News and Noise Shaping International Yield Curves*

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March 7, 2022

Abstract

We study the joint response of US and euro area yields to both US and euro area news using a new semi-latent factor methodology, where some news are observable and some are not. US news announcements have larger effects than EA announcements, perhaps because the latter are less timely and released in a more staggered way. We show that not only are there spillovers from the US to the euro area, but also the other way around, although to a lesser extent. Overall, our understanding of yield curve movements is much better than previously thought.

JEL Classification: E43, E52, E58, G12, G14.
Keywords: Event Study, Bond Markets, High-Frequency Data, Identification.

*We thank Mahmut İpek and Senem Turan for research assistance. Gürkaynak's research was supported by funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation program (grant agreement No 726400). The views expressed here are those of the authors and do not necessarily coincide with the views of the Deutsche Bundesbank or the Eurosystem. The code that implements the econometric procedures described in this paper is available at https://sites.google.com/site/markkerssenfischer.

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1 Introduction

Yield curves are constructed from bond prices, which (should) depend on the current and expected state of the economy, as well as risk pricing. Changes in the yield curves should therefore depend on news – updates to the current and expected state vector, which also drives risk pricing – and market noise. One hopes that market noise is not very large and that changes in yields can be related to updates to market participants' information sets.

But what constitutes news? Where to look to measure updates to information sets? The literature has focused on scheduled macroeconomic news releases for which expectations surveys exist and hence the news component can be measured. But although such news indeed seem to move yield curves, the fraction of the variance explained by news even in tight (20 minute) intraday event windows ranges from one-fifth to two-fifths, a very unsatisfactory state of affairs. Labeling the residual as noise both involves a rather strong assumption that the reaction to news is correctly measured and any residual is noise, and an argument that a great majority of bond pricing even around important economic news releases is just noise.

In this paper, we will tackle several issues about bond pricing and yield curves simultaneously. We will show *what* moves yields at various maturities, make a decomposition between observed news (surprises in headline announcements), latent news factors, and noise. The noise can further be decomposed into a common factor that exists with or without an announcement and a vector of uncorrelated residuals. We will show the interplay between US and euro area (EA) yield curves and news, and we will have an answer to *why* these curves behave the way they do.

It turns out that news explains a great majority of event window changes in short-term yields in both the US and the EA. We also discuss what these news represent. The most pertinent news for both countries[1] are the US news but spillovers are not unidirectional, some EA news affect US yields as well. News explains a large share of variance in long-

[1] We use the term "country" for both the US and EA for convenience although the EA obviously is not one country.

term US yields in the event windows, but we find that they explain little of EA long-term yields that are primarily driven by noise. That brings us to *why*, which required the joint study of the two countries. The main difference between the US and EA in our sample period (2002-2019) is that the ECB was a credible inflation targeter for all of this period but the FOMC only articulated a numerical inflation target in 2012, past the middle of the sample.

Hence, EA long-term yields are insensitive to incoming news as expected steady state inflation is anchored (not always at the desired level) whereas learning about the target – the definition of "stable prices" – was ongoing in the US. News' contribution to long-term yield variance is therefore quite different in the two countries. However, noise is noise and similarly affects pricing in the US and EA. Thus, noise explains a greater share of long-term yields in the EA but this is a share of much lower total variance.

Methodologically, we make use of a long line of research utilizing event studies going back to Fama, Fisher, Jensen and Roll (1969). All of this literature focuses on headline news but news releases are multidimensional – think of the FOMC statement or the details in the employment report – and hence contain more news than is observable to the econometrician. Focusing only on headline news understates the fraction of variance in asset prices that is attributable to news. We therefore use the new method proposed by Gürkaynak, Kısacıkoğlu and Wright (2020) – henceforth GKW – to pin down news perceived by market participants but unobservable to researchers as latent variables.

In what follows, we first introduce the data, then explain how our estimator works and why it is appropriate for these questions, and then present results. Discussion of the results and some robustness tests follow, with a lot more relegated to appendices.

2 Data

We study yield curve responses in the US and the euro area (EA). Our high-frequency data are based on interest rate and bond futures and cover six different maturities, ranging

from three months to thirty years. The sample period is from March 2002 to December 2019. Appendix A has details.

We study responses to two types of news: macroeconomic data releases and monetary policy announcements of the US and the EA. For all news, we study yield curve responses over a 20 minute window from 5 minutes before the release to 15 minutes afterwards. The only exceptions are central bank announcements that were followed by a press conference. In those cases, our event window starts 5 minutes before the press release and ends 70 minutes after the start of the press conference.[2]

For macroeconomic data releases, we compute "surprises" as the difference between the actual release and its median forecasted value. Throughout, we scale surprise series by their sample standard deviation, to make the units comparable.

US news: For the US, we study the same 14 releases as in GKW. All of these releases take place at 8:30 a.m. US Eastern Time. As our US monetary policy news measure we use changes in short-dated federal funds futures around scheduled FOMC announcements, as in Kuttner (2001).[3]

Euro area news: For the EA, we study ten different news releases. EA aggregate data releases usually contain no surprises as country level data are released beforehand and weights are known. Hence, most releases we utilize are specific to Germany, but we also consider releases of euro area M3 and CPI as well as monetary policy news. Apart from monetary policy, all releases occur at 10:00 a.m., 11:00 a.m. or 12:00 (noon) Central European Time (CET). Our monetary policy news measure for the euro area is the change in the one-month OIS rate around scheduled ECB announcements.[4] The monetary policy

[2]If there was no trade within 30 minutes before the window start or within 30 minutes after the window end, we impute missing values. For monetary policy announcements this restriction is not imposed, i.e. we allow for overnight changes if e.g. an FOMC announcement occurs after trading hours in Europe (which happened occasionally prior to 2005).

[3]For FOMC days with a press release at 12:30 p.m. and a press conference at 2:15 p.m., we use an event window from 12:25-3:25 p.m. For FOMC days with a press release at 2:00 p.m. and a press conference at 2:30 p.m., we use an event window from 1:55-3:40 p.m. For FOMC days without a press conference, we use the usual 20 minute event window around the press release.

[4]On ECB Governing Council meeting days, we use a window from 1:40 to 3:40 p.m. This window spans the press release at 1:45 p.m. and the ensuing press conference that starts at 2:30 p.m. For meetings without a press conference, we use the usual 20 minute event window around the press release.

surprise is obtained from the dataset of Altavilla, Brugnolini, Gürkaynak, Motto and Ragusa (2019).

Control windows: For all of the above-mentioned news, we use appropriate control windows without news. To achieve maximum comparability, we construct control windows by shifting event windows by exactly one week in either direction. The only exception are US initial jobless claims, which are released weekly. In this case, we instead shift the event windows by one day forward and backward. This approach generates two candidate control windows of equal length and with identical intraday times for each event window. As a last step, we drop any control windows that overlap with an event window.[5]

3 Methodology

We consider a number of ways of estimating the effects of macroeconomic news announcements on asset returns. The first is the simple OLS method which is well known to produce estimates that explain a low fraction of the variance. We will use this to build intuition. The OLS set up is:

$$y_t = \beta' s_t + \varepsilon_t \tag{1}$$

where y_t is a vector of yield changes at times of day where there may or may not be an announcement. The vector s_t captures observable surprises in macroeconomic or monetary policy announcements, i.e. s_t is set to 0 if there is no announcement in that window. y_t includes 12 yield changes, covering six different maturities for both the US and the EA. Likewise, s_t captures 24 observable surprises, 14 from the US and 10 from the EA. Equation (1) can straightforwardly be estimated by OLS, and this is the most common event study methodology.

This approach relies on the surprises being well measured. An alternative approach

[5]One further complication arises from the fact that US initial jobless claim releases usually coincide with the start of ECB press conferences. Hence, some US event windows from 2:25 to 2:45 p.m. Central European Time (CET) fall within ECB event and control windows from 1:40 to 3:40 p.m. CET. In these cases, we compute market responses only over the 2 hour windows, dropping the 20 minute windows in both event and control windows.

posits instead that the surprise is observed with classical measurement error. In this case, the model can still be identified using the approach of Rigobon and Sack (2003, 2004, 2005, 2008) which relies on comparing the variance of y_t in announcement windows, the variance of y_t in comparable windows without announcements, and the covariance between y_t and the mismeasured surprise in announcement windows, known as heteroskedasticity-based identification.

Our approach instead posits that the surprises are measured with negligible error – which GKW document for the US news – but that these observed surprises are only part of the news that comes out in the announcement. Think of the revision to the previous release that is part of many data releases, or information about expenditure components' growth that is part of the GDP report. Expectations for these are not surveyed so we do not know what the surprises are, but we do know that such surprises are possible in these windows. We estimate these as latent factors and also estimate their effects in one efficient step.

The baseline model that we specify is:

$$y_t = \beta' s_t + \gamma' d_t f_t + \varepsilon_t \tag{2}$$

where d_t is a dummy that is 1 if there is an announcement in that window and 0 otherwise, f_t is an i.i.d. $N(0,1)$ latent variable and ε_t is i.i.d. normal with mean zero and diagonal variance-covariance matrix. GKW show that this is roughly equivalent to estimating the responses to observable surprises by OLS and the responses to unobserved surprises by heteroskedasticity-based identification using the residuals, but is efficiently done in one step.

Note that f_t is a latent factor common to all data releases. The variance of f_t is normalized to 1, because otherwise γ would be identified only up to scale. For identification, we also require that d_t is equal to 1 for some, but not all, observations – that is, there are both event and control dates in the sample. We can then estimate equation (2) by

maximum likelihood using the Kalman filter, giving us estimates of the latent factor f_t as a by-product.

The model that we start out with assumes that there is a single factor common to all releases, but it seems desirable to relax this assumption. We can do this within the same framework in a number of ways. One possibility is to specify that:

$$y_t = \beta' s_t + \Sigma_{c=1}^{2} d_{ct}\gamma_c f_{ct} + \varepsilon_t \tag{3}$$

where d_{ct} is a dummy that is 1 if an announcement comes out in country c (the US or EA) on day t and zero otherwise. In this case the latent factors are differentiated by country.[6] The latent factors f_{ct} are i.i.d. standard normal and mutually independent, as before.

Another possibility is to specify that:

$$y_t = \beta' s_t + \Sigma_{i=1}^{I} d_{it}\gamma_i f_{it} + \varepsilon_t \tag{4}$$

where d_{it} is a dummy that is 1 if an announcement of the ith type comes out on day t and zero otherwise and I is the number of announcement types. This allows for factors specific to each type of release. The latent factors f_{it} are i.i.d. standard normal and mutually independent. We know from previous work that monetary policy announcements in both the US and the EA are sometimes associated with multiple distinct latent factors (eg. capturing forward guidance and quantitative easing, see Gürkaynak, Sack and Swanson, 2005; Swanson, 2021; Altavilla et al., 2019). Hence, we allow for three latent factors around both FOMC and ECB announcements. Since we are not directly interested in an economic interpretation of those factors, however, we do not aim to identify them (e.g. by applying a suitable rotation).

In equations (2)-(4) the only term that affects yields other than the observed and latent news is the residual, ε_t, the elements of which are assumed to be contemporaneously uncorrelated. This is a strong assumption that in event windows yields are driven either

[6]The factors are differentiated based on the *origin* of the news, the LHS vector is the same.

by news – observable and latent – or contemporaneously uncorrelated residuals. This does not allow for common ever-present market noise. The next extension we consider does, by allowing for a factor that affects yields in all intraday windows, whether there is an announcement or not. This model specifies that:

$$y_t = \beta' s_t + \Sigma_{i=1}^{I} d_{it}\gamma_i f_{it} + \gamma_0 f_{0t} + \varepsilon_t \tag{5}$$

and applies in all windows, as before. The new factor f_{0t} captures the common "background" noise in asset prices that would be present even without any announcement and we call it the "ever-present" factor. We consider the noise component to consist of both the ever-present factor and the residual vector.

While we will characterize the ever-present noise and its effects on yields, fully understanding what this noise is requires a study of its own. Are these the effects of trickling of minor news themselves? Changes in global risk aversion due to animal spirits? Artefacts of market microstructure? Or other movers of yields? We will show the weight of noise in moving yields and leave these questions for future work.

All of the models (2)-(5) can be estimated by maximum likelihood.

4 Results

4.1 Domestic Euro Area News Effects

To start with, we consider the analysis of the euro area alone. Table 1 shows that observable surprises explain little of the immediate yield reactions (see panel a) and that a single latent factor as in equation (2) dramatically raises the share of explained yield movements (see panel b).[7] The loadings of the latent factor are also hump-shaped along the yield curve, just as in the US case.

Table 2 provides an additional piece of evidence consistent with our interpretation

[7]Throughout this paper, we report White standard errors in brackets and indicate statistical significance at the 10/5/1% level with */**/***.

of the latent factor as surprises perceived by the market participants that are unobservable to the econometrician due to a lack of surveys for those components of the data or policy release. The table compares OLS and heteroskedasticity-based estimates for ECB announcement surprises, distinguishing between ECB press releases and press conferences. The idea here is that unobservable "non-headline" news should be more important for press conferences than for boilerplate press releases. Hence, the difference between heteroskedasticity-based estimates and OLS-based estimates should be larger for press conferences than for press releases.

The results in Table 2 are in line with this prediction. The difference between OLS-based and heteroskedasticity-based estimates is much larger for press conferences than for press releases. Even for boilerplate press releases, however, the two estimation methods often yield different estimates, suggesting that press releases already signal information beyond the one-month horizon.

Table 1: Euro area News Effects on Domestic Yields

(a) OLS Estimates

	3-Month	1-Year	2-Year	5-Year	10-Year	30-Year
ECB GCM	1.70**	1.91***	1.80***	1.37***	0.59***	0.19
	(0.67)	(0.50)	(0.44)	(0.31)	(0.22)	(0.18)
Euro area M3	0.10***	0.27***	0.15***	0.13**	0.09**	0.08
	(0.04)	(0.06)	(0.06)	(0.06)	(0.05)	(0.06)
Euro area Consumer Prices	0.08	0.25**	0.20**	0.22**	0.16**	0.13**
	(0.05)	(0.12)	(0.08)	(0.10)	(0.08)	(0.06)
Germany Factory Orders	0.09*	0.25***	0.15**	0.20**	0.17***	0.11
	(0.05)	(0.07)	(0.06)	(0.08)	(0.06)	(0.07)
Germany Industrial Production	0.05	0.13*	0.14**	0.10	0.05	-0.00
	(0.05)	(0.07)	(0.06)	(0.07)	(0.07)	(0.10)
Germany ifo Business Climate	0.02	0.21	0.26	0.21	-0.03	-1.08
	(0.19)	(0.34)	(0.30)	(0.26)	(0.22)	(0.73)
Germany ifo Current assessment	0.33**	0.73***	0.56***	0.65***	0.59***	1.08***
	(0.14)	(0.24)	(0.21)	(0.19)	(0.15)	(0.42)
Germany ifo Expectations	0.04	0.16	0.00	0.10	0.20	0.76
	(0.13)	(0.27)	(0.23)	(0.21)	(0.17)	(0.48)
Germany ZEW Expectations	0.16**	0.42***	0.37***	0.42***	0.37***	0.25***
	(0.07)	(0.09)	(0.07)	(0.08)	(0.07)	(0.06)
Germany ZEW Current Situation	0.10	0.04	-0.02	0.04	0.05	-0.03
	(0.12)	(0.10)	(0.06)	(0.07)	(0.06)	(0.07)
R^2	0.16	0.14	0.16	0.12	0.07	0.03

(b) Latent Factor Model

	3-Month	1-Year	2-Year	5-Year	10-Year	30-Year
ECB GCM	1.70**	1.95***	1.80***	1.37***	0.59***	0.13
	(0.67)	(0.50)	(0.44)	(0.31)	(0.22)	(0.19)
Euro area M3	0.10***	0.27***	0.15***	0.12**	0.09**	0.08
	(0.04)	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)
Euro area Consumer Prices	0.08*	0.25**	0.20**	0.22**	0.16**	0.14**
	(0.05)	(0.12)	(0.08)	(0.10)	(0.08)	(0.06)
Germany Factory Orders	0.09*	0.25***	0.15**	0.20**	0.17***	0.12*
	(0.05)	(0.07)	(0.06)	(0.08)	(0.06)	(0.07)
Germany Industrial Production	0.05	0.13**	0.14**	0.10	0.05	-0.00
	(0.05)	(0.07)	(0.06)	(0.07)	(0.07)	(0.10)
Germany ifo Business Climate	0.04	0.25	0.26	0.21	-0.03	-0.86
	(0.19)	(0.33)	(0.30)	(0.26)	(0.22)	(0.58)
Germany ifo Current assessment	0.33**	0.71***	0.56***	0.65***	0.59***	0.96***
	(0.14)	(0.23)	(0.21)	(0.19)	(0.15)	(0.33)
Germany ifo Expectations	0.02	0.13	0.00	0.10	0.20	0.63
	(0.13)	(0.27)	(0.23)	(0.21)	(0.17)	(0.39)
Germany ZEW Expectations	0.16**	0.42***	0.37***	0.42***	0.37***	0.26***
	(0.07)	(0.09)	(0.07)	(0.08)	(0.07)	(0.06)
Germany ZEW Current Situation	0.11	0.03	-0.02	0.04	0.05	-0.03
	(0.12)	(0.10)	(0.06)	(0.07)	(0.06)	(0.07)
Factor	1.25***	1.97***	1.67***	1.62***	1.03***	0.57***
	(0.17)	(0.19)	(0.17)	(0.11)	(0.07)	(0.09)
R^2 no factor	0.16	0.14	0.16	0.12	0.07	0.03
R^2 with factor	0.75	0.94	0.95	0.90	0.64	0.27

Estimated effect of euro area news on euro area yields. Panel (a) refers to OLS estimates, panel (b) shows results for the basic latent factor model as in equation (2).

Table 2: ECB Announcement Effects on Domestic Yields

	3-Month	1-Year	2-Year	5-Year	10-Year	30-Year
Press Release (1:35-2:00 p.m.)						
OLS	0.63***	0.35***	0.34***	0.21***	0.02	-0.03
	(0.08)	(0.08)	(0.08)	(0.07)	(0.05)	(0.05)
IDHET	0.83***	0.84***	0.81***	1.07**	4.82	-4.41
	(0.08)	(0.27)	(0.19)	(0.47)	(10.62)	(11.55)
Press Conference (2:25-3:40 p.m.)						
OLS	1.68***	1.93***	1.39***	1.03***	0.43***	0.09
	(0.27)	(0.38)	(0.25)	(0.22)	(0.16)	(0.13)
IDHET	7.16***	9.86***	8.98***	8.43***	5.25**	9.72
	(2.38)	(3.50)	(3.24)	(3.08)	(2.48)	(15.80)
Equivalence Test Statistics (OLS vs IDHET Estimates)						
Press Release	-1.77*	-1.71*	-2.25**	-1.82*	-0.45	0.38
Press Conference	-2.28**	-2.25**	-2.33**	-2.39**	-1.94*	-0.61

Results are based on the pre-2015 sample because ECB press releases contain additional information beyond policy rate decisions since 2015. As before, our policy news measure is the one-month OIS change from Altavilla et al. (2019) during the relevant window. In contrast to elsewhere in the paper, however, policy surprises are not standardized, i.e. they are kept as basis point changes. The equivalence test statistics refer to the null hypothesis that the OLS and heteroskedasticity-based estimates are identical.

4.2 News Effects Across the Atlantic

Turning to the joint study of US and EA yields and news, we start with the simple OLS equation (1) without the latent factor. Table 3 reports results. For almost all surprises, we see a hump-shaped effect across the yield curve, with 2- and 5-year yields being most sensitive to news, but with sizeable effects on long-term rates as well. US news have significant effects on domestic and foreign yields, while EA news seem to affect mainly domestic yields. Only a few news announcements, such as German factory orders and ZEW survey expectations affect the entire US yield curve, something also found by Rogers, Scotti and Wright (2014). The R-squared values, already low for US yields (25-30%), are even lower for EA yields (13-24%). These results are broadly consistent with the conventional wisdom that spillovers are much larger from the US to the EA than the other way around, as discussed in the introduction.

Table 3: OLS Estimates

(a) US yields

	3-Month	1-Year	2-Year	5-Year	10-Year	30-Year
FOMC	2.85***	1.88**	1.08***	1.02**	0.65**	0.23
	(0.62)	(0.74)	(0.41)	(0.40)	(0.30)	(0.21)
Nonfarm Payrolls	1.71***	5.22***	4.09***	4.84***	3.83***	3.30***
	(0.23)	(0.62)	(0.48)	(0.48)	(0.37)	(0.33)
Initial Jobless Claims	-0.27***	-0.65***	-0.51***	-0.62***	-0.54***	-0.47***
	(0.08)	(0.09)	(0.07)	(0.08)	(0.07)	(0.06)
Durable Goods Orders	0.44***	0.92***	0.68***	0.78***	0.61***	0.52***
	(0.16)	(0.25)	(0.19)	(0.21)	(0.17)	(0.15)
Employment Cost	0.00	0.12	0.16	0.38	0.30	0.21
	(0.19)	(0.38)	(0.32)	(0.35)	(0.26)	(0.19)
Retail Sales	0.08	0.18	0.30	0.35	0.29	0.22
	(0.19)	(0.38)	(0.32)	(0.35)	(0.28)	(0.26)
Retail Sales Ex Auto	0.27	0.99***	0.92***	1.08***	0.86***	0.86***
	(0.19)	(0.35)	(0.29)	(0.31)	(0.25)	(0.24)
GDP	0.51***	1.44***	1.24***	1.59***	1.33***	1.19***
	(0.09)	(0.43)	(0.34)	(0.40)	(0.33)	(0.30)
CPI	-0.10	-0.18	-0.14	-0.11	-0.06	-0.01
	(0.08)	(0.18)	(0.15)	(0.18)	(0.15)	(0.16)
Core CPI	0.55***	1.41***	1.23***	1.29***	1.02***	0.88***
	(0.11)	(0.23)	(0.19)	(0.21)	(0.17)	(0.16)
PPI	0.13	0.33	0.15	0.14	0.18	0.21
	(0.17)	(0.23)	(0.19)	(0.18)	(0.14)	(0.14)
Core PPI	0.23**	0.55**	0.47***	0.52***	0.42***	0.41***
	(0.10)	(0.22)	(0.17)	(0.17)	(0.13)	(0.14)
Hourly Earnings	0.33**	1.29***	1.11***	1.65***	1.27***	0.94***
	(0.15)	(0.37)	(0.28)	(0.32)	(0.26)	(0.24)
Unemployment	-0.60***	-1.72***	-1.35***	-1.57***	-1.14***	-0.86***
	(0.19)	(0.37)	(0.28)	(0.29)	(0.22)	(0.20)
ECB GCM	0.30**	0.43*	0.11	0.29	0.30	0.12
	(0.15)	(0.23)	(0.10)	(0.24)	(0.22)	(0.26)
Euro area M3	0.04	0.12***	0.03	0.08**	0.05	0.04
	(0.03)	(0.04)	(0.04)	(0.04)	(0.03)	(0.04)
Euro area Consumer Prices	0.00	0.08*	0.09***	0.09**	0.09**	0.07**
	(0.03)	(0.04)	(0.03)	(0.04)	(0.04)	(0.03)
Germany Factory Orders	0.12***	0.14**	0.10**	0.16***	0.12***	0.09**
	(0.04)	(0.06)	(0.04)	(0.04)	(0.05)	(0.04)
Germany Industrial Production	-0.02	0.05	0.11*	0.06	0.02	-0.03
	(0.05)	(0.06)	(0.06)	(0.04)	(0.04)	(0.06)
Germany ifo Business Climate	0.03	0.26	0.54*	0.16	-0.19	-0.13
	(0.06)	(0.23)	(0.29)	(0.20)	(0.16)	(0.16)
Germany ifo Current assessment	0.03	0.12	-0.12	0.13	0.33***	0.23**
	(0.06)	(0.14)	(0.17)	(0.12)	(0.10)	(0.10)
Germany ifo Expectations	0.02	-0.07	-0.24	-0.01	0.19*	0.17
	(0.04)	(0.15)	(0.19)	(0.14)	(0.11)	(0.11)
Germany ZEW Expectations	0.06	0.14***	0.18***	0.21***	0.20***	0.19***
	(0.04)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)
Germany ZEW Current Situation	0.00	0.01	0.03	0.07**	0.03	-0.02
	(0.02)	(0.04)	(0.03)	(0.04)	(0.03)	(0.03)
R^2	0.28	0.28	0.27	0.30	0.29	0.25

(b) EA yields

	3-Month	1-Year	2-Year	5-Year	10-Year	30-Year
FOMC	0.79***	0.99**	0.82**	0.83**	0.48*	0.30
	(0.17)	(0.41)	(0.32)	(0.37)	(0.28)	(0.23)
Nonfarm Payrolls	0.76***	2.19***	1.76***	2.29***	2.03***	1.50***
	(0.14)	(0.33)	(0.25)	(0.26)	(0.20)	(0.15)
Initial Jobless Claims	-0.31***	-0.56***	-0.50***	-0.55***	-0.42***	-0.28***
	(0.08)	(0.11)	(0.10)	(0.09)	(0.07)	(0.07)
Durable Goods Orders	0.18**	0.43***	0.28***	0.42***	0.38***	0.14**
	(0.08)	(0.14)	(0.10)	(0.12)	(0.11)	(0.06)
Employment Cost	-0.01	-0.25	-0.20	-0.07	0.09	0.16
	(0.06)	(0.16)	(0.14)	(0.15)	(0.15)	(0.19)
Retail Sales	0.00	0.16	0.14	0.12	0.05	-0.03
	(0.08)	(0.22)	(0.17)	(0.20)	(0.19)	(0.18)
Retail Sales Ex Auto	0.10	0.16	0.18	0.34*	0.40**	0.48***
	(0.09)	(0.20)	(0.16)	(0.19)	(0.17)	(0.16)
GDP	0.10	0.76***	0.74***	0.91***	0.86***	0.56***
	(0.08)	(0.23)	(0.17)	(0.23)	(0.17)	(0.14)
CPI	-0.03	-0.04	-0.08	-0.04	-0.02	-0.09
	(0.04)	(0.11)	(0.09)	(0.10)	(0.10)	(0.09)
Core CPI	0.07*	0.36***	0.31***	0.49***	0.46***	0.34***
	(0.04)	(0.10)	(0.09)	(0.10)	(0.10)	(0.10)
PPI	0.05	0.21	0.18	0.14	0.08	0.10
	(0.06)	(0.13)	(0.12)	(0.12)	(0.11)	(0.10)
Core PPI	0.06	0.15	0.12	0.22**	0.19*	0.19**
	(0.06)	(0.10)	(0.09)	(0.10)	(0.10)	(0.09)
Hourly Earnings	0.18***	0.46**	0.38**	0.63***	0.72***	0.60***
	(0.07)	(0.19)	(0.15)	(0.18)	(0.15)	(0.13)
Unemployment	-0.27***	-0.76***	-0.58***	-0.80***	-0.69***	-0.55***
	(0.08)	(0.19)	(0.14)	(0.15)	(0.13)	(0.13)
ECB GCM	2.15***	1.97***	1.84***	1.31***	0.54**	0.13
	(0.34)	(0.46)	(0.40)	(0.33)	(0.25)	(0.21)
Euro area M3	0.10***	0.27***	0.15***	0.12**	0.09*	0.08
	(0.04)	(0.06)	(0.06)	(0.06)	(0.05)	(0.06)
Euro area Consumer Prices	0.08	0.25**	0.20**	0.22**	0.16**	0.13**
	(0.05)	(0.12)	(0.08)	(0.10)	(0.08)	(0.06)
Germany Factory Orders	0.09*	0.25***	0.15**	0.20**	0.17***	0.11
	(0.05)	(0.07)	(0.06)	(0.08)	(0.06)	(0.07)
Germany Industrial Production	0.05	0.13*	0.14**	0.10	0.05	-0.00
	(0.05)	(0.07)	(0.06)	(0.07)	(0.07)	(0.10)
Germany ifo Business Climate	0.02	0.21	0.26	0.21	-0.02	-1.11
	(0.19)	(0.34)	(0.30)	(0.26)	(0.22)	(0.73)
Germany ifo Current assessment	0.34**	0.73***	0.56***	0.65***	0.58***	1.10***
	(0.14)	(0.24)	(0.21)	(0.19)	(0.15)	(0.42)
Germany ifo Expectations	0.04	0.16	0.00	0.10	0.19	0.78
	(0.13)	(0.27)	(0.23)	(0.21)	(0.17)	(0.49)
Germany ZEW Expectations	0.16**	0.42***	0.37***	0.42***	0.37***	0.25***
	(0.07)	(0.09)	(0.07)	(0.08)	(0.07)	(0.06)
Germany ZEW Current Situation	0.11	0.03	-0.02	0.04	0.05	-0.03
	(0.12)	(0.10)	(0.06)	(0.07)	(0.06)	(0.07)
R^2	0.24	0.20	0.20	0.20	0.19	0.13

OLS estimates of Equation (1).

The model with a single latent factor in equation (2) does not make much sense in the context of studying US and EA yields jointly. This is because it implies that latent news from the have the same patterns of loadings at home and abroad. Clearly latent news associated with EA releases is bound to have bigger relative effects on EA yields and vice-versa. So, in the context of modeling US and EA yields jointly, we start from the model with two latent factors, as in equation (3), one for US news announcements and one for EA news announcements, each of which can have its own loadings.

Results for this model are in Table 4 and Figure 1. The country-level factors affect the entire domestic as well as foreign yield curve, meaning that spillovers go both from the US to Europe and the other way around. Spillovers originating in the US are clearly larger, though.

For both US and EA yields, the latent factors are highly predictive for all maturities. Adding in the latent factors increases the R^2 values substantially. In fact, we have nearly perfect fits at intermediate maturities.

Table 4: Country-level Factors

(a) US yields

	3-Month	1-Year	2-Year	5-Year	10-Year	30-Year
FOMC	2.85***	1.88**	1.07***	1.02**	0.64**	0.22
	(0.62)	(0.74)	(0.41)	(0.40)	(0.30)	(0.21)
Nonfarm Payrolls	1.71***	5.22***	4.08***	4.84***	3.83***	3.29***
	(0.23)	(0.62)	(0.48)	(0.47)	(0.37)	(0.33)
Initial Jobless Claims	-0.24***	-0.57***	-0.46***	-0.55***	-0.48***	-0.41***
	(0.08)	(0.10)	(0.07)	(0.08)	(0.07)	(0.06)
Durable Goods Orders	0.44***	0.92***	0.68***	0.78***	0.61***	0.52***
	(0.16)	(0.25)	(0.19)	(0.21)	(0.17)	(0.15)
Employment Cost	0.00	0.12	0.16	0.38	0.30	0.20
	(0.19)	(0.38)	(0.31)	(0.35)	(0.25)	(0.19)
Retail Sales	0.08	0.18	0.29	0.34	0.29	0.21
	(0.19)	(0.37)	(0.31)	(0.35)	(0.28)	(0.26)
Retail Sales Ex Auto	0.27	1.00***	0.93***	1.08***	0.86***	0.86***
	(0.19)	(0.35)	(0.28)	(0.31)	(0.25)	(0.24)
GDP	0.52***	1.48***	1.25***	1.61***	1.35***	1.21***
	(0.09)	(0.43)	(0.33)	(0.40)	(0.33)	(0.30)
CPI	-0.10	-0.17	-0.14	-0.11	-0.06	-0.01
	(0.08)	(0.18)	(0.15)	(0.18)	(0.15)	(0.15)
Core CPI	0.55***	1.40***	1.21***	1.28***	1.00***	0.87***
	(0.11)	(0.23)	(0.19)	(0.21)	(0.17)	(0.16)
PPI	0.13	0.31	0.15	0.13	0.18	0.21
	(0.17)	(0.23)	(0.19)	(0.18)	(0.14)	(0.14)
Core PPI	0.23**	0.55**	0.47***	0.52***	0.42***	0.41***
	(0.10)	(0.22)	(0.17)	(0.17)	(0.13)	(0.14)
Hourly Earnings	0.33**	1.29***	1.10***	1.64***	1.26***	0.93***
	(0.15)	(0.37)	(0.28)	(0.32)	(0.26)	(0.24)
Unemployment	-0.59***	-1.70***	-1.35***	-1.56***	-1.14***	-0.86***
	(0.19)	(0.36)	(0.28)	(0.29)	(0.22)	(0.20)
ECB GCM	0.21*	0.15	-0.12	0.02	0.08	-0.06
	(0.11)	(0.16)	(0.12)	(0.13)	(0.13)	(0.18)
Euro area M3	0.03	0.12***	0.04	0.09**	0.05	0.05
	(0.03)	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)
Euro area Consumer Prices	0.01	0.08*	0.08***	0.09**	0.08**	0.07**
	(0.03)	(0.04)	(0.03)	(0.04)	(0.04)	(0.03)
Germany Factory Orders	0.13***	0.15**	0.11**	0.16***	0.12***	0.09***
	(0.04)	(0.06)	(0.04)	(0.04)	(0.04)	(0.03)
Germany Industrial Production	-0.02	0.05	0.10*	0.05	0.01	-0.05
	(0.05)	(0.05)	(0.06)	(0.04)	(0.04)	(0.06)
Germany ifo Business Climate	0.06	0.25	0.55*	0.16	-0.18	-0.12
	(0.06)	(0.22)	(0.28)	(0.19)	(0.15)	(0.15)
Germany ifo Current assessment	0.01	0.13	-0.11	0.14	0.34***	0.25***
	(0.06)	(0.14)	(0.17)	(0.12)	(0.09)	(0.10)
Germany ifo Expectations	0.00	-0.07	-0.24	-0.01	0.18*	0.17
	(0.04)	(0.15)	(0.19)	(0.13)	(0.11)	(0.11)
Germany ZEW Expectations	0.06	0.14***	0.19***	0.22***	0.21***	0.19***
	(0.04)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)
Germany ZEW Current Situation	0.00	0.01	0.03	0.08**	0.04	-0.01
	(0.02)	(0.04)	(0.03)	(0.04)	(0.03)	(0.03)
US Factor	0.90***	2.84***	2.36***	2.75***	2.18***	1.87***
	(0.06)	(0.15)	(0.11)	(0.11)	(0.08)	(0.07)
EA Factor	0.19***	0.61***	0.44***	0.60***	0.52***	0.49***
	(0.04)	(0.10)	(0.07)	(0.07)	(0.05)	(0.05)
R^2 no factor	0.28	0.28	0.27	0.30	0.29	0.25
R^2 country-level factors	0.50	0.84	0.87	0.95	0.94	0.81

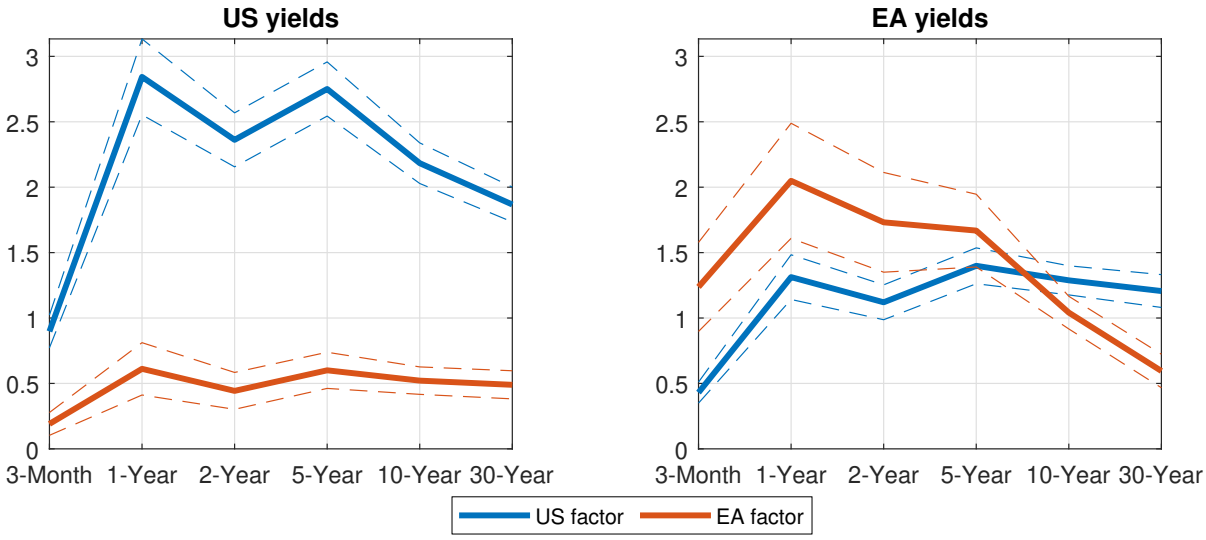
(b) EA yields

	3-Month	1-Year	2-Year	5-Year	10-Year	30-Year
FOMC	0.79***	0.98**	0.80**	0.81**	0.46	0.22
	(0.17)	(0.40)	(0.32)	(0.37)	(0.28)	(0.26)
Nonfarm Payrolls	0.76***	2.20***	1.77***	2.29***	2.03***	2.03***
	(0.14)	(0.33)	(0.25)	(0.25)	(0.19)	(0.24)
Initial Jobless Claims	-0.15***	-0.32***	-0.29***	-0.35***	-0.30***	-0.23***
	(0.04)	(0.06)	(0.05)	(0.06)	(0.06)	(0.06)
Durable Goods Orders	0.19**	0.46***	0.30***	0.45***	0.40***	0.32***
	(0.08)	(0.14)	(0.10)	(0.12)	(0.11)	(0.09)
Employment Cost	0.00	-0.23	-0.18	-0.06	0.10	0.07
	(0.06)	(0.15)	(0.13)	(0.15)	(0.14)	(0.15)
Retail Sales	-0.00	0.15	0.13	0.12	0.05	0.13
	(0.08)	(0.21)	(0.17)	(0.20)	(0.19)	(0.19)
Retail Sales Ex Auto	0.11	0.18	0.19	0.35*	0.41**	0.40**
	(0.09)	(0.20)	(0.15)	(0.18)	(0.16)	(0.16)
GDP	0.17***	0.88***	0.84***	1.00***	0.92***	0.92***
	(0.05)	(0.21)	(0.16)	(0.19)	(0.16)	(0.18)
CPI	-0.02	-0.02	-0.07	-0.03	-0.02	-0.05
	(0.04)	(0.11)	(0.09)	(0.10)	(0.10)	(0.08)
Core CPI	0.05	0.34***	0.28***	0.46***	0.44***	0.35***
	(0.04)	(0.09)	(0.08)	(0.10)	(0.10)	(0.10)
PPI	0.03	0.17	0.15	0.11	0.06	0.05
	(0.05)	(0.12)	(0.11)	(0.11)	(0.11)	(0.10)
Core PPI	0.06	0.15	0.12	0.22**	0.19*	0.18**
	(0.05)	(0.10)	(0.09)	(0.10)	(0.10)	(0.09)
Hourly Earnings	0.16**	0.43**	0.34**	0.59***	0.68***	0.65***
	(0.07)	(0.19)	(0.15)	(0.18)	(0.15)	(0.14)
Unemployment	-0.23***	-0.69***	-0.52***	-0.74***	-0.66***	-0.60***
	(0.08)	(0.16)	(0.12)	(0.14)	(0.13)	(0.14)
ECB GCM	2.11***	1.88***	1.73***	1.17***	0.42*	-0.10
	(0.35)	(0.49)	(0.39)	(0.33)	(0.22)	(0.18)
Euro area M3	0.10***	0.27***	0.15***	0.12**	0.09**	0.08
	(0.04)	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)
Euro area Consumer Prices	0.08*	0.25**	0.20**	0.22**	0.16**	0.14**
	(0.05)	(0.12)	(0.08)	(0.10)	(0.08)	(0.06)
Germany Factory Orders	0.09*	0.25***	0.15**	0.20**	0.17***	0.12
	(0.05)	(0.07)	(0.06)	(0.08)	(0.06)	(0.07)
Germany Industrial Production	0.05	0.13**	0.14**	0.10	0.05	0.00
	(0.05)	(0.07)	(0.06)	(0.07)	(0.07)	(0.10)
Germany ifo Business Climate	0.04	0.25	0.26	0.21	-0.03	-0.86
	(0.19)	(0.33)	(0.30)	(0.26)	(0.22)	(0.57)
Germany ifo Current assessment	0.33**	0.71***	0.56***	0.65***	0.59***	0.96***
	(0.14)	(0.23)	(0.21)	(0.19)	(0.15)	(0.32)
Germany ifo Expectations	0.02	0.13	0.00	0.10	0.20	0.63*
	(0.13)	(0.27)	(0.23)	(0.21)	(0.17)	(0.38)
Germany ZEW Expectations	0.16**	0.42***	0.37***	0.42***	0.37***	0.26***
	(0.07)	(0.09)	(0.07)	(0.08)	(0.07)	(0.06)
Germany ZEW Current Situation	0.11	0.03	-0.02	0.04	0.05	-0.03
	(0.12)	(0.10)	(0.06)	(0.07)	(0.06)	(0.07)
US Factor	0.43***	1.31***	1.12***	1.40***	1.29***	1.21***
	(0.04)	(0.09)	(0.07)	(0.07)	(0.06)	(0.06)
EA Factor	1.24***	2.05***	1.73***	1.67***	1.04***	0.60***
	(0.17)	(0.22)	(0.19)	(0.14)	(0.06)	(0.07)
R^2 no factor	0.24	0.20	0.20	0.20	0.19	0.13
R^2 country-level factors	0.70	0.83	0.85	0.85	0.76	0.57

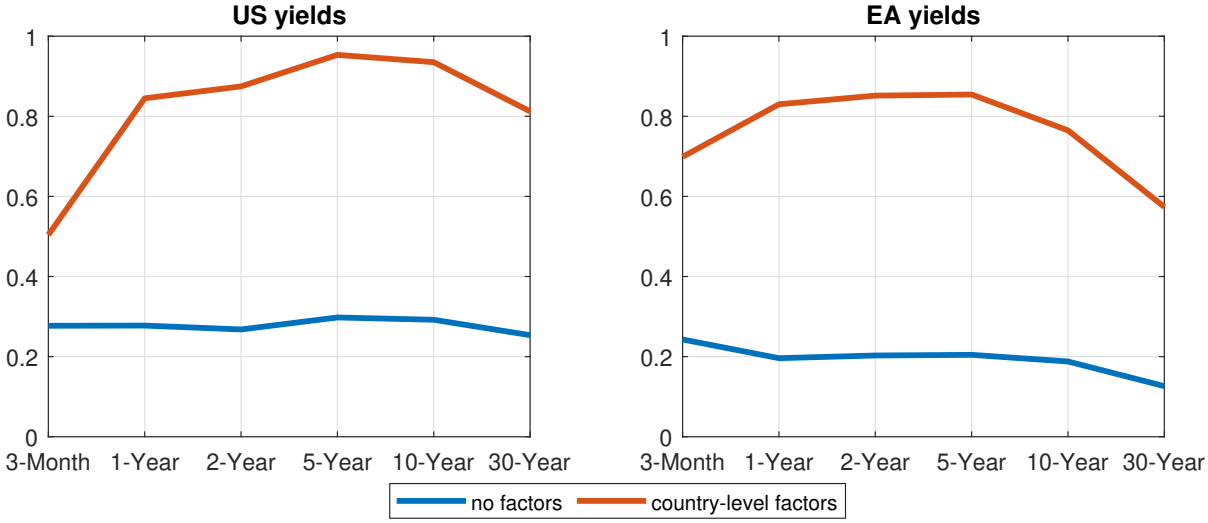
Maximum-likelihood estimation results of equation (3), i.e. adding country-level release factors to the observable surprises.

Figure 1: Country-level Factors

(a) Effect on Yield Curve



(b) Adj. R^2



Factor loadings and adjusted R^2s from Table 4. Solid lines refer to point estimates, dashed lines to 95% confidence bands.

In equations (2)-(4), the shocks ε_t are assumed to be mutually uncorrelated. Thus any common movements in yields that are not explained by the observable surprise will be soaked up by the latent factor. This makes for a potential model mis-specification. Including the ever-present factor resolves this problem, as the common movement can be ascribed either to the latent news or the background noise factors, depending on the variance-covariance matrices in announcement and control windows. Thus equation (5) is our preferred specification.

Estimating this model, as in Table 5 and Figure 2, we find that the ever-present factor has almost identical effects on US and EA yields. In contrast to the latent news factors, however, the loadings are less hump-shaped and instead increase with maturity. Including the ever-present factor, we have virtually perfect fits for the entire US and EA yield curves beyond the 1-year maturity. What is striking, moreover, is how much explanatory power the ever-present factor has for EA yields. At the 10-year maturity, for instance, when we exclude the ever-present factor the R^2 drops from almost 100% to 60% for EA yields, but only to 80% for US yields. The same is true for most other maturities. That is, news explain yield curve movements less well in the EA than the US. This might be because euro area news comes out in a more staggered manner than in the US, with data first coming out at the sub-national level, then at the national level, and then at the euro area level.

Table 5: Release-Specific & Ever-Present Factor

(a) US yields

	3-Month	1-Year	2-Year	5-Year	10-Year	30-Year
FOMC	2.85***	1.88**	1.07***	1.02**	0.64**	0.22
Nonfarm Payrolls	1.72***	5.26***	4.12***	4.88***	3.86***	3.32***
Initial Jobless Claims	-0.18***	-0.54***	-0.45***	-0.54***	-0.46***	-0.39***
Durable Goods Orders	0.44**	0.96***	0.71***	0.83***	0.65***	0.56***
Employment Cost	-0.02	0.01	0.05	0.26	0.20	0.11
Retail Sales	0.00	-0.05	0.10	0.13	0.12	0.07
Retail Sales Ex Auto	0.31	1.10***	1.01***	1.17***	0.92***	0.90***
GDP	0.48***	1.28***	1.07***	1.41***	1.18***	1.04***
CPI	-0.08	-0.08	-0.06	-0.02	0.02	0.06
Core CPI	0.56***	1.44***	1.24***	1.30***	1.01***	0.87***
PPI	0.08	0.16	0.03	0.04	0.12	0.17
Core PPI	0.24**	0.62***	0.53***	0.59***	0.49***	0.47***
Hourly Earnings	0.33**	1.30***	1.10***	1.65***	1.27***	0.94***
Unemployment	-0.61***	-1.74***	-1.38***	-1.61***	-1.18***	-0.91***
ECB GCM	0.26*	0.30*	0.01	0.18	0.21	0.04
Euro area M3	0.03	0.12***	0.03	0.08**	0.04	0.04
Euro area Consumer Prices	0.00	0.08*	0.08***	0.09**	0.08**	0.07**
Germany Factory Orders	0.12***	0.15***	0.11***	0.16***	0.12***	0.09***
Germany Industrial Production	-0.02	0.05	0.09*	0.05	0.01	-0.04
Germany ifo Business Climate	0.06	0.27	0.56**	0.18	-0.16	-0.11
Germany ifo Current assessment	0.01	0.12	-0.11	0.14	0.34***	0.25**
Germany ifo Expectations	0.00	-0.08	-0.25	-0.02	0.17*	0.16
Germany ZEW Expectations	0.06	0.14***	0.19***	0.22***	0.21***	0.19***
Germany ZEW Current Situation	0.00	0.01	0.03	0.08**	0.04	-0.01
F FOMC 1st	-0.04	1.77**	2.24***	3.75***	3.06***	2.29***
F FOMC 2nd	0.28	2.54*	2.34**	3.07***	1.94***	0.75
F FOMC 3rd	2.19***	5.17***	3.73***	2.92***	1.78***	1.05**
F Nonfarm Payrolls	2.05***	5.22***	4.02***	3.93***	2.77***	2.06***
F Initial Jobless Claims	0.38***	1.62***	1.48***	1.74***	1.46***	1.39***
F Durable Goods Orders	1.80**	2.22***	1.44***	1.61***	1.32***	1.35***
F Employment Cost	0.73***	2.04***	1.78***	1.84***	1.38***	1.01**
F Retail Sales Ex Auto	0.87***	2.83***	2.29***	2.06***	1.53***	1.19***
F GDP	0.32*	1.95***	1.74***	1.79**	1.38	1.17
F Core CPI	0.92***	2.57***	2.15***	2.23***	1.66***	1.39***
F Core PPI	0.60***	2.01***	1.66***	1.89***	1.46***	1.22***
F ECB GCM 1st	0.15	0.42**	0.17	-0.04	-0.21	-0.52**
F ECB GCM 2nd	-0.03	0.27	0.23	0.42	0.40	0.44
F ECB GCM 3rd	0.30**	0.53**	0.32**	0.68***	0.73***	0.99**
F Euro area M3	0.05	0.10	0.04	0.10**	0.08*	0.08
F Euro area Consumer Prices	0.05	0.18*	0.07	0.12*	0.13***	0.16***
F Germany Factory Orders	0.02	0.08	0.06	0.11**	0.13**	0.10***
F Germany Industrial Production	0.04	0.06	0.05	0.03	0.09**	0.10**
F Germany ifo Business Climate	0.06	0.23***	0.19***	0.27***	0.24***	0.18***
F Germany ZEW Expectations	-0.02	0.04	0.03	0.11**	0.08	0.09*
Ever-present Factor	0.17***	0.63***	0.55***	0.84***	0.79***	0.81***
R^2 no factor	0.28	0.28	0.27	0.30	0.29	0.25
R^2 release-specific factors	0.66	0.88	0.88	0.86	0.78	0.64
R^2 all factors	0.67	0.92	0.93	0.98	0.97	0.89

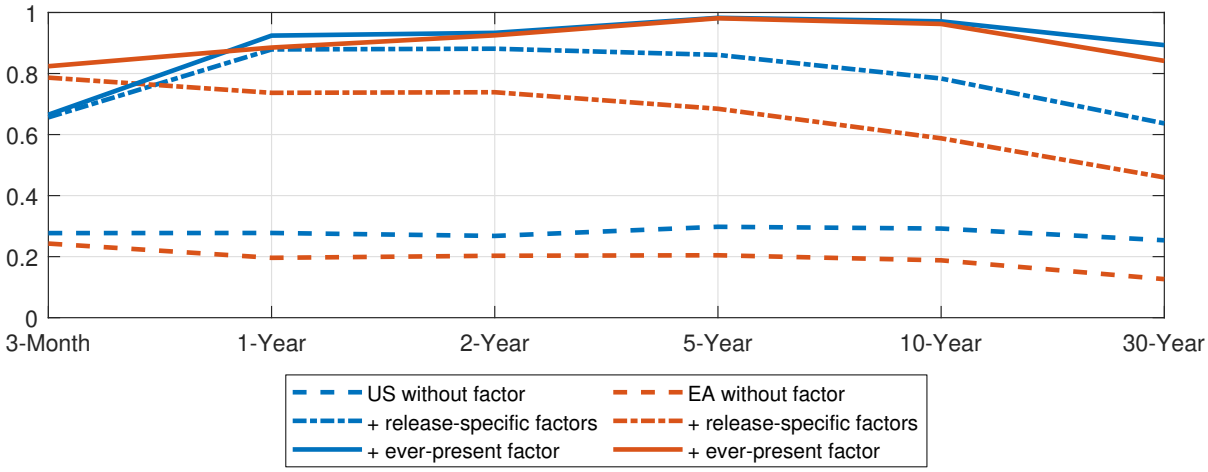
(b) EA yields

	3-Month	1-Year	2-Year	5-Year	10-Year	30-Year
FOMC	0.79***	0.98**	0.80**	0.82**	0.46*	0.36
Nonfarm Payrolls	0.76***	2.22***	1.79***	2.33***	2.07***	1.86***
Initial Jobless Claims	-0.12***	-0.30***	-0.29***	-0.36***	-0.31***	-0.24***
Durable Goods Orders	0.18**	0.45***	0.30***	0.45***	0.40***	0.30***
Employment Cost	0.01	-0.22	-0.18	-0.07	0.08	0.07
Retail Sales	-0.04	0.11	0.10	0.08	0.01	0.05
Retail Sales Ex Auto	0.13	0.21	0.22	0.37**	0.42***	0.41***
GDP	0.17***	0.88***	0.84***	1.01***	0.92***	0.81***
CPI	-0.02	-0.02	-0.06	-0.02	0.00	-0.03
Core CPI	0.07*	0.38***	0.30***	0.48***	0.46***	0.36***
PPI	0.00	0.10	0.09	0.05	0.03	0.03
Core PPI	0.05	0.16*	0.14	0.26***	0.24**	0.23***
Hourly Earnings	0.16**	0.42**	0.33**	0.57***	0.66***	0.60***
Unemployment	-0.23***	-0.68***	-0.50***	-0.73***	-0.67***	-0.56***
ECB GCM	2.14***	1.99***	1.82***	1.29***	0.52**	0.09
Euro area M3	0.09**	0.24***	0.13**	0.10*	0.07*	0.06
Euro area Consumer Prices	0.08*	0.25**	0.20**	0.22**	0.16**	0.14**
Germany Factory Orders	0.09*	0.25***	0.15**	0.20**	0.17***	0.12*
Germany Industrial Production	0.05	0.13**	0.14**	0.10	0.05	0.01
Germany ifo Business Climate	0.05	0.28	0.29	0.24	-0.00	-0.56
Germany ifo Current assessment	0.32**	0.69***	0.54**	0.63***	0.57***	0.78***
Germany ifo Expectations	0.02	0.11	-0.01	0.08	0.18	0.43
Germany ZEW Expectations	0.16**	0.42***	0.37***	0.42***	0.37***	0.27***
Germany ZEW Current Situation	0.11	0.03	-0.02	0.04	0.05	-0.03
F FOMC 1st	-0.17	0.18	0.27	0.95***	1.17***	0.83**
F FOMC 2nd	0.74**	2.23***	2.00***	2.16***	1.43**	0.83*
F FOMC 3rd	0.40	1.01*	0.79	0.57*	0.52***	0.66***
F Nonfarm Payrolls	0.76***	1.92***	1.43***	1.37***	1.05***	1.01***
F Initial Jobless Claims	-0.09	0.04	0.08	0.24	0.36*	0.30*
F Durable Goods Orders	0.48**	0.69***	0.19	0.23	0.27	0.15
F Employment Cost	0.16**	0.28*	0.31	0.44*	0.58***	0.55***
F Retail Sales Ex Auto	0.43***	1.02***	0.75***	0.74***	0.54***	0.39**
F GDP	0.15**	1.26***	1.00***	1.06***	0.71*	0.61*
F Core CPI	0.18***	0.60***	0.51***	0.66***	0.63***	0.55***
F Core PPI	0.23***	0.58***	0.45***	0.53***	0.56***	0.52***
F ECB GCM 1st	1.88***	2.75*	2.36	1.43	-0.37	-1.16*
F ECB GCM 2nd	0.56	2.19	2.18	2.84***	2.15***	1.08
F ECB GCM 3rd	2.69***	2.79***	2.03***	1.76***	1.48**	1.31*
F Euro area M3	0.25***	0.47***	0.42***	0.46***	0.31***	0.20
F Euro area Consumer Prices	0.30***	0.69***	0.60***	0.79***	0.59***	0.41***
F Germany Factory Orders	0.29***	0.50***	0.42***	0.49***	0.34***	0.14
F Germany Industrial Production	0.22***	0.46***	0.52***	0.55***	0.42***	0.30***
F Germany ifo Business Climate	0.50***	1.31***	1.11***	1.15***	0.78***	0.56***
F Germany ZEW Expectations	0.32***	0.67***	0.59***	0.69***	0.50***	0.40***
Ever-present Factor	0.23***	0.67***	0.62***	0.84***	0.80***	0.70***
R^2 no factor	0.24	0.20	0.20	0.20	0.19	0.13
R^2 release-specific factors	0.79	0.74	0.74	0.68	0.59	0.46
R^2 all factors	0.82	0.89	0.93	0.98	0.96	0.84

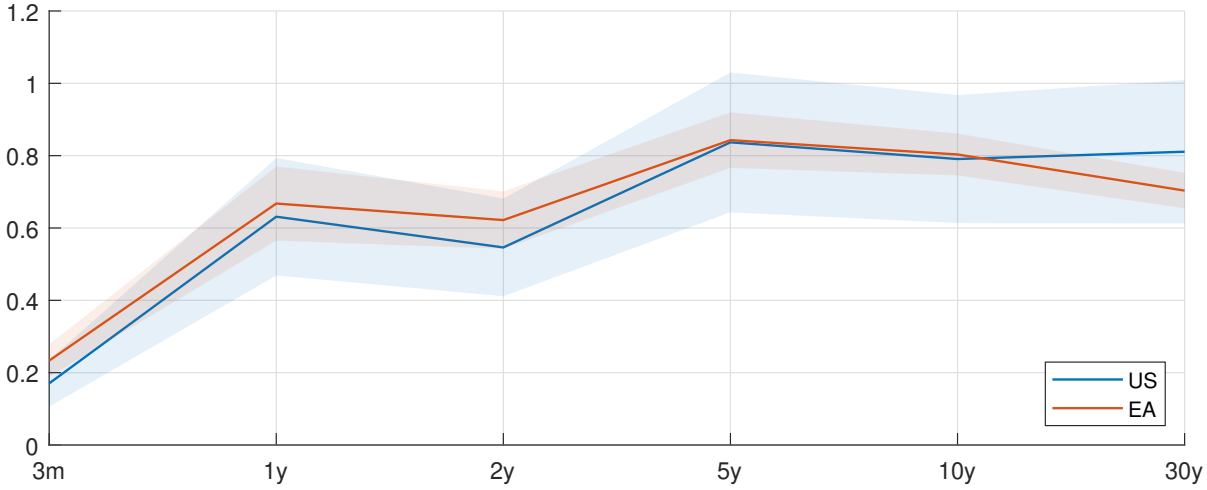
Maximum likelihood estimation results of equation (5), i.e. adding release-specific factors and an ever-present factor to the observable surprises. Standard errors are omitted for brevity.

Figure 2: Model with Release-Specific & Ever-Present Factor

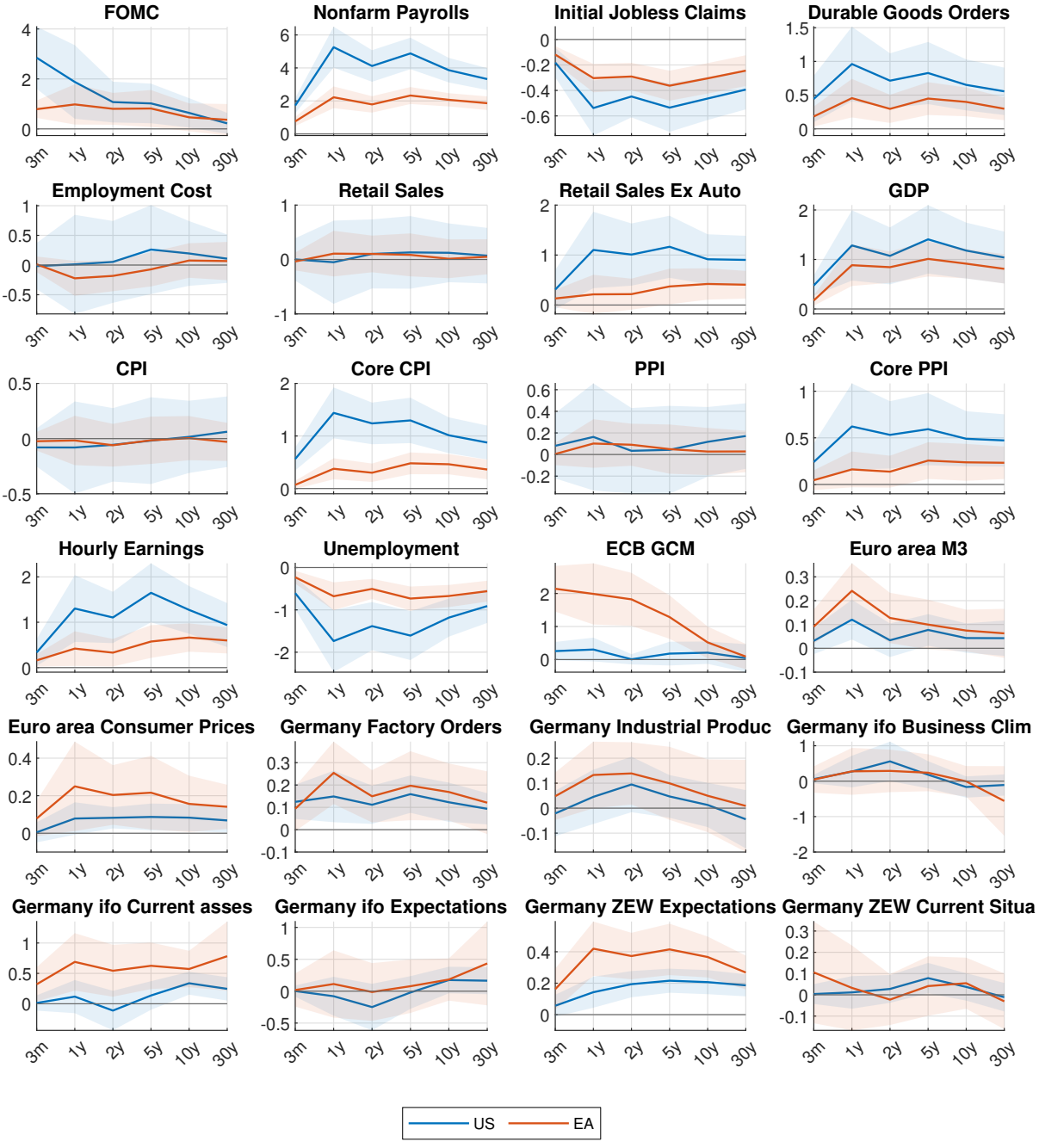
(a) Adj. R^2



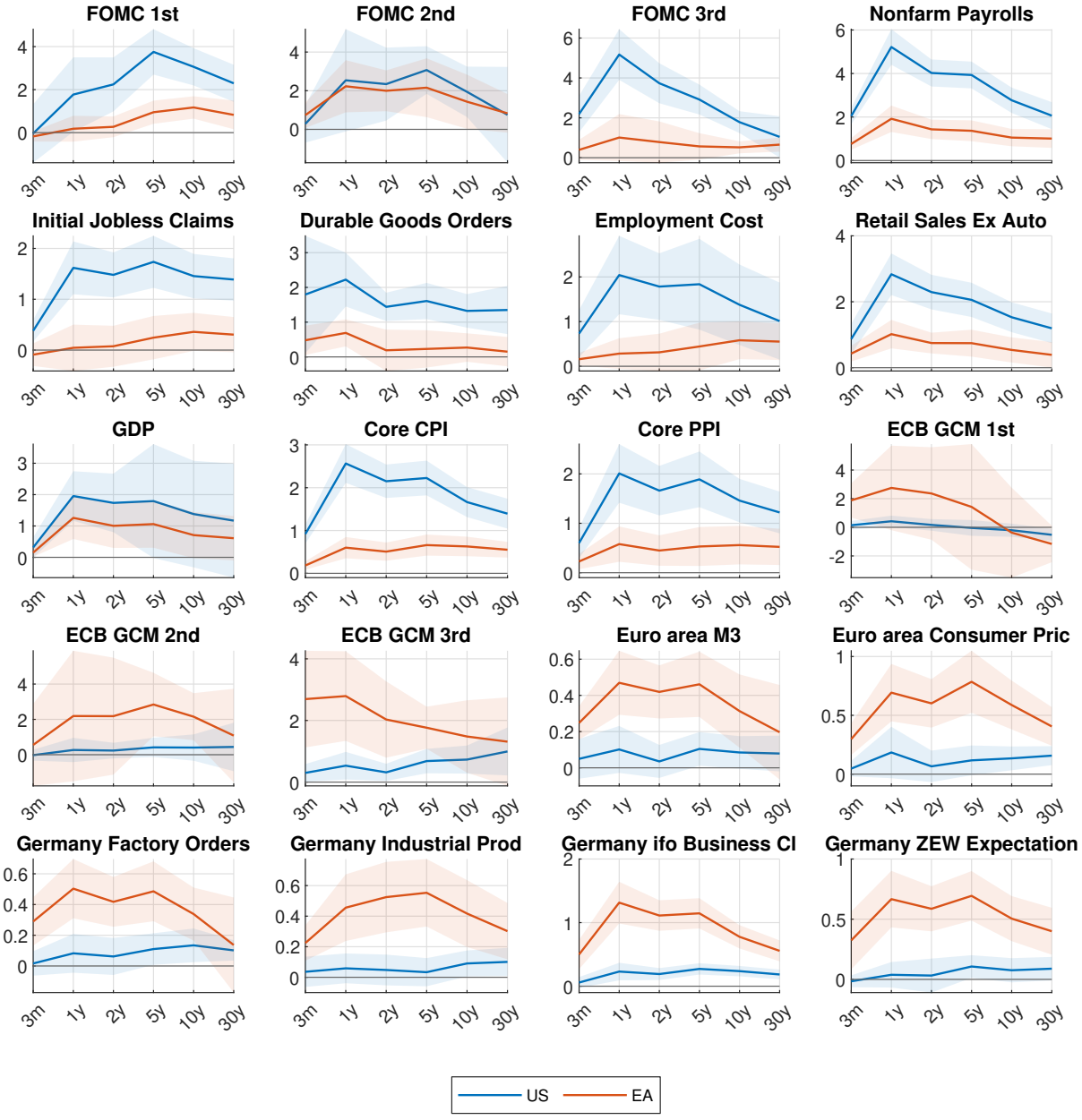
(b) Effect of Ever-Present Factor



(c) Effect of Observable Surprises



(d) Effect of Release-Specific Latent Factors



Results from Table 5. Solid lines refer to point estimates, shaded areas to 95% confidence bands.

4.3 Anchoring of inflation expectations

Do long rates in the euro area respond less to news because the policy framework better anchors inflation expectations? To test this hypothesis, we regress changes in market-based measures of long-term inflation expectations in the US and EA onto observable news and the factors that we have estimated.[8]

Table 6 shows the results from regressing changes in market-based inflation expectations on the same set of regressors as in Table 5, i.e. observable surprises, release-specific factors, and an ever-present factor. The table largely verifies the above mentioned conjecture: US long-term inflation expectations respond much more strongly to news than their EA counterparts. This effect is entirely driven by domestic US news, both observable and unobservable ones.

That US inflation expectations respond more to observable surprises than their EA counterparts has already been documented by Gürkaynak, Levin and Swanson (2010a) and Beechey, Johannsen and Levin (2011). But remember that the observable surprises are a minority of the news in any release, as shown in Section 4.2. Most of the event related variance is explained by unobservable latent surprises. Hence, responding more to the latent news is what makes US inflation expectations more volatile.

One further testable claim of our hypothesis can be derived from the fact that the Fed announced its explicit two percent inflation target only on January 25, 2012. Our above-mentioned hypothesis implies that the sensitivity of US inflation expectations to news should have decreased after this announcement.

The bottom two panels in Table 6 confirm this prediction. Prior to the target announcement, US long-term inflation expectations responded significantly to both types of news. Since the announcement, inflation expectations do not respond to news anymore, neither to observable nor unobservable ones.

[8]For the US, we use breakeven inflation rates from Gürkaynak, Sack and Wright (2010b). For the euro area, we use inflation-linked swaps, since the inflation-indexed bond market is small. In both cases, we study 5y5y and 9y1y rates, i.e. the 5-year inflation rate beginning in 5 years and the 1-year rate beginning in 9 years. Of course, these market-based inflation expectations are not necessarily physical expectations; they also incorporate inflation risk premia.

Table 6: Response of Market-Based Inflation Expectations to (Un)Observable News

	US 5y5y	US 9y1y	EA 5y5y	EA 9y1y
Full Sample				
US Observable News	8.16^{***}	11.48^{***}	0.02	1.59
US Unobservable News	3.29^{*}	2.19	0.62	0.01
EA Observable News	0.49	0.90	2.03	2.76^{*}
EA Unobservable News	1.81	1.60	0.00	0.11
Background Noise	0.49^{***}	0.45^{***}	0.16	0.13
Pre-2012 Sample				
US Observable News	5.31^{**}	9.06^{***}	0.02	1.23
US Unobservable News	4.95^{**}	2.27	0.61	0.14
EA Observable News	0.02	0.32	1.44	0.72
EA Unobservable News	1.18	0.96	0.01	0.06
Background Noise	0.48^{**}	0.50^{**}	0.19	0.15
Post-2012 Sample				
US Observable News	0.51	0.97	0.00	0.00
US Unobservable News	1.69	2.51	0.05	0.15
EA Observable News	0.10	0.37	1.62	4.01^{**}
EA Unobservable News	0.40	0.46	0.00	0.77
Background Noise	0.52^{***}	0.23	0.09	0.15

Each column refers to a regression of changes in market-based inflation expectations onto the same set of regressors as in Table 5, i.e. 14 observable US news, 11 unobservable US news (the release-specific factors), 10 observable EA news, 9 unobservable EA news and background noise (the ever-present factor). All regressors are cumulated to daily frequency and then standardized to mean zero and unit variance. Each cell refers to an F-test statistic of the null hypothesis that all regressors mentioned at the beginning of the row are jointly zero. Table B4 in the Appendix contains detailed results for the full sample regression. For the background noise, the cells contain the coefficient estimates of the ever-present factor, i.e. the change in inflation expectations (in basis points) to a one standard deviation shock in the ever-present factor.

The ever-present "background noise" factor, lastly, also has much stronger effects on inflation expectations in the US than in the EA.

5 Conclusions

We understand exactly what moves yields in event windows, i.e. around macroeconomic data releases and monetary policy announcements. That understanding is common for the US and the EA. Short yields are affected almost exclusively by news, while long yields owe more of their variance to noise, depending on how firmly inflation expectations are anchored. While the ECB was a credible inflation targeter since its inception, the Fed only articulated a numerical inflation target in 2012. Hence, prior to 2012, news played a larger role in driving US long term yields.

Being able to do the analysis we have and coming to the conclusion just spelled out requires pinning down news and noise in a reliable way. We were able to do so by employing what is in essence a joint application of OLS and heteroskedasticity-based identification. The efficient estimator we utilized backed out responses to headline news, as well as backing out latent news and ever-present noise, and yield curve responses to these.

We have taken what will hopefully be an important step in understanding what moves yields in the US and EA. Now waiting to be studied are questions about the nature of these news – what is so special about US news that they move EA yields, or the few EA news that move US yields – and perhaps even more interestingly about the nature of noise. We show that noise is an important driver of yields but we are yet to understand what it is and why it affects bond prices the way it does. We hope others will find these questions that we are now able to ask properly as interesting as we do.

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