0.218	0.58	37.7	1.09	1.23
YTM HY	-0.06**	0.03	1.2	-0.043	0.25	11.5	-0.021	0.90	33.7	1.03	2.50
ASW all	-0.095	0.43	-0.3	-0.005	0.85	9.1	-0.053	0.69	32.5	1.03	1.77
ASW IG	-0.299	0.29	0.3	-0.121	0.70	9.5	-0.164	1.00	34.1	1.05	1.20
ASW HY	-0.066	0.09	0.7	-0.042	0.42	10.4	-0.019	0.71	32.7	1.02	0.54
YTM all - REBP	**-1.071*** **	**0.00**	**9.7**	**-0.884*** **	**0.00**	**28.5**	**-0.573*** **	**0.00**	**56.6**	**0.71*** **	**-6.94**
YTM IG - REBP	**-0.978*** **	**0.00**	**9.2**	**-0.809*** **	**0.00**	**27.6**	**-0.542*** **	**0.00**	**57.0**	**0.70*** **	**-6.95**
YTM HY - REBP	**-1.021*** **	**0.00**	**7.5**	**-0.844*** **	**0.00**	**24.3**	**-0.407* **	**0.06**	**42.7**	**0.94**	**-0.19**
ASW all - REBP	**-1.175*** **	**0.00**	**9.5**	**-0.848*** **	**0.00**	**23.4**	**-0.518*** **	**0.02**	**47.4**	**0.76*** **	**-6.69**
ASW IG - REBP	**-1.051*** **	**0.00**	**8.7**	**-0.742*** **	**0.00**	**21.7**	**-0.478*** **	**0.03**	**46.9**	**0.76*** **	**-6.21**
ASW HY - REBP	**-0.924*** **	**0.00**	**5.8**	**-0.761*** **	**0.00**	**21.1**	**-0.369**	**0.29**	**40.5**	**0.97**	**-0.02**
YTM all - common shock EBP	-0.688***	0.00	7.7	-0.558***	0.00	24.1	-0.328***	0.00	47.5	0.80***	-4.75
YTM IG - common shock EBP	-0.806***	0.00	6.3	-0.645***	0.00	21.4	-0.409***	0.00	46.9	0.85***	-3.04
YTM HY- common shock EBP	-0.265***	0.00	6.1	-0.225***	0.00	22.4	-0.084	0.09	37.6	0.94	-0.43
ASW all - common shock EBP	-0.612***	0.00	7.4	-0.444***	0.00	20.4	-0.237	0.00	41.3	0.84***	-3.16
ASW IG - common shock EBP	-0.72***	0.00	5.4	-0.504**	0.01	17.1	-0.285*	0.00	39.3	0.88*	-1.78
ASW HY - common shock EBP	-0.195***	0.00	4.7	-0.166**	0.01	19.7	-0.060	0.49	36.1	0.96	-0.20
YTM all - extended GZ EBP	-0.612***	0.00	5.4	-0.497***	0.00	20.1	-0.261*	0.00	41.2	0.85*	-1.83
YTM IG - extended GZ EBP	-0.673***	0.00	4.7	-0.531***	0.01	18.3	-0.337***	0.00	43.1	0.84***	-3.39
YTM HY - extended GZ EBP	-0.226***	0.00	4.0	-0.192***	0.00	18.4	-0.065	0.41	35.1	0.96	-0.46
ASW all - extended GZ EBP	-0.392**	0.01	3.2	-0.311**	0.01	15.7	-0.138	0.20	35.8	0.92	-1.08
ASW IG - extended GZ EBP	-0.556***	0.01	3.5	-0.396**	0.05	14.9	-0.257	0.00	39.1	0.86***	-3.21
ASW HY - extended GZ EBP	-0.154**	0.00	2.7	-0.126**	0.00	15.3	-0.035	0.68	33.3	0.99	-0.12
YTM all - GZ EBP	-0.196	0.20	0.4	-0.182	0.08	11.3	-0.155	0.18	36.6	1.09	0.82
YTM IG - GZ EBP	-0.281	0.08	0.8	-0.191	0.11	10.9	-0.191	0.08	37.2	1.06	0.16
YTM HY - GZ EBP	-0.021	0.76	-0.5	-0.04	0.17	9.7	-0.032	0.68	32.9	1.04	1.17
ASW all - GZ EBP	-0.085	0.55	-0.3	-0.091	0.32	10.0	-0.088	0.76	34.3	1.08	2.50
ASW IG - GZ EBP	-0.155	0.34	0.1	-0.07	0.57	9.5	-0.109	0.68	34.4	1.07	0.88
ASW HY - GZ EBP	0.009	0.87	-0.5	-0.009	0.43	9.2	-0.012	0.91	32.1	1.02	0.35

Notes: "coef" is the coefficient of the in-sample forecast regression of the listed variable against the dependent variable $\Delta^h Y_{t+h}$, where Y_{t+h} denotes the euro area stock market price in month *t* and *h* is the forecast horizon. In addition to the specified financial indicator in month *t*, each specification also includes a constant, the dividend yield, the US VIX, the term spread, the real EONIA rate, the growth rate in survey-based economic sentiment and one lag of ΔY_t. BBB-AA denotes the long-term industrial corporate bond spread. YTM and ASW (All, IG, HY) denote the micro-derived yield-to-maturity and asset swap spreads using all bonds, investment grade bonds and high yield bonds, respectively. REBP denotes the relative excess bond premium as in equation (7). Common shock EBP denotes the excess bond premium defined as the difference between corporate spreads and justified credit spreads as in equation (9). Extended GZ EBP denotes the excess bond premium estimated including systematic risk as in equation (13). GZ EBP denotes the excess bond premium à la Gilchrist and Zakrajšek (2012) as in equation (11). Entries in the table denote 1) the estimates of the OLS coefficients associated with each financial indicator (*** significant at 1%, ** significant at 5%, * significant at 10% based on Newey-West robust standard errors), 2) the p-value based on the Wald test in the reverse regression computed according to Hodrick (1992) and 3) the adjusted R^2. The last two columns, which provide the results of the pseudo out-of-sample forecast with the rolling regression analysis conducted over 40 months starting from December 2011, shows (i) the ratio between the root mean squared forecast error of the model with alternative measures of credit spreads and the root mean squared forecast error of the model including the standard BBB-AA corporate spreads; (ii) the statistics of the Diebold-Mariano test (*** significant at 1%, ** significant at 5%, * significant at 10%). All, IG and HY include all, investment grade and high yields bonds, respectively. Sample period: October 1999 – March 2015.

Table 6. Credit Spreads and Survey-Based Economic Sentiment

(in-sample and out-of-sample analysis)

	Forecast horizon: 1 month			Forecast horizon: 3 months			Forecast horizon: 1 year			RMSFE	DM
Growth rate in	Spreads	Reverse	R^2	Spreads	Reverse	R^2	Spreads	Reverse	R^2	ratio	test
Economic sentiment	coef	P value		coef	P value		coef	P value		1-year	1-year
Bench	-	-	36.9	-	-	41.4	-	-	39.1	-	-
BBB-AA	0.069	0.11	38.1	0.089	0.08	44.8	0.065***	0.09	43.8	-	-
YTM all	0.036	0.28	37.1	0.027	0.32	41.5	0.034	0.11	40.3	1.01	0.24
YTM IG	0.065	0.30	37.1	0.060	0.42	41.7	0.025	0.33	39.0	1.02	0.29
YTM HY	0.008	0.45	36.8	0.001	0.63	41.1	0.016***	0.00	42.1	0.99	-0.17
ASW all	0.065	0.16	37.7	0.064	0.15	42.6	0.068***	0.01	42.6	0.98	-1.45
ASW IG	0.121	0.17	37.8	0.144	0.16	43.7	0.106*	0.02	41.9	0.97	-1.19
ASW HY	0.014	0.29	37.0	0.007	0.44	41.2	0.024***	0.00	43.1	0.97	-0.24
YTM all - REBP	**-0.131****	**0.04**	**37.9**	**-0.271*****	**0.00**	**49.2**	**-0.300*****	**0.01**	**60.4**	**0.76*****	**-5.06**
YTM IG - REBP	**-0.124****	**0.04**	**37.9**	**-0.248*****	**0.00**	**48.9**	**-0.288*****	**0.00**	**61.5**	**0.75*****	**-5.02**
YTM HY - REBP	**-0.088**	**0.17**	**37.1**	**-0.245*****	**0.00**	**46.8**	**-0.19*****	**0.03**	**46.4**	**0.96*****	**-3.34**
ASW all - REBP	**-0.103**	**0.11**	**37.2**	**-0.212*****	**0.01**	**45.1**	**-0.239****	**0.57**	**49.4**	**0.88*****	**-3.01**
ASW IG - REBP	**-0.094**	**0.12**	**37.2**	**-0.185*****	**0.01**	**44.6**	**-0.221*****	**0.45**	**49.2**	**0.88**	**-1.29**
ASW HY - REBP	**-0.070**	**0.29**	**36.9**	**-0.216*****	**0.00**	**45.4**	**-0.183*****	**0.09**	**45.5**	**0.98****	**-2.33**
YTM all - common shock EBP	-0.120***	0.01	38.7	-0.198***	0.00	49.5	-0.200***	0.04	57.4	0.75***	-4.16
YTM IG - common shock EBP	-0.160***	0.01	38.9	-0.245***	0.00	49.0	-0.264***	0.02	58.7	0.73***	-4.09
YTM HY- common shock EBP	-0.038***	0.02	37.7	-0.069***	0.01	46.6	-0.038**	0.10	42.6	0.98	-1.09
ASW all - common shock EBP	-0.080*	0.05	37.7	-0.125***	0.02	45.1	-0.129***	0.23	47.7	0.89***	-3.39
ASW IG - common shock EBP	-0.101	0.13	37.5	-0.146*	0.12	44.1	-0.174***	0.07	47.6	0.88***	-2.54
ASW HY - common shock EBP	-0.027*	0.05	37.4	-0.050***	0.01	45.4	-0.032*	0.16	42.7	0.98***	-0.91
YTM all - extended GZ EBP	-0.144***	0.01	39.4	-0.211***	0.00	50.0	-0.208***	0.03	57.9	0.73***	-4.27
YTM IG - extended GZ EBP	-0.164***	0.01	39.2	-0.219***	0.00	48.0	-0.239***	0.00	56.8	0.75***	-4.40
YTM HY - extended GZ EBP	-0.04**	0.03	37.8	-0.074***	0.01	47.3	-0.054***	0.01	46.2	0.92***	-4.26
ASW all - extended GZ EBP	-0.096**	0.05	38.5	-0.136***	0.01	46.8	-0.156***	0.03	55.2	0.80***	-3.48
ASW IG - extended GZ EBP	-0.134**	0.03	38.6	-0.162***	0.04	45.4	-0.200***	0.00	52.7	0.80***	-4.80
ASW HY - extended GZ EBP	-0.029*	0.07	37.6	-0.052***	0.00	45.9	-0.045***	0.02	46.6	0.93***	-3.11
YTM all - GZ EBP	0.076*	0.06	37.7	0.039	0.69	41.5	-0.004	0.81	38.8	1.04	0.47
YTM IG - GZ EBP	0.069	0.15	37.3	0.033	0.71	41.3	-0.013	0.87	38.9	1.04	0.34
YTM HY - GZ EBP	0.040*	0.05	38.3	0.020	0.81	41.7	0.004	0.91	38.8	1.03	0.53
ASW all - GZ EBP	0.084**	0.02	38.8	0.062	0.38	42.9	0.014	0.46	39.0	1.03	0.38
ASW IG - GZ EBP	0.089**	0.04	38.4	0.071	0.28	42.7	0.032	0.27	39.5	1.01	0.12
ASW HY - GZ EBP	0.038**	0.04	38.8	0.023	0.28	42.3	0.002	0.27	38.8	1.04	0.85

Notes: "coef" is the coefficient of the in-sample forecast regression of the listed variable against the dependent variable $\Delta^h Y_{t+h}$, where Y_{t+h} denotes the euro area survey-based economic sentiment in month *t* and *h* is the forecast horizon. In addition to the specified financial indicator in month *t*, each specification also includes a constant, the dividend yield, the US VIX, the term spread, the real EONIA rate and one lag of ΔY_t. BBB-AA denotes the long-term industrial corporate bond spread. YTM and ASW (All, IG, HY) denote the micro-derived yield-to-maturity and asset swap spreads using all bonds, investment grade bonds and high yield bonds, respectively. REBP denotes the relative excess bond premium as in equation (7). Common shock EBP denotes the excess bond premium defined as the difference between corporate spreads and justified credit spreads as in equation (9). Extended GZ EBP denotes the excess bond premium estimated including systematic risk as in equation (13). GZ EBP denotes the excess bond premium à la Gilchrist and Zakrajšek (2012) as in equation (11). Entries in the table denote 1) the estimates of the OLS coefficients associated with each financial indicator (*** significant at 1%, ** significant at 5%, * significant at 10% based on Newey-West robust standard errors), 2) the p-value based on the Wald test in the reverse regression computed according to Hodrick (1992) and 3) the adjusted R^2. The last two columns, which provide the results of the pseudo out-of-sample forecast with the rolling regression analysis conducted over 40 months starting from December 2011, shows (i) the ratio between the root mean squared forecast error of the model with alternative measures of credit spreads and the root mean squared forecast error of the model including the standard BBB-AA corporate spreads; (ii) the statistics of the Diebold-Mariano test (*** significant at 1%, ** significant at 5%, * significant at 10%). All, IG and HY include all, investment grade and high yields bonds, respectively. Sample period: October 1999 – March 2015.

Table 7. Credit Spreads and Unemployment Rate

(in-sample and out-of-sample analysis)

	Forecast horizon: 1 month			Forecast horizon: 3 months			Forecast horizon: 1 year			RMSFE	DM
Growth rate in	Spreads	Reverse	R^2	Spreads	Reverse	R^2	Spreads	Reverse	R^2	ratio	test
Unemployment rate	coef	P value		coef	P value		coef	P value		1-year	1-year
Bench	-	-	66.9	-	-	73.6	-	-	49.6	-	-
BBB-AA	0.004	0.71	66.3	-0.013	0.16	73.3	-0.024	0.08	49.6	-	-
YTM all	0.026***	0.00	67.7	0.022**	0.36	74.3	0.014	0.25	49.7	0.99	-0.08
YTM IG	0.040**	0.02	67.5	0.03*	0.66	74.0	0.039	0.66	50.6	0.98	-0.26
YTM HY	0.012***	0.00	68.8	0.012***	0.06	75.9	0.007**	0.25	50.4	0.97	-0.68
ASW all	0.035***	0.00	67.9	0.025	0.52	74.1	0.004	0.11	49.3	0.98	-0.31
ASW IG	0.066***	0.00	68.1	0.044	0.61	74.2	0.024*	0.46	49.6	0.96	-0.44
ASW HY	0.015***	0.00	68.5	0.014**	0.12	75.3	0.006	0.09	49.8	0.97	-0.64
YTM all - REBP	**0.026**	**0.32**	**66.9**	**0.045**	**0.30**	**74.2**	**0.182*****	**0.00**	**67.4**	**0.68*****	**-6.20**
YTM IG - REBP	**0.018**	**0.47**	**66.8**	**0.035**	**0.41**	**74.0**	**0.167*****	**0.00**	**66.6**	**0.68*****	**-4.96**
YTM HY - REBP	**0.057****	**0.02**	**67.6**	**0.075****	**0.09**	**75.3**	**0.176*****	**0.00**	**63.5**	**0.85*****	**-4.09**
ASW all - REBP	**0.042**	**0.15**	**67.1**	**0.046**	**0.49**	**74.1**	**0.165*****	**0.00**	**60.5**	**0.74*****	**-4.23**
ASW IG - REBP	**0.033**	**0.23**	**67.0**	**0.034**	**0.66**	**73.8**	**0.141*****	**0.00**	**58.7**	**0.77*****	**-2.95**
ASW HY - REBP	**0.049***	**0.06**	**67.3**	**0.067***	**0.14**	**74.9**	**0.17******	**0.00**	**62.1**	**0.88*****	**-2.99**
YTM all - common shock EBP	0.013	0.43	66.8	0.022	0.58	73.8	0.098***	0.00	59.4	0.77***	-4.84
YTM IG - common shock EBP	0.007	0.75	66.7	0.016	0.89	73.5	0.114***	0.03	57.5	0.8***	-4.22
YTM HY- common shock EBP	0.016**	0.01	67.6	0.019**	0.06	74.9	0.036***	0.02	56.6	0.87***	-10.87
ASW all - common shock EBP	0.018	0.24	66.9	0.018	0.75	73.7	0.07***	0.00	55.2	0.83***	-3.04
ASW IG - common shock EBP	0.010	0.63	66.7	0.005	0.80	73.4	0.071***	0.00	52.6	0.88*	-1.97
ASW HY - common shock EBP	0.011**	0.03	67.3	0.013*	0.12	74.5	0.028**	0.02	56.0	0.89***	-9.57
YTM all - extended GZ EBP	0.006	0.73	66.7	0.013	0.77	73.5	0.083***	0.00	56.0	0.82***	-7.91
YTM IG - extended GZ EBP	-0.001	0.96	66.7	0.004	0.87	73.4	0.084***	0.02	54.2	0.84***	-4.29
YTM HY - extended GZ EBP	0.010*	0.11	67.0	0.014*	0.11	74.2	0.034**	0.06	55.7	0.88***	-8.11
ASW all - extended GZ EBP	-0.002	0.89	66.7	-0.001	0.93	73.4	0.05**	0.00	53.0	0.89***	-5.88
ASW IG - extended GZ EBP	0.003	0.90	66.7	-0.004	0.68	73.4	0.055*	0.01	51.6	0.9***	-3.31
ASW HY - extended GZ EBP	0.004	0.42	66.7	0.007	0.31	73.7	0.024	0.11	54.4	0.91***	-7.59
YTM all - GZ EBP	0.031**	0.02	67.4	0.019	0.37	73.8	0.035	0.69	50.8	0.97	-0.25
YTM IG - GZ EBP	0.025*	0.08	67.1	0.013*	0.97	73.5	0.023	0.72	49.8	0.98	-0.27
YTM HY - GZ EBP	0.010*	0.06	67.1	0.008	0.15	73.8	0.017*	0.04	51.3	1.00	0.04
ASW all - GZ EBP	0.025**	0.02	67.4	0.014	0.29	73.7	0.021	0.57	50.2	0.97	-0.31
ASW IG - GZ EBP	0.031**	0.02	67.5	0.013	0.94	73.6	0.003	0.43	49.3	0.98	-0.28
ASW HY - GZ EBP	0.004	0.37	66.8	0.003	0.51	73.5	0.012	0.09	50.7	1.01	0.21

Notes: "coef" is the coefficient of the in-sample forecast regression of the listed variable against the dependent variable $\Delta^h Y_{t+h}$, where Y_{t+h} denotes the euro area unemployment rate in month *t* and *h* is the forecast horizon. In addition to the specified financial indicator in month *t*, each specification also includes a constant, the dividend yield, the US VIX, the term spread, the real EONIA rate, the growth rate in survey-based economic sentiment and one lag of ΔY_t. BBB-AA denotes the long-term industrial corporate bond spread. YTM and ASW (All, IG, HY) denote the micro-derived yield-to-maturity and asset swap spreads using all bonds, investment grade bonds and high yield bonds, respectively. REBP denotes the relative excess bond premium as in equation (7). Common shock EBP denotes the excess bond premium defined as the difference between corporate spreads and justified credit spreads as in equation (9). Extended GZ EBP denotes the excess bond premium estimated including systematic risk as in equation (13). GZ EBP denotes the excess bond premium à la Gilchrist and Zakrajšek (2012) as in equation (11). Entries in the table denote 1) the estimates of the OLS coefficients associated with each financial indicator (*** significant at 1%, ** significant at 5%, * significant at 10% based on Newey-West robust standard errors), 2) the p-value based on the Wald test in the reverse regression computed according to Hodrick (1992) and 3) the adjusted R^2. The last two columns, which provide the results of the pseudo out-of-sample forecast with the rolling regression analysis conducted over 40 months starting from December 2011, shows (i) the ratio between the root mean squared forecast error of the model with alternative measures of credit spreads and the root mean squared forecast error of the model including the standard BBB-AA corporate spreads; (ii) the statistics of the Diebold-Mariano test (*** significant at 1%, ** significant at 5%, * significant at 10%). All, IG and HY include all, investment grade and high yields bonds, respectively. Sample period: October 1999 – March 2015.

Table 8. Credit Spreads and Industrial Production

(in-sample and out-of-sample analysis)

Growth rate in Industrial Production	Forecast horizon: 1 month Spreads coef	Reverse P value	R^2	Forecast horizon: 3 months Spreads coef	Reverse P value	R^2	Forecast horizon: 1 year Spreads coef	Reverse P value	R^2	RMSFE ratio 1-year	DM test 1-year
Bench	-	-	33.9	-	-	52.7	-	-	41.6	-	-
BBB-AA	0.004	0.82	34.9	0.030	0.22	56.1	0.024**	0.02	44.1	-	-
YTM all	-0.017	0.27	33.9	-0.004	0.79	52.4	0.001	0.37	41.3	1.02	0.21
YTM IG	-0.006	0.83	33.5	0.009	0.74	52.5	-0.007	0.28	41.4	1.04	0.38
YTM HY	-0.006	0.15	34.0	-0.003	0.51	52.8	0.000	0.32	41.3	1.00	0.03
ASW all	-0.022	0.27	33.9	0.002	0.99	52.4	0.011	0.09	41.8	0.97	-0.43
ASW IG	-0.016	0.66	33.6	0.026	0.64	52.8	0.016	0.04	41.7	0.98	-0.35
ASW HY	-0.006	0.27	33.8	-0.003	0.77	52.5	0.002	0.14	41.4	0.99	-0.15
YTM all - REBP	**0.019**	**0.56**	**33.6**	**-0.035**	**0.92**	**53.1**	**-0.126*****	**0.10**	**61.7**	**0.64*****	**-6.22**
YTM IG - REBP	**0.019**	**0.55**	**33.6**	**-0.03**	**1.00**	**53.0**	**-0.115****	**0.12**	**60.5**	**0.67*****	**-5.00**
YTM HY - REBP	**0.024**	**0.48**	**33.7**	**-0.037***	**0.78**	**53.1**	**-0.114****	**0.01**	**55.9**	**0.78*****	**-9.70**
ASW all - REBP	**0.011**	**0.74**	**33.6**	**-0.012**	**0.58**	**52.5**	**-0.09*****	**0.40**	**49.3**	**0.8*****	**-3.08**
ASW IG - REBP	**0.005**	**0.88**	**33.5**	**-0.009**	**0.58**	**52.4**	**-0.074****	**0.70**	**47.4**	**0.84**	**-0.90**
ASW HY - REBP	**0.044**	**0.23**	**33.9**	**-0.023**	**0.88**	**52.6**	**-0.11**	**0.02**	**54.2**	**0.85*****	**-8.57**
YTM all - common shock EBP	-0.001	0.98	33.5	-0.023	0.97	53.0	-0.065***	0.24	51.8	0.72***	-4.61
YTM IG - common shock EBP	-0.01	0.78	33.6	-0.030	0.93	53.0	-0.081***	0.25	51.2	0.74***	-4.20
YTM HY- common shock EBP	0.002	0.83	33.5	-0.009	0.81	52.9	-0.019*	0.17	46.4	0.82***	-9.94
ASW all - common shock EBP	-0.010	0.63	33.6	-0.006	0.58	52.4	-0.035***	0.92	44.8	0.85	-1.10
ASW IG - common shock EBP	-0.024	0.45	33.7	-0.004	0.54	52.4	-0.039***	0.96	43.7	0.88	-0.93
ASW HY - common shock EBP	0.008	0.36	33.8	-0.004	0.78	52.5	-0.015	0.26	46.0	0.85***	-7.48
YTM all - extended GZ EBP	0.002	0.95	33.5	-0.024	0.99	53.0	-0.063***	0.15	50.7	0.75***	-5.64
YTM IG - extended GZ EBP	-0.012	0.71	33.6	-0.026	0.98	52.9	-0.066***	0.46	48.7	0.75***	-4.52
YTM HY - extended GZ EBP	0.008	0.40	33.7	-0.009	0.83	52.9	-0.022*	0.02	47.8	0.79***	-13.38
ASW all - extended GZ EBP	0.010	0.63	33.6	-0.004	0.51	52.4	-0.04***	0.14	47.1	0.81***	-5.26
ASW IG - extended GZ EBP	-0.017	0.57	33.6	-0.005	0.43	52.4	-0.04***	0.70	44.3	0.86***	-3.11
ASW HY - extended GZ EBP	0.012	0.11	34.1	-0.003	0.77	52.5	-0.017	0.02	47.4	0.83***	-15.52
YTM all - GZ EBP	0.007	0.73	33.6	0.012	0.69	52.6	-0.012**	0.74	41.8	1.06	0.58
YTM IG - GZ EBP	-0.007	0.78	33.6	0.007	0.84	52.5	-0.010**	0.75	41.6	1.03	0.30
YTM HY - GZ EBP	0.010	0.22	33.9	0.006	0.69	52.7	-0.006	0.04	42.0	1.08	0.98
ASW all - GZ EBP	0.011	0.48	33.7	0.018	0.51	53.2	-0.005*	0.81	41.4	1.06	0.63
ASW IG - GZ EBP	-0.012	0.58	33.6	0.014	0.70	52.7	0.005	0.40	41.4	1.00	-0.01
ASW HY - GZ EBP	0.013*	0.06	34.5	0.008	0.44	53.2	-0.005	0.02	42.0	1.09	1.20

Notes: "coef" is the coefficient of the in-sample forecast regression of the listed variable against the dependent variable $\Delta^h Y_{t+h}$, where Y_{t+h} denotes the euro area unemployment rate in month *t* and *h* is the forecast horizon. In addition to the specified financial indicator in month *t*, each specification also includes a constant, the dividend yield, the US VIX, the term spread, the real EONIA rate, the growth rate in survey-based economic sentiment and one lag of ΔY_t. BBB-AA denotes the long-term industrial corporate bond spread. YTM and ASW (All, IG, HY) denote the micro-derived yield-to-maturity and asset swap spreads using all bonds, investment grade bonds and high yield bonds, respectively. REBP denotes the relative excess bond premium as in equation (7). Common shock EBP denotes the excess bond premium defined as the difference between corporate spreads and justified credit spreads as in equation (9). Extended GZ EBP denotes the excess bond premium estimated including systematic risk as in equation (13). GZ EBP denotes the excess bond premium à la Gilchrist and Zakrajšek (2012) as in equation (11). Entries in the table denote 1) the estimates of the OLS coefficients associated with each financial indicator (*** significant at 1%, ** significant at 5%, * significant at 10% based on Newey-West robust standard errors), 2) the p-value based on the Wald test in the reverse regression computed according to Hodrick (1992) and 3) the adjusted R^2. The last two columns, which provide the results of the pseudo out-of-sample forecast with the rolling regression analysis conducted over 40 months starting from December 2011, shows (i) the ratio between the root mean squared forecast error of the model with alternative measures of credit spreads and the root mean squared forecast error of the model including the standard BBB-AA corporate spreads; (ii) the statistics of the Diebold-Mariano test (*** significant at 1%, ** significant at 5%, * significant at 10%). All, IG and HY include all, investment grade and high yields bonds, respectively. Sample period: October 1999 – March 2015.

Table 9. Credit Spreads and Consumer Prices

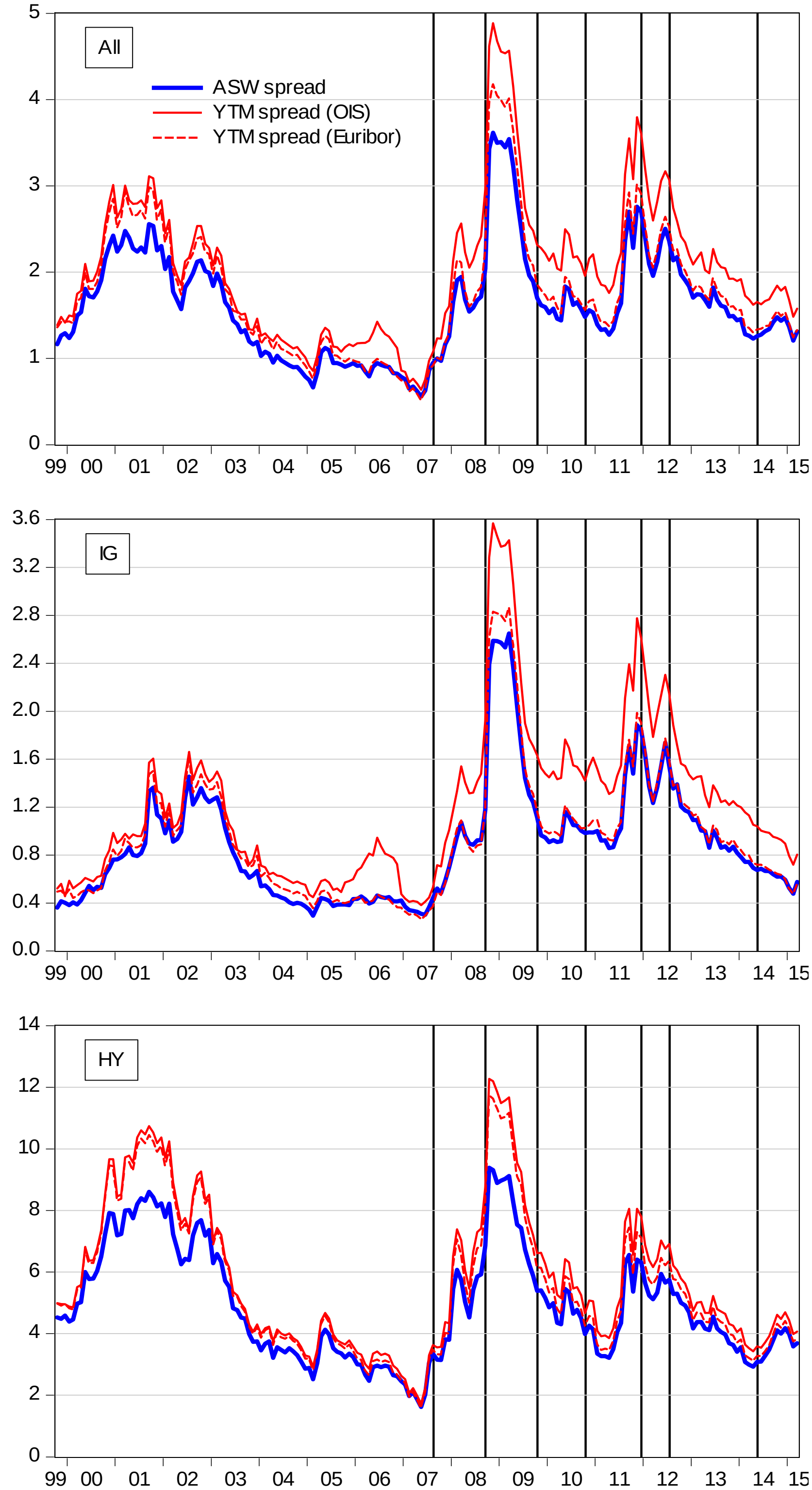
(in-sample and out-of-sample analysis)

Growth rate in HICP	Forecast horizon: 1 month Spreads coef	Reverse P value	R^2	Forecast horizon: 3 months Spreads coef	Reverse P value	R^2	Forecast horizon: 1 year Spreads coef	Reverse P value	R^2	RMSFE ratio 1-year	DM test 1-year
Bench	-	-	9.6	-	-	7.8	-	-	23.9	-	-
BBB-AA	-0.001	0.85	8.9	-0.001	0.93	7.8	-0.003	0.68	23.9	-	-
YTM all	0.000	0.92	9.1	-0.001	0.76	8.2	-0.004	0.97	27.9	0.97	-0.02
YTM IG	0.003	0.59	9.2	0.001	0.69	8.0	-0.007	0.66	27.2	0.98	-0.81
YTM HY	0.000	0.96	9.1	-0.001	0.37	8.5	-0.001	0.92	28.3	1.01	0.50
ASW all	0.001	0.80	9.1	-0.001	0.93	8.0	-0.005	0.96	27.0	0.98	-0.39
ASW IG	0.006	0.40	9.4	0.003	0.57	8.2	-0.007	0.90	25.9	0.97	-0.74
ASW HY	0.000	0.94	9.1	-0.001	0.49	8.3	-0.002	0.97	27.6	1.02	0.81
YTM all - REBP	**0.017****	**0.04**	**11.5**	**0.010**	**0.42**	**9.7**	**-0.005**	**0.83**	**23.7**	**1.07**	**7.86**
YTM IG - REBP	**0.016****	**0.04**	**11.6**	**0.010**	**0.36**	**10.0**	**-0.003**	**0.88**	**23.4**	**1.06**	**12.05**
YTM HY - REBP	**0.012**	**0.16**	**10.2**	**0.004**	**0.81**	**8.2**	**-0.008**	**0.58**	**25.2**	**1.07**	**1.42**
ASW all - REBP	**0.022****	**0.01**	**12.6**	**0.015***	**0.15**	**11.2**	**0.000**	**0.95**	**22.6**	**1.04**	**2.14**
ASW IG - REBP	**0.021****	**0.01**	**12.7**	**0.015***	**0.13**	**11.6**	**0.001**	**0.95**	**22.7**	**1.04**	**2.30**
ASW HY - REBP	**0.012**	**0.16**	**10.2**	**0.006**	**0.71**	**8.4**	**-0.006**	**0.82**	**24.1**	**1.06**	**1.17**
YTM all - common shock EBP	0.009*	0.08	10.6	0.007	0.36	9.6	0.001	0.97	22.7	1.05	2.72
YTM IG - common shock EBP	0.012*	0.09	10.6	0.010	0.33	9.9	0.002	0.98	22.9	1.03	1.28
YTM HY- common shock EBP	0.002	0.43	9.3	0.001	0.99	8.0	-0.001	0.97	23.0	1.06	1.59
ASW all - common shock EBP	0.011**	0.02	11.8	0.009*	0.18	11.1	0.003	0.89	23.6	1.02	1.24
ASW IG - common shock EBP	0.015**	0.04	11.8	0.013	0.16	11.7	0.006	0.89	24.6	1.01	0.27
ASW HY - common shock EBP	0.002	0.35	9.4	0.001	0.79	8.2	0.000	0.79	22.7	1.05	1.43
YTM all - extended GZ EBP	0.009*	0.08	10.5	0.007	0.34	9.6	0.003	0.99	23.3	1.03	1.98
YTM IG - extended GZ EBP	0.012*	0.06	10.7	0.010	0.25	10.2	0.003	0.99	23.1	1.03	0.83
YTM HY - extended GZ EBP	0.002	0.38	9.4	0.001	0.82	8.1	0.000	0.77	22.6	1.06	2.86
ASW all - extended GZ EBP	0.008*	0.05	10.9	0.008	0.13	10.9	0.005	0.98	26.0	0.99	-0.36
ASW IG - extended GZ EBP	0.017***	0.00	12.8	0.015**	0.03	13.7	0.007	0.31	26.3	0.99	-0.23
ASW HY - extended GZ EBP	0.002	0.34	9.4	0.001	0.58	8.3	0.001	0.67	23.0	1.04	2.49
YTM all - GZ EBP	0.003	0.55	9.3	0.001	0.58	8.0	-0.004	0.96	25.2	0.97***	-2.84
YTM IG - GZ EBP	0.006	0.24	9.7	0.003	0.37	8.2	-0.004	0.92	24.7	1.00	-0.68
YTM HY - GZ EBP	0.000	0.81	9.1	-0.001	0.86	8.2	-0.002	0.83	24.9	0.96*	-1.76
ASW all - GZ EBP	0.002	0.58	9.2	0.001	0.52	8.1	-0.003	0.72	24.4	0.98	-1.11
ASW IG - GZ EBP	0.006	0.17	10.0	0.003	0.37	8.4	-0.003	0.47	24.5	1.00	-0.62
ASW HY - GZ EBP	0.000	0.79	9.1	-0.001	0.97	8.0	-0.001	0.60	23.9	0.99	-0.69

Notes: "coef" is the coefficient of the in-sample forecast regression of the listed variable against the dependent variable $\Delta^h Y_{t+h}$, where Y_{t+h} denotes the euro area HICP in month *t* and *h* is the forecast horizon. In addition to the specified financial indicator in month *t*, each specification also includes a constant, the dividend yield, the US VIX, the term spread, the real EONIA rate, the growth rate in survey-based economic sentiment and one lag of ΔY_t. BBB-AA denotes the long-term industrial corporate bond spread. YTM and ASW (All, IG, HY) denote the micro-derived yield-to-maturity and asset swap spreads using all bonds, investment grade bonds and high yield bonds, respectively. REBP denotes the relative excess bond premium as in equation (7). Common shock EBP denotes the excess bond premium defined as the difference between corporate spreads and justified credit spreads as in equation (9). Extended GZ EBP denotes the excess bond premium estimated including systematic risk as in equation (13). GZ EBP denotes the excess bond premium à la Gilchrist and Zakrajšek (2012) as in equation (11). Entries in the table denote 1) the estimates of the OLS coefficients associated with each financial indicator (*** significant at 1%, ** significant at 5%, * significant at 10% based on Newey-West robust standard errors), 2) the p-value based on the Wald test in the reverse regression computed according to Hodrick (1992) and 3) the adjusted R^2. The last two columns, which provide the results of the pseudo out-of-sample forecast with the rolling regression analysis conducted over 40 months starting from December 2011, shows (i) the ratio between the root mean squared forecast error of the model with alternative measures of credit spreads and the root mean squared forecast error of the model including the standard BBB-AA corporate spreads; (ii) the statistics of the Diebold-Mariano test (*** significant at 1%, ** significant at 5%, * significant at 10%). All, IG and HY include all, investment grade and high yields bonds, respectively. Sample period: October 1999 – March 2015.

Figure 1. Euro Area Non-Financial Corporations' Credit Spreads:
Yield versus ASW Spreads in the Investment Grade (IG) and High Yields (HY) Segments

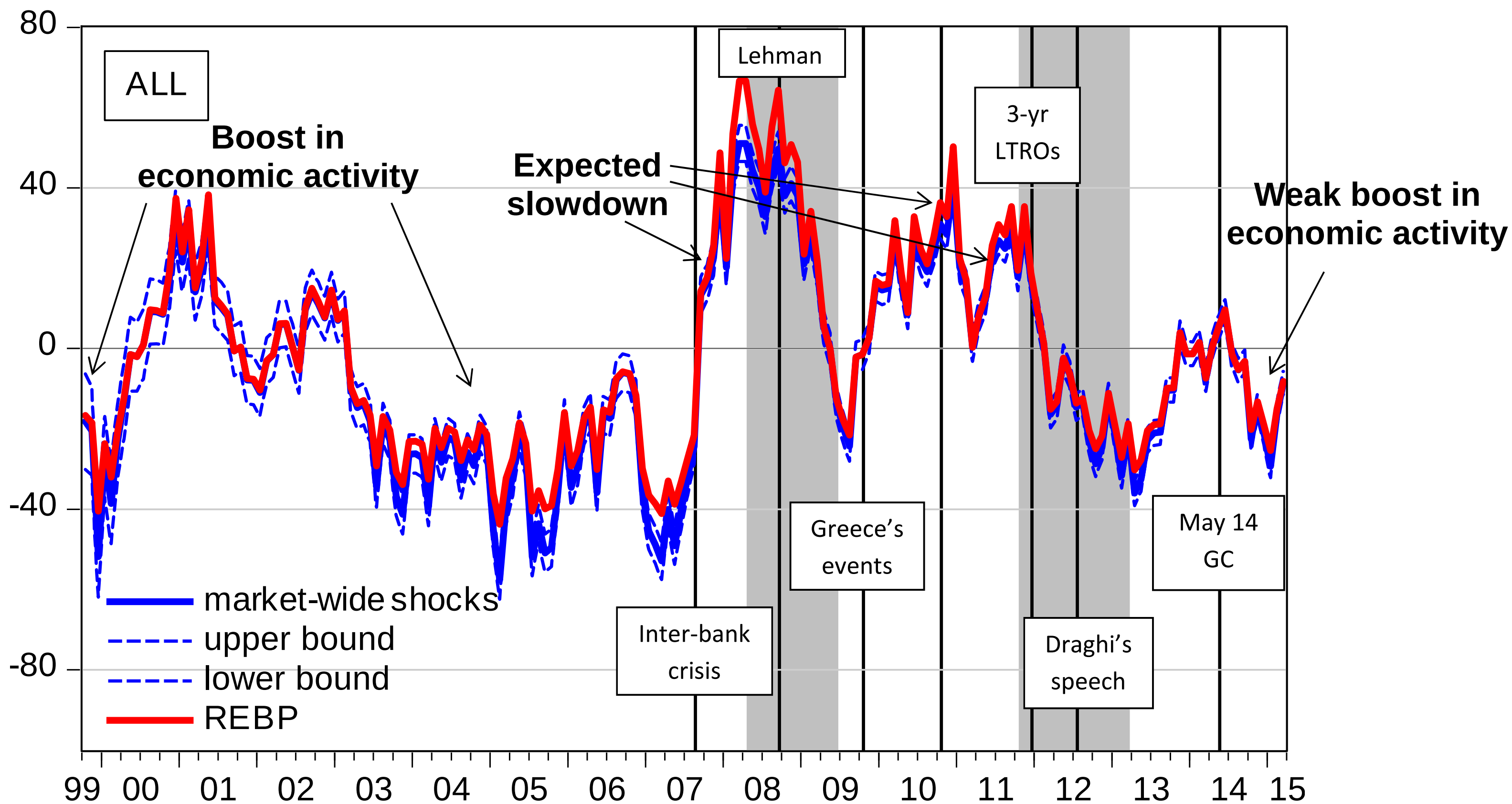
(mean, percentage points)



Notes: This figure shows the mean value of yield to maturity (YTM) spreads and ASW spreads of the bonds in the sample. Yield spreads are computed as the mean of the individual yield-to-maturity minus the OIS rate or the EURIBOR rate with the same duration. All, IG and HY include all, investment grade and high yields bonds, respectively. The vertical bars denote: 15 Aug. 07 - Money market crisis; 15 Sep. 08 - Lehman; 16 Oct. 09 - Greece; 18 Oct. 2010 - Deauville. 8 Dec. 11 - 3-yr LTROs; 26 Jul. 12 - Draghi's "whatever it takes" speech in London; 6 May 14 - May 2014 14 GC meeting. Sample period: October 1999 – March 2015.

Figure 2. Euro Area Relative Excess Bond Premium

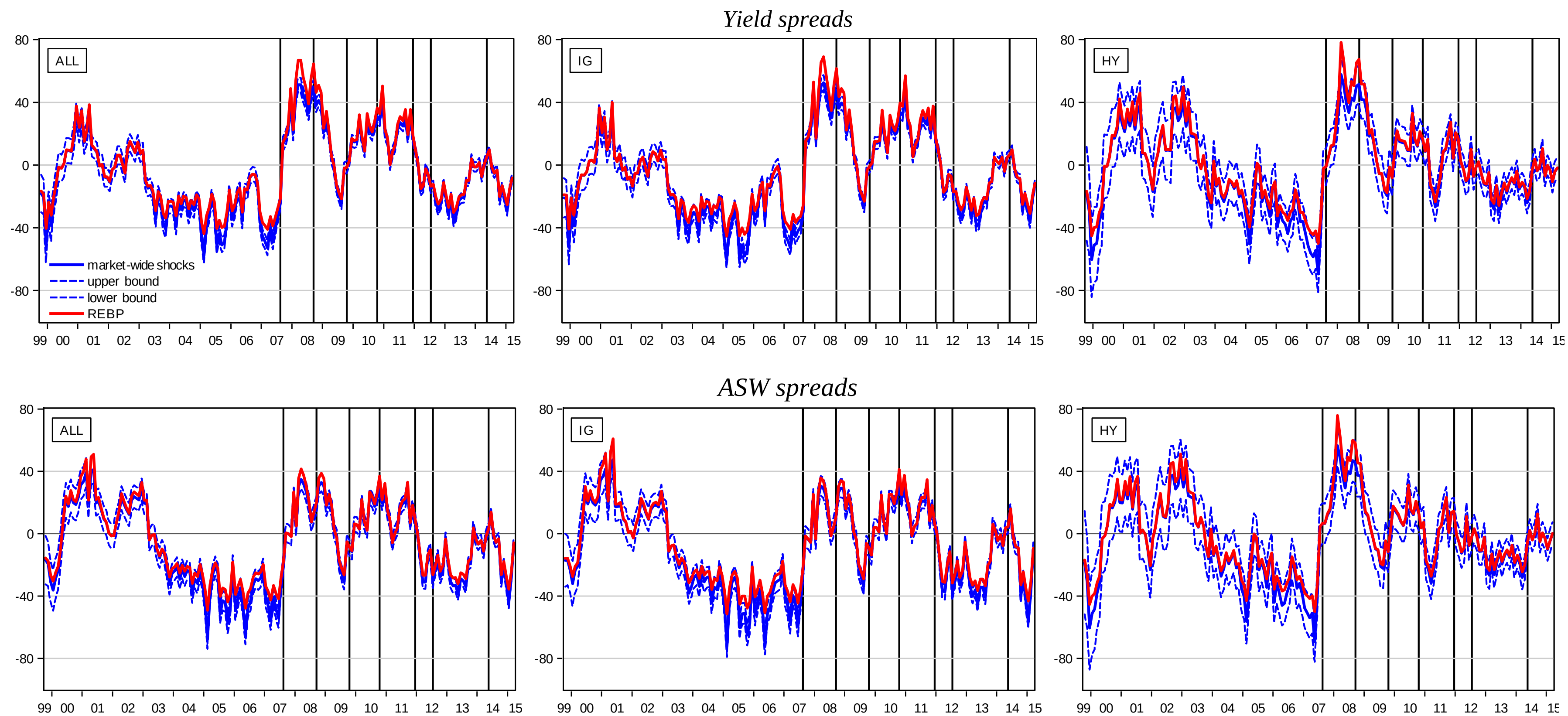
(percentage growth, based on yield spreads)



Notes: This figure shows the OLS estimates with robust standard errors of the euro area market-wide shocks and the excess bond premium as a percentage of justified credit spreads (REBP). The lower and upper bound provide the 95% confidence interval for the market-wide shocks. All denotes all bonds. The vertical bars denote: 15 Aug. 07 - Money market crisis; 15 Sep. 08 - Lehman; 16 Oct. 09 - Greece; 18 Oct. 2010 - Deauville. 8 Dec. 11 - 3-yr LTROs; 26 Jul. 12 - Draghi's "whatever it takes" speech in London; 6 May 14 - May 2014 14 GC meeting. Months of recession are indicated in grey, and months of expansion in white using the CEPR based recession indicator. It shows a recession from month following the peak through the month of the trough (i.e. the peak is not included in the recession shading, but the trough is). Sample period: October 1999 – March 2015.

Figure 3. Euro Area Relative Excess Bond Premia in Various Market Segments

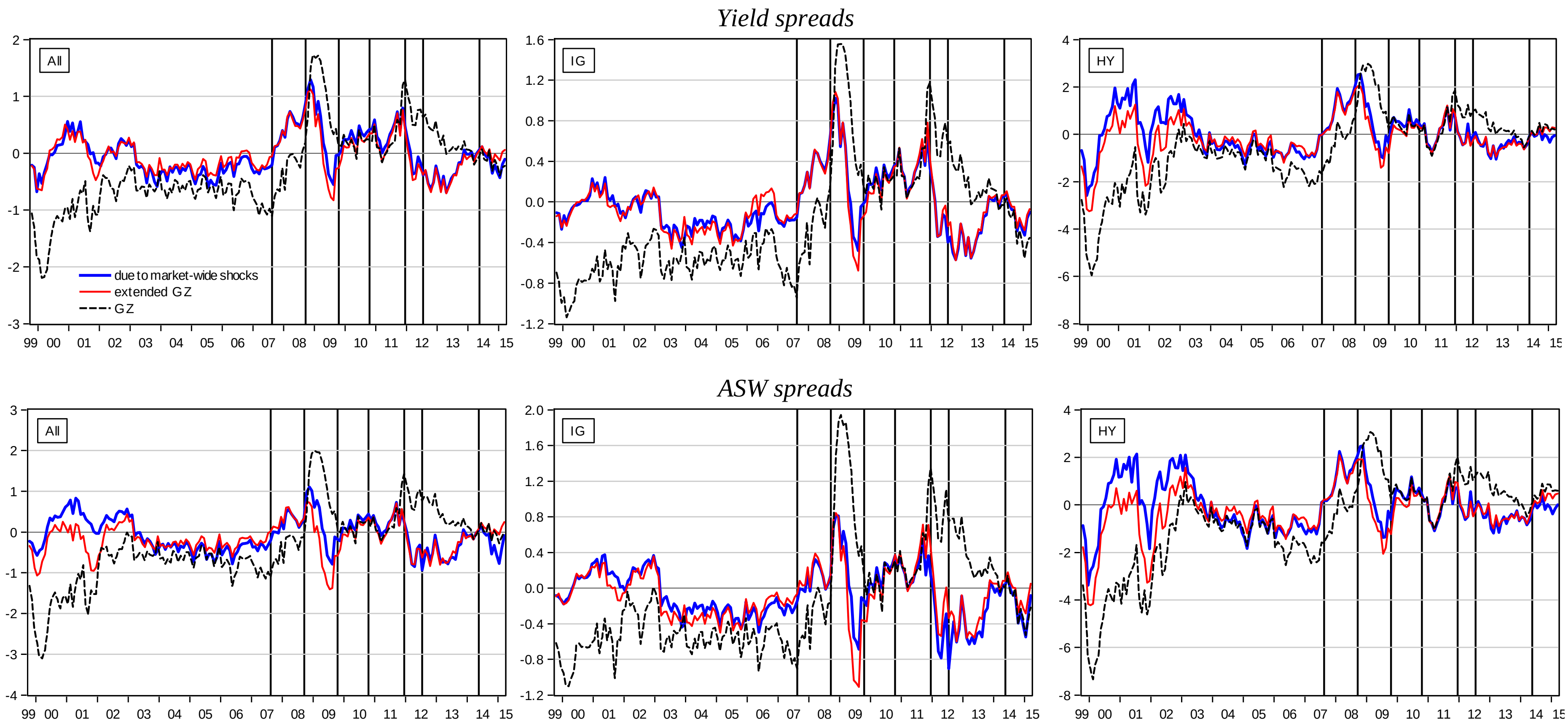
(percentage growth)



Notes**:** This figure shows the OLS estimates with robust standard errors of the euro area market-wide shocks and the excess bond premium as a percentage of justified credit spreads (REBP). The lower and upper bound provide the 95% confidence interval for the common factor. All, IG and HY include all, investment grade and high yields bonds, respectively. The vertical bars denote: 15 Aug. 07 - Money market crisis; 15 Sep. 08 - Lehman; 16 Oct. 09 - Greece; 18 Oct. 2010 - Deauville. 8 Dec. 11 - 3-yr LTROs; 26 Jul. 12 - Draghi's "whatever it takes" speech in London; 6 May 14 - May 2014 14 GC meeting. Sample period: October 1999 – March 2015.

Figure 4. Euro Area Excess Bond Premium

(percentage points)

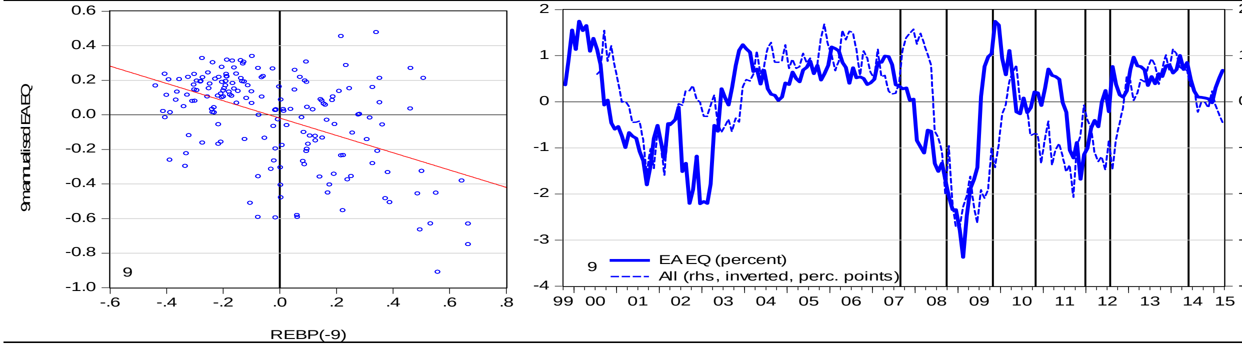


Notes: This figure shows the estimated excess bond premium using different methods. “GZ” applies the Gilchrist-Zakrajšek method, which controls for firm characteristics. “Extended GZ” applies the Gilchrist-Zakrajšek method, which controls for both firm characteristics and observable systematic risk. “market-wide shocks” applies the method suggested in Section 2, which controls for firm characteristics, observable systematic risk and idiosyncratic shocks. All, IG and HY include all, investment grade and high yields bonds, respectively. The vertical bars denote: 15 Aug. 07 - Money market crisis; 15 Sep. 08 - Lehman; 16 Oct. 09 - Greece; 18 Oct. 2010 - Deauville. 8 Dec. 11 - 3-yr LTROs; 26 Jul. 12 - Draghi’s “whatever it takes” speech in London; 6 May 14 - May 2014 14 GC meeting. Sample period: October 1999 – March 2015.

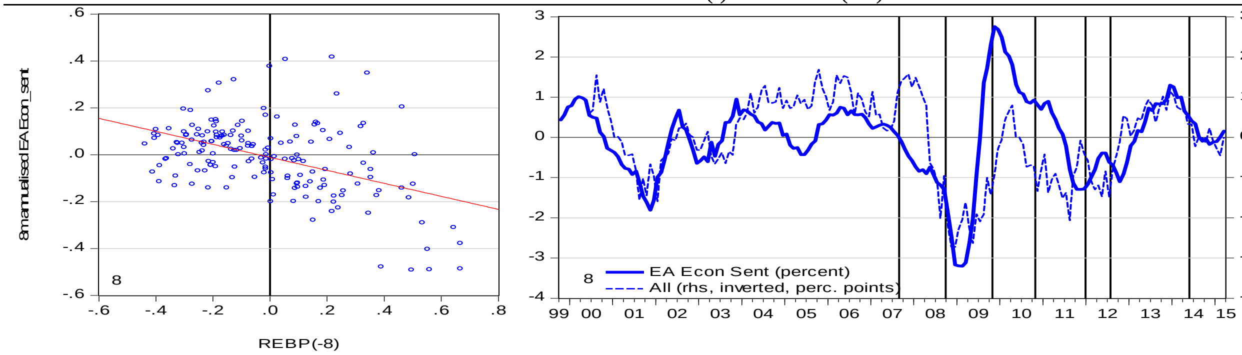
Figure 5. Relative Excess Bond Premium and Economic Activity: Bivariate Forecast Analysis

(percent and percentage points)

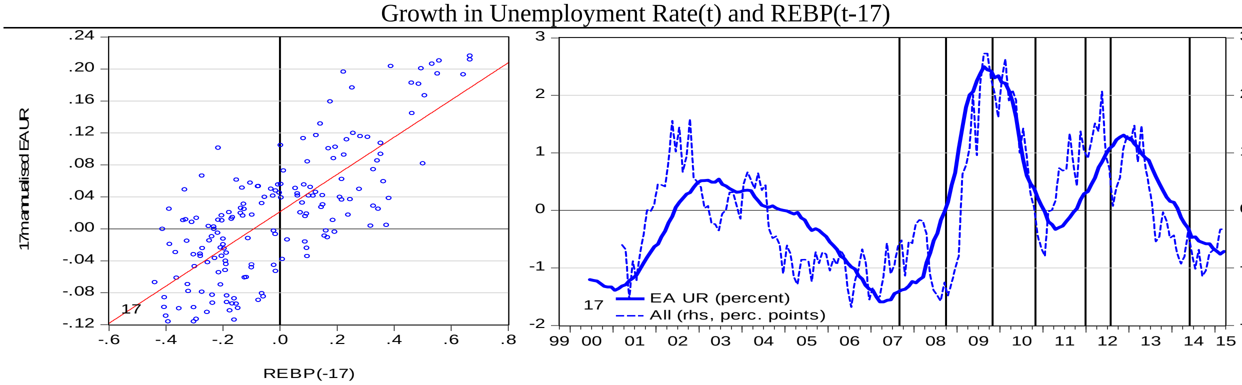
Stock Market Returns(t) and REBP(t-9)



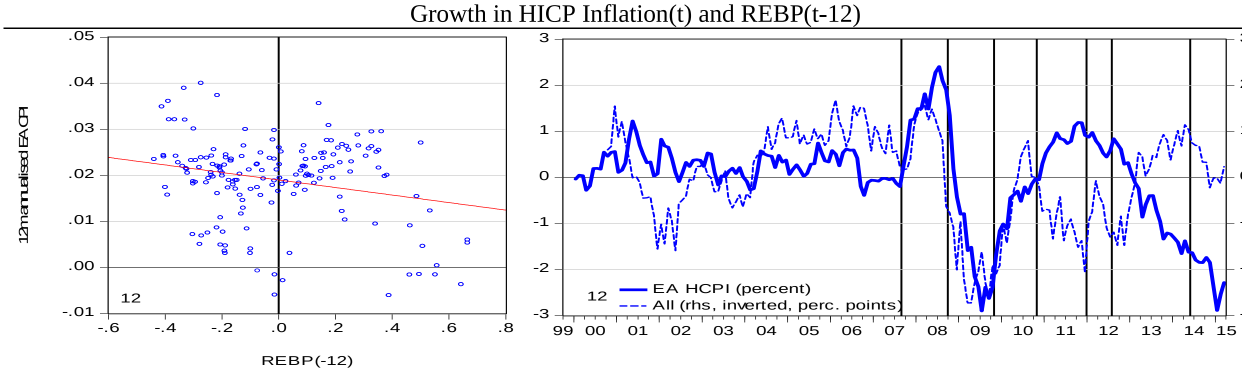
Growth in Economic Sentiment(t) and REBP(t-8)



Growth in Unemployment Rate(t) and REBP(t-17)



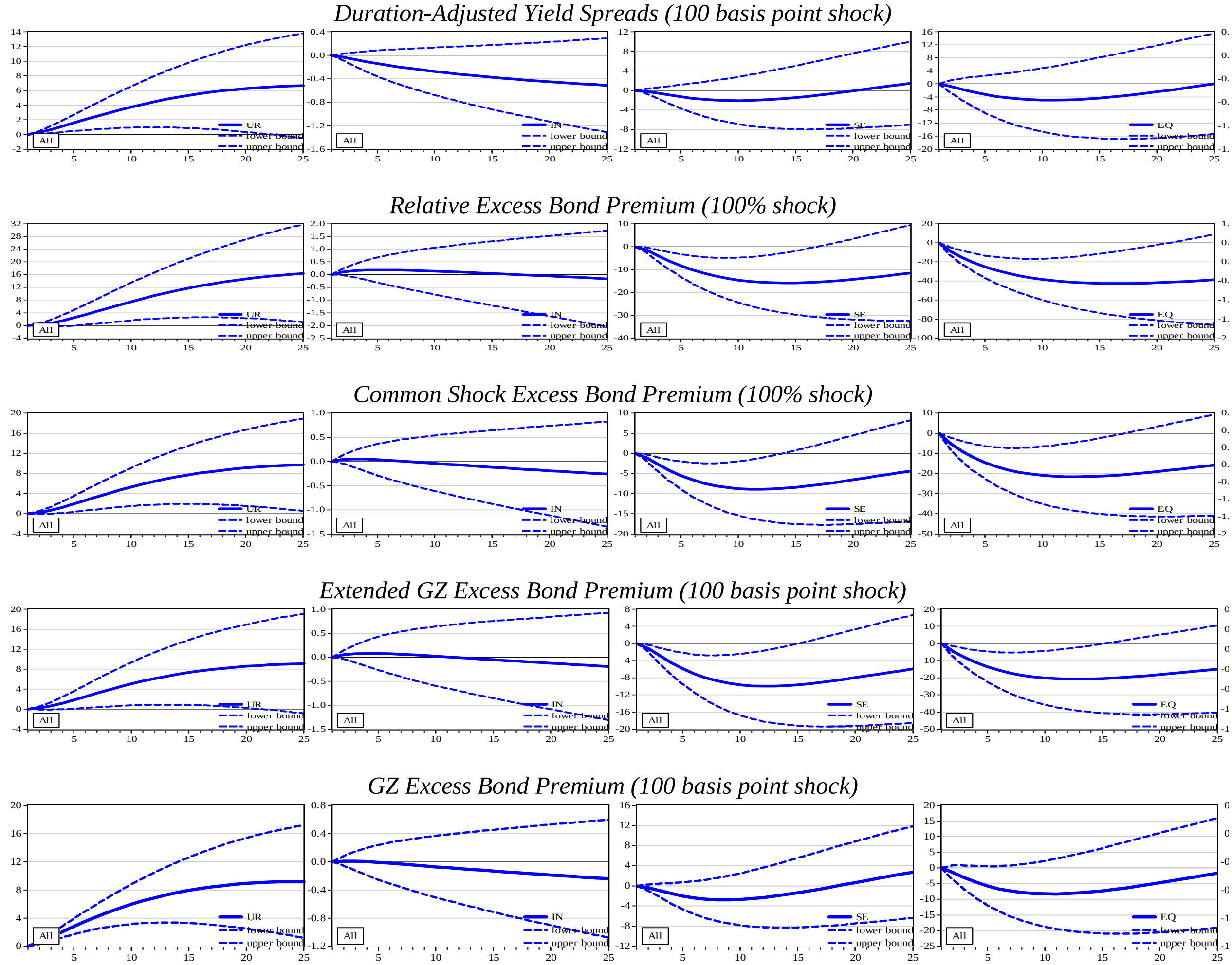
Growth in HICP Inflation(t) and REBP(t-12)



Notes: The figure depicts the leading relationship of the relative excess bond premium vis-à-vis economic activity. All variables are standardised. "EQ" for stock market returns. "Econ Sent" stands for growth in survey-based economic sentiment. "UR" stands for growth in unemployment rate. "HCPI" stands for HICP inflation. The number in the south-west corner shows the lagged month of the relative excess bond premium (REBP), computed using all bonds, which is selected based on the largest adj. R^2. Sample period: October 1999 – March 2015.

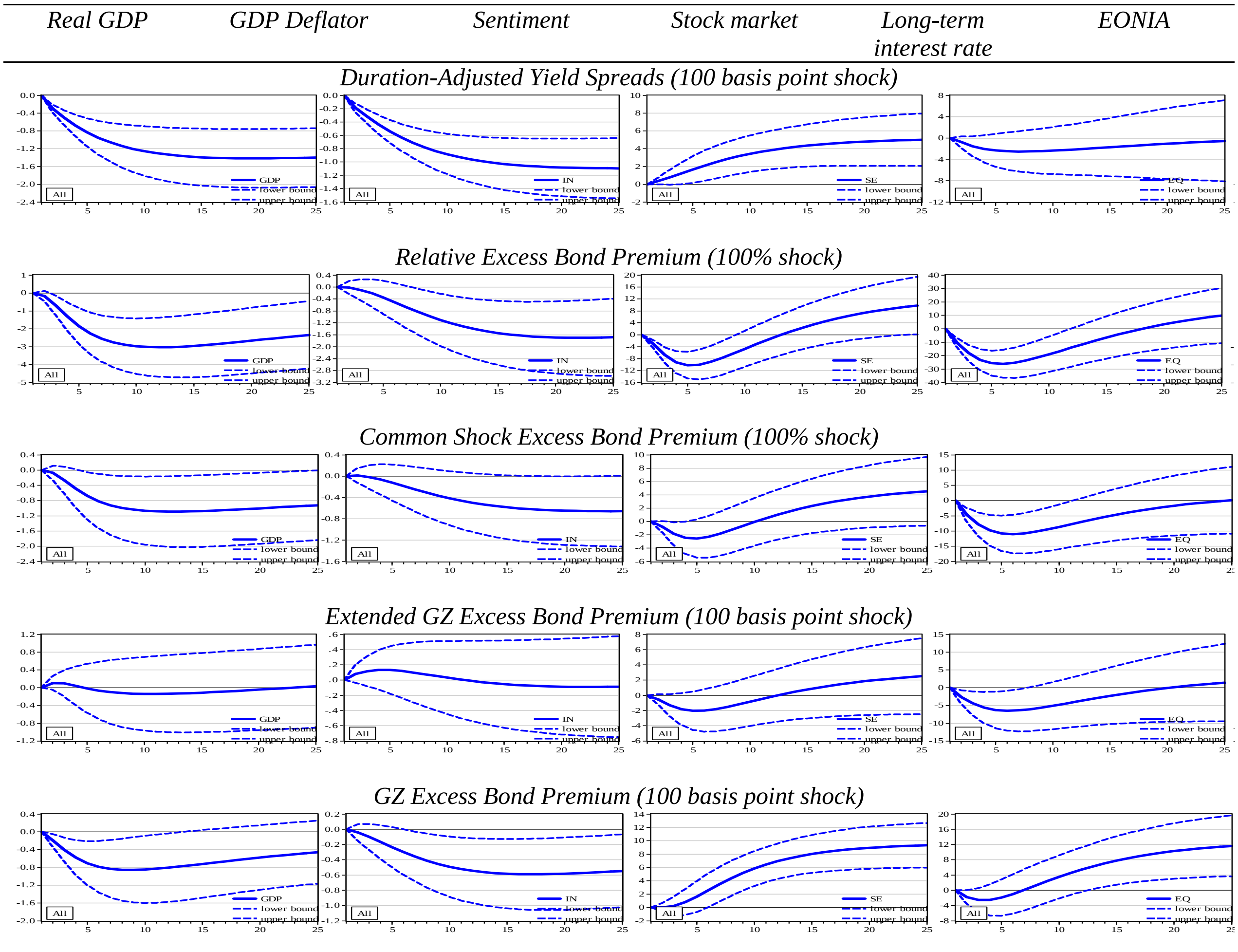
Figure 6. Impact on Euro Area Economic Activity and Asset Markets of Credit Spreads Shocks: Single-Country VAR *(percent)*

UR	*HICP*	*Sentiment*	*Stock market*	*Long-term interest rate*	*EONIA*



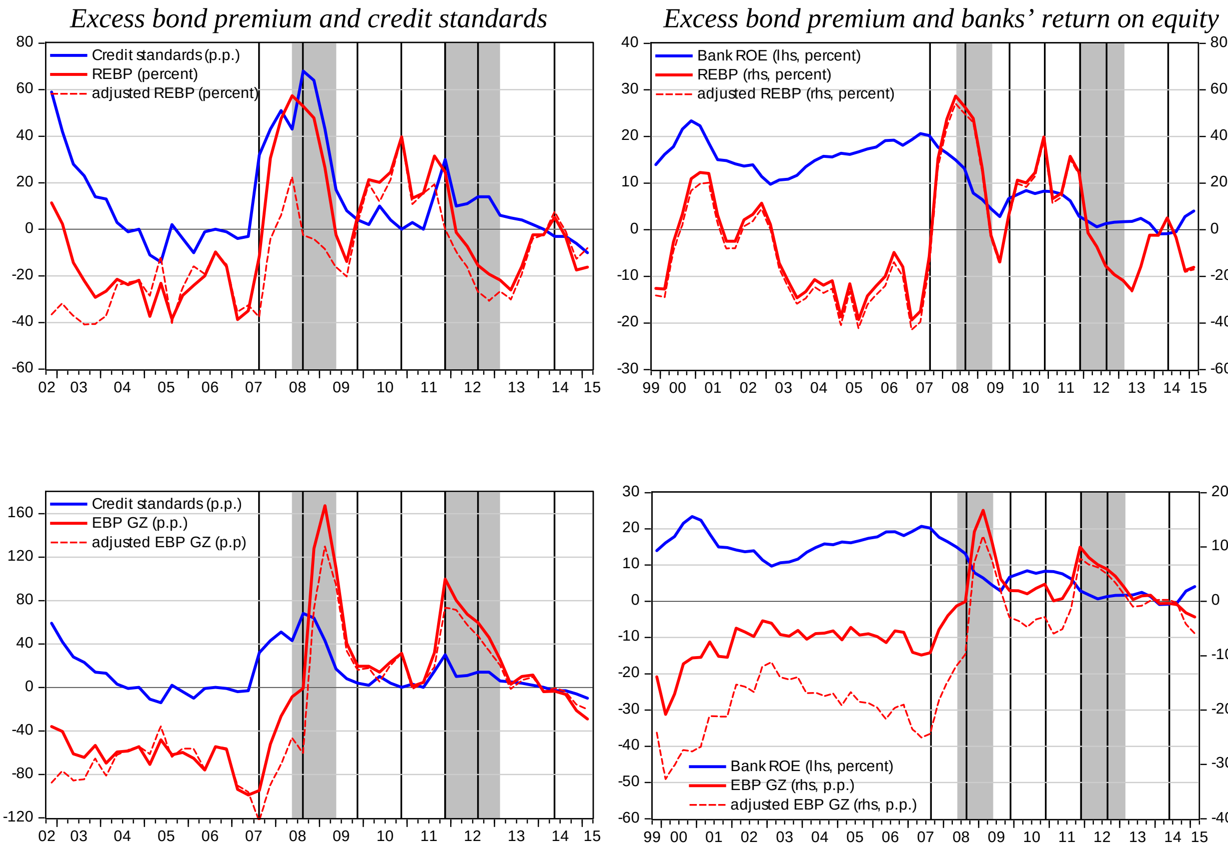
Notes: The figure depicts the impulse responses to orthogonalized and normalised shocks to the duration-adjusted yield spreads, the relative excess bond premium or the excess bond premium (see text for details). Dotted lines denote 95-percent confidence intervals. The excess bond premium is estimated using different methods. "Common Shock EBP" controls for firm characteristics, observable systematic risk and idiosyncratic shocks. "Extended GZ EBP" applies the Gilchrist-Zakrajšek method, which controls for both firm characteristics and observable systematic risk. "GZ EBP" applies the Gilchrist-Zakrajšek method, which controls for firm characteristics. All bonds are used to extract the credit spreads and risk premia. The VAR includes the following endogenous variables: (i) log-difference of euro area unemployment rate, (ii) log-difference of euro area HICP, (iii) log-difference of euro area survey-based economic sentiment, (iv) US VIX, (v) log-difference of euro area stock market price, (vi) the ten-year (nominal) AAA euro area yield, (vii) the EONIA rate, (viii) credit spreads or alternative measures of euro area excess bond premia. The bond risk premium is ordered last in the recursive ordering. Sample period: October 1999 – March 2015.

Figure 7. Impact on Euro Area Economic Activity and Asset Markets of Credit Spreads Shocks: Panel VAR *(percent)*



Notes: The figure depicts the impulse responses to orthogonalized and normalised shocks to the duration-adjusted yield spreads, the relative excess bond premium or the excess bond premium (see text for details). Dotted lines denote 95-percent confidence intervals. The excess bond premium is estimated using different methods. "Common Shock EBP" controls for firm characteristics, observable systematic risk and idiosyncratic shocks. "Extended GZ EBP" applies the Gilchrist-Zakrajšek method, which controls for both firm characteristics and observable systematic risk. "GZ EBP" applies the Gilchrist-Zakrajšek method, which controls for firm characteristics. All bonds are used to extract the credit spreads and risk premia. The VAR includes the following endogenous variables: (i) log-difference of countries' real GDP, (ii) log-difference of countries' GDP deflator, (iii) log-difference of euro area survey-based economic sentiment, (iv) US VIX, (v) log-difference of countries' stock market price, (vi) ten-year (nominal) AAA euro area yield, (vii) the EONIA rate, (viii) credit spreads or alternative measures of countries' excess bond premia. The bond risk premium is ordered last in the recursive ordering. Sample period: 1999 Q4 – 2015 Q1.

Figure 8. Relative Excess Bond premium and Credit Supply



Notes: This figure shows on the left panel the relative excess bond premium (top) and the excess bond premium à la Gilchrist and Zakrajšek (bottom) vis-à-vis the changes in credit standards applied to the approval of loans to euro area enterprises. The adjusted bond premia are obtained by subtracting the contribution of the changes in credit standards. The figure shows on the right panel the relative excess bond premium (top) and the excess bond premium à la Gilchrist and Zakrajšek (bottom) vis-à-vis the banks' return on equity (ROE). The adjusted bond premia are obtained by subtracting the contribution of the ROEs. The bond premia are computed including all bonds and the yield to maturity spreads. The net percentage for the questions on supply of loans refers to the difference between the sum of the percentages for "tightened considerably" and "tightened somewhat" and the sum of the percentages for "eased considerably" and "eased somewhat". The (trailing) ROE, which is based on the sample of all 33 euro area banks included in the Euro STOXX index, is the weighted average (by market capitalization) of individual ROEs in percent. The shaded area denote the recession periods dated by the CEPR committee. The vertical bars denote: 15 Aug. 07 - Money market crisis; 15 Sep. 08 - Lehman; 16 Oct. 09 - Greece; 18 Oct. 2010 - Deauville. 8 Dec. 11 - 3-yr LTROs; 26 Jul. 12 - Draghi's "whatever it takes" speech in London; 6 May 14 - May 2014 14 GC meeting. Sample period: October 1999 – March 2015.