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‘Macroeconomic Announcements, Confidence and Economic Activity Through the Business Cycles’

Barbara Casu Stefano Di Colli Giovanni Urga

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Emerging Markets Group
Bayes Business School City University
106 Bunhill Row London EC1Y 8TZ UK
www.bayes.city.ac.uk/emg/

Macroeconomic Announcements, Confidence and Economic Activity Through the Business Cycles *

Barbara Casu, Stefano Di Colli and Giovanni Urga†

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Abstract

We propose two new indices — the Business Confidence Surprise Index and the Industrial Production Surprise Index — to explore the relationship between economic confidence and business cycles across seven major economies (United States, Japan, United Kingdom, Germany, France, Italy, Spain) from 2000 to 2023. Using a Vector Autoregressive framework, we examine how macroeconomic surprise shocks propagate through economic confidence and activity. We find that macroeconomic surprise shocks have a lasting influence on economic activity. The long-term effects are significantly stronger during periods of financial distress and low economic confidence, suggesting heightened sensitivity to such shocks in adverse conditions.

Keywords: Macro Announcements and Surprises; Economic Confidence, Business Cycles.

JEL Codes: C32, E12, E32, E43, E44, F44, G01

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†*Corresponding author: Giovanni Urga.* Barbara Casu, Bayes Business School (formerly Cass), London, UK (b.casu@city.ac.uk). Stefano Di Colli, Bayes Business School (formerly Cass), 106 Bunhill Row, London EC1Y 8TZ, United Kingdom; stefano.di-colli@bayes.city.ac.uk) and Centro Studi Confindustria. Giovanni Urga, Bayes Business School (formerly Cass), London, UK (g.urga@city.ac.uk)

nal expectations have been reformulated to include economic sentiment. Benhabib et al. (2016) and Acharya et al (2021) attribute macroeconomic fluctuations to purely psychological sunspot-driven waves while suggesting that it is the subsequent actions triggered by these waves that cause changes in fundamentals. This perspective rationalizes the initial boom or bust in confidence as expectations eventually materialize.

An alternative stream of literature, known as *news view*, suggests that a relationship exists between economic confidence and subsequent macroeconomic activity because confidence measures contain fundamental information about the current and future state of the economy (Cochrane, 1994). In this case, optimism (pessimism) arises when agents learn about forces that will positively (negatively) affect the future value of fundamentals. This approach emphasises the role of new information (Barsky and Sims, 2011, 2012; Blanchard et al, 2013; Beaudry and Portier, 2014; Chahrour and Jurado, 2018).

Macroeconomic announcements are one of the most effective channels through which new information arrives to agents. Market participants, economists, and the media interpret the new information, use it to make decisions, and update their views on the next release of the same or other relevant economic variables. An important characteristic of macroeconomic announcements is that they are scheduled, namely, are released at dates and times known in advance, thus carrying quantitative content on which agents can formulate precise expectations (Hardouvelis, 1988). The regularity of the release allows agents to formulate expectations based on the model of the economy they have in mind and their efficiency in distinguishing between noise and market signals. Agents' confidence is mainly affected by the unexpected component (surprise), defined as the difference between the actual and expected values of the announcements. If markets are efficient, agents react when the actual releases differ from their expectations: "news" moves the markets (Gürkaynak and Wright, 2013).

We focus on the unexpected information (surprises) coming from macroeconomic announcements, and we postulate that the releases of macroeconomic announcements,

when different from expectations, can induce persistent changes in the information set about the fundamentals of the economy, thus affecting agents' predictions about future states of the economy. This change can have a structural impact on economic confidence not only as a temporary psychological wave, as postulated by the *animal spirits* point of view but as a long-term effect reflected in a persistent change in economic activity. We contribute to the stream of literature analysing the connection between surprises, economic confidence and economic activity by implementing an empirical strategy composed of the following steps. In the first step, we evaluate the role played by the arrival of new information (surprises) on economic and financial variables by estimating their impact on business confidence and economic activity (industrial production) for each country in our sample. To the best of our knowledge, this is the first paper to evaluate the direct impact of macroeconomic surprises on economic activity and business confidence, incorporating global announcements coming from the US, major European economies and Japan, with macroeconomic announcements released throughout the global trading day in different time zones. In the second step, building on the literature on surprise indices (Altavilla et al, 2017; Scotti, 2016; among others), we construct two novel surprise indices, namely the BCSI and IPSI, by aggregating the significant macroeconomic surprises identified by implementing the automated selection procedure *Autometrics* (Doornik, 2009), that allows us to improve the adjusted R^2. We also check the robustness of the final specification to the presence of latent variables and local and global shifts via an extensive indicator saturation procedure (Castle et al., 2023). In the third step, building upon the framework of Swanson and Williams (2014), Gardner et al (2022) and Bauer and Swanson (2023), we explore how the impact of macroeconomic announcement surprises changes over the different business cycles, isolating their time-varying effects. Our estimations cover the period from January 2000 to April 2023, allowing us to include several business cycles along with periods of financial crises and geopolitical turbulence. Time-varying estimates show that macroeconomic announcement surprises have a statistically signif-

icant impact on confidence and economic activity throughout the entire time sample. However, the impact is more significant during the periods of turbulence. This result is in line with the literature that suggests that during periods of crises or recessions, the capacity of agents to make predictions deteriorates as uncertainty increases (Scotti, 2016). Finally, we investigate the transmission mechanism from macroeconomic surprise shocks to economic confidence and economic activity in a vector autoregressive (VAR) framework, following the recursive approach proposed in Levchenko and Pandalai-Nayar (2020). The use of our proposed $BCSI$ and $IPSI$ allows us to distinguish confidence shocks due to the arrival of relevant unexpected macroeconomic information (economic situation news) from variations in expectations not related to current or future changes in economic activity (sentiment). We provide robust evidence that the arrival of new information persistently affects confidence and economic activity, confirming the *news view* hypothesis. The variance decomposition analysis highlights the effectiveness of our approach: surprise shocks, particularly those on confidence, have a predominant role. Compared with Enders et al. (2021), who find that the contribution of belief shocks to output fluctuations to be about 40%, our VAR analysis explains more than 50% of the forecast error variances of the economic activity of all countries included in this analysis (from a minimum of 56% for Germany to a maximum of 73% for France). The results of the VAR model are robust to changes in variable ordering, estimation sample, filters applied to the automated model selection procedure, the VAR estimation technique, and the introduction of additional macroeconomic and financial control variables.

The remainder of the paper is organised as follows. Section 2 discusses the main properties of the data used in the empirical investigation, including macroeconomic announcement surprises, business and industrial production confidence and other financial and economic variables. In Section 3, we report the empirical analysis: the estimates of the effects of macroeconomic surprises on business confidence and industrial production (Section 3.1), the construction of surprise indices (Section 3.2), their time-varying impact

(Section 3.3), the transmission mechanism of macroeconomic surprises (Section 3.4), the state-dependent analysis (Section 3.5) and finally the sensitivity analysis (Section 3.6). Section 4 concludes.

2 Data

2.1 Sample

We use time series data from 3 January 2000 to 28 April 2023 (T=280 observations), available in real time and monthly frequencies for the United States, Japan, the United Kingdom, Germany, France, Italy, and Spain. The number of observations for macroeconomic announcements differs, with some news released or surveyed/recorded by Bloomberg only after January 2000 (see Table 1 for more details).

2.2 Variables

The dataset contains a selection of (K=)137 actual and expected macroeconomic announcements, and a set of macroeconomic indicators such as the business confidence index, the consumer confidence index, the industrial production index, and the consumer consumption index.

The first group of variables of actual and expected real-time macroeconomic announcements is released monthly, part of them quarterly, only the Initial Jobless Claim at a weekly frequency. A detailed list of announcements is reported in Tables 1-4, which summarise the main features of announcements: Column (i) contains the unit of measurement, Column (ii) the number of observations, namely how many announcements were released within the sample, Column (iii) the frequency, and finally Column (iv) the time of the releases.

[Insert Tables 1-4 about here]

Note that agents look at more than one release for some of the variables listed in Table 1. Examples include real GDP, which has preliminary, final and advanced releases; Durable Goods and the University of Michigan Confidence indicator, which have preliminary and final releases. In our analysis, these different releases are used as separate variables.

The expected values of announcements are the surveys collected by Bloomberg considered the main benchmark for market expectations (Balduzzi et al., 2001; Andersen et al., 2003; Scotti, 2016; Altavilla et al., 2017; Caruso, 2019).

Data from the Economic Calendars (ECO) provided by Bloomberg are used to proxy the real-time information available to market participants. For each macroeconomic announcement, Bloomberg Economic Calendars makes its realised (actual) value and the predicted (expected) value available. The expected values are obtained by conducting a survey among a panel of market participants. The ECO survey forecasts procedure typically starts one to two weeks before each release and is updated in real-time until the macroeconomic variable is officially released. They are available from a few days before the announcements and can be updated by the respondents up to one hour before the release. The survey value is calculated as the median (consensus) forecast. Using the official value released and the corresponding ex-ante expectation for each macroeconomic variable permits measuring the size and direction of the unexpected component (surprise) of macroeconomic announcements at each point.

We measure the surprise in the k-th announcements as the difference between actual and expected values: $FS_{k,t} = A_{k,t} - F_{k,t}$ where $A_{k,t}$ is the released value of the k-th announcement at time t for k going from 1 to 137; $F_{k,t}$ indicates the median of the Bloomberg survey expectations among practitioners given their information set at time t. If variable k-th is not released at time t, $A_{k,t}$=$F_{k,t}$=0, then the surprise is zero as well. In other words, forecast surprises are constructed as daily vectors equal to $FS_{k,t}$ on those days when a piece of news occurs, to 0 otherwise or when $A_{k,t} = F_{k,t}$. Since

units of measures change significantly across economic variables, $FS_{k,t}$ are standardised (Balduzzi et al., 2003; Andersen et al., 2003, among others) by their standard deviation σ_k, calculated only on those days where a news occurs:

$$S_{k,t} = \frac{FS_{k,t}}{\sigma_k}. \tag{1}$$

The direction of the effect of surprises is a matter to be determined empirically. For example, if GDP growth is higher (lower) than expected, $S_{GDP,t} > 0$ ($S_{GDP,t} < 0$)), this is positive (negative) news. In contrast, there is a subset of indicators for which the sign of surprise has an inverse meaning. If unemployment is higher (lower) than expected $S_{Unem,t} > 0$ ($S_{Unem,t} < 0$), it is a negative (positive) surprise. The subset of surprises with reversal economic interpretation consists of the unemployment rate and public deficit. At the same time, inflation surprises (regarding CPI, core CPI and PPI) can be ambiguously interpreted. During periods of weak or negative economic growth and inflation rate consistently lower than the Central Bank inflation target, the value of an inflationary announcement higher than expected can be read as a positive surprise. The opposite occurs during good economic times and/or when the inflation rate is higher or too close to the Central Bank's inflation target.

We consider business confidence indicators and industrial production indices among the macroeconomic variables. The OECD reports all of them on a monthly basis. In particular, confidence indicators are smoothed, normalised, and seasonally adjusted, while Industrial Production and Retail Sales indices are seasonally adjusted. Table 5 shows the summary statistics, highlighting that the minimum value of all variables was reached in the first semester of 2020, which corresponds to the peak of the Covid-19 pandemic. Table 5 also reports preliminary statistics on Economic Policy Uncertainty (EPU, Baker et al. 2016) indices, which are included as control variables in the robustness checks.

[Insert Table 5 about here]

3 Empirical analysis

3.1 Impact of Surprises on Business Confidence and Economic Activity

This section describes the identification strategy for economic activity behaviour. We follow a recursive approach based on Levchenko and Pandalai-Nayar (2020), Barsky and Sims (2011, 2012) and Benhima and Cordonier (2022).

Formally, we assume that the change in Industrial Production at time t (ipi_t) follows a moving-average process driven by a shock due to the unexpected part of the production at time t (ϵ^{ipi_t}), plus the shock given by the arrival of unexpected relevant information ($\epsilon_t^{news_t}$) that can change the information set available to the investors to decide at which level to set production:

$$ipi_t = \theta_1 \epsilon^{ipi_t} + \theta_2 \epsilon_t^{news_t} \tag{2}$$

We also assume that agents' expectations (e_t) about the state of the economy can be represented as a moving-average process of the following type:

$$e_t = \phi_1 \epsilon^{e_t} + \phi_2 \epsilon_t^{news_t} + \phi_3 \epsilon_t^{sent_t} + \eta_t \tag{3}$$

where not only the unexpected shock (ϵ^{e_t}) and the news shock (ϵ^{news_t}) can affect the level of expectations, but also a sentiment shock ($\epsilon_t^{sent_t}$). The latter captures variations in expectations not related to current or future changes in economic activity.

In our set-up, the shock due to the arrival of the unexpected relevant information (ϵ^{news_t}) is approximated by the unexpected component of the macroeconomic announcement released at time t, that is, the surprise as defined in Equation (1). Empirically, the unexpected component of macroeconomic announcement releases is used to model the arrival of new information relevant to investors and firms. We estimate the monthly

effect of macroeconomic announcement surprises on business confidence and industrial production to approximate $\theta_2 \epsilon^{news_t}$ and $\phi_2 \epsilon^{news_t}$ in Equations (2) and (3), respectively. To this aim, for each country, we estimate the following specification:

$$y_t = \alpha + \sum_{k=1}^{K} \beta_k S_{k,t} + \eta_t \tag{4}$$

where y_t is either the rate of change of the Business Confidence or of the Industrial Production indices, respectively; t = from January 2000 to April 2023 with a monthly frequency, α is the constant, $S_{k,t}$ are the standardised surprises, for k which goes from 1 to K=137, β_k are the estimated impact of surprises on respectively the Business Confidence and the Industrial Production, η_t is the error term. Equation (4) indicates that each initial estimate includes all announcement surprises regarding the selected countries' economies. The standard errors are corrected for autocorrelation and heteroscedasticity by applying an HAC Newey-West standard errors technique.

[Insert Tables 6-7 about here]

Tables 6 and 7 report the estimated regression coefficients $\hat{\beta}_k$ from Equation (4) for the United States[1], with respect to Business Confidence (Table 6) and Industrial Production (Table 7) indices as dependent variables. In column (i), we report the result of the regression which includes the full set of announcement surprises, as in Altavilla et al. (2017). Columns (ii)-(iv) report the estimated regression coefficients associated with macroeconomic surprises selected with the automated model selection procedure *Autometrics* at 90%, 95% and 99% confidence levels, respectively.[2] Evidence shows that

[1] We do not report the results for the other countries but they are available upon request.

[2] *Autometrics* is an automatic model selection programme, within the general-to-specific framework also known as the 'Hendry' or 'LSE' methodology, based on a tree-search structure commencing from a general unrestricted model (GUM) and selecting congruent, parsimonious encompassing simplifications. The main procedure involve the following steps: divide the complete set of variables and indicators into sub-blocks smaller than T/2; select within each block, where many variables are included in each block and record which variables are relevant in each multiple block search, and collect information across blocks on which matter when others that are significant are also included. At each stage, *Autometrics*

a large set of macroeconomic announcement surprises significantly influences the monthly delta-logs of Business Confidence and Industrial Production. Among others, the first set of confidence-moving indicators includes qualitative surveys such as the Conference Board Consumer Confidence index, the ISM manufacturing surveys, the Chicago PMI index, and the Leading Indicator index. Because of their timeliness, these soft data (the Leading Indicator index partially includes hard data information) are particularly important (as in Altavilla et al, 2017) for the confidence of economic agents, but not for the economic activity.

A second set of relevant indicators includes data about economic fundamentals. Variables summarising labour market dynamics, such as Unemployment (relevant for Business Confidence), change in Nonfarm Payrolls (for Industrial Production), and Initial Jobless Claims (for both), are found to be important. Again, these variables are also very timely (Jobless Claims, for example, are released on a weekly basis). Other macroeconomic announcements significantly affecting business confidence and economic activity are the advanced releases of Real GDP, Capacity Utilisation and Core CPI (significant only for Industrial Production), Factory Orders, Industrial Production, Durable Goods, New House Sales (only for Business Confidence), Retail Sales and Personal Income (for both).

Finally, Industrial Production and Business Confidence are affected by a large set of macroeconomic announcement surprises released by all countries included in the dataset. This allows us to control for the role of global surprises in confidence fluctuations and, consequently, their impact on business cycles. By incorporating macroeconomic an-

groups variables into those already selected and those not yet selected. Variables that are not currently selected are divided into sub-blocks, and the search switches between an expansion step, selecting within the not-selected sub-blocks to find significant omitted variables. This process is repeated until the current model is small enough for the usual algorithm, and further searches do not locate any additional significant omitted variables. It is infeasible to test the GUM for mis-specifications if $N > T$, so the programme selects as if the estimable sub-models were well specified and seeks to move to a final choice that is congruent. This approach selects a statistically robust and simplified model from a complex initial set of variables. (Hendry et al, 2008; Doornik, 2009; Castle et al., 2012; Castle et al., 2023)

nouncements from all countries in our sample, we account for the different time zones into which the global trading day is divided.

The sign of the statistically significant coefficients of macroeconomic announcements about the economy of the same country is typically positive: good macroeconomic news (positive surprise) leads to an improvement of the expectations about the economy's future, then to an increase in economic activity. There are some exceptions, in particular for those announcements with a reversal economic meaning (a greater than expected Unemployment or Initial Jobless Claims is a bad surprise) or for those with potentially inflationary implications that may create expectations of future monetary policy tightening (Factory Orders, New House Sales, Capacity Utilisation, Retail Sales index). The sign of the Consumer Price Index can also be ambiguous: if it is greater than expected when the inflation is below the monetary policy target, it can be considered a positive surprise; the opposite is when the inflation is above it.

Looking at the size of the estimated significant coefficients, the most relevant macroeconomic surprises are those related to the labour market (in particular, Unemployment for Business Confidence, non-farm Payroll Change, and Initial Jobless Claim for Industrial Production).

Tables 6 and 7 (last row) and Table 8 report the adjusted R^2 values for the regressions from Equation (4). Macroeconomic announcement surprises explain a predominant fraction of Business Confidence and Industrial Production. Looking at Column (iii) of Table 8 (adjusted R^2 obtained at 95% confidence level) the adjusted R^2 represents on average 69.7% of the Business Confidence (from a minimum of 58.4% for the United States to a maximum of 76.7% for Japan) and 68.0% of the Industrial Production (from a minimum of 44.8% for Japan, the only one below 50 per cent, and a maximum of 79.9% for Spain)[3].

[3]The R^2 are, on average, 1.5% higher for the Business Confidence index and 1.6% higher for the Industrial Production index when applying the selection procedure at 90% confidence level

The effectiveness of adopting *Autometrics* is demonstrated by the significant improvement achieved on average in the adjusted R^2: up to a maximum of +9.3% on average (from a minimum of 5.0% for Italy to a maximum of +14.5% for Japan) for the $IPSI$ equation, +8.4% (from a minimum of 5.3% for Spain to a maximum of 13.4% for the United Kingdom) for the $BCSI$ specification (Table 8).[4]

It is worth noticing that the estimated specifications are likely to be affected by multiple breaks, outliers and latent factors missing in Equation (2) that may compromise the validity of the estimated beta coefficients. We run an impulse-indicator saturation (IIS) procedure (Castle et al., 2012; Hendry et al., 2008; Marczak and Proietti, 2016) to tackle data contamination and remove extreme observations, as well as location shifts and innovation outliers. News shocks include a common component controlling for prevalent common shocks in the economy, applicable to all types of news shocks on output, inflation, employment, and financial markets. Good examples would, of course, include the COVID-19 pandemic or the global financial crisis, as well as global recessions or slowdowns in 2001, 2009, 2012-14, and 2020. To control for common shocks and to treat for breaks during the COVID-19 pandemic, we executed an IIS procedure that incorporates the common shocks and possible breaks. The robustness of our results (which are available upon request) is fully confirmed.

[Insert Table 8 about here]

3.2 Suprise indices

As the next step, country-specific $BCSI_t$ and $IPSI_t$ are constructed as the weighted average of the significant macroeconomic surprises (Scotti, 2016; Altavilla et al., 2017;

[4]It is important to note that most surveys are conducted during the first or second week of each month, meaning that daily news shocks can occur after the survey period. To account for potential reverse causality and spurious correlations, we re-estimated Equation (4) for the $BCSI$, using macroeconomic announcement surprises lagged by one month as regressors. The results, available upon request, confirm the significance of these surprises in explaining business confidence, although the adjusted R^2 values are smaller than those reported in Table 6.

Caruso, 2019), with weights being the beta estimated at previous step ($w_k = \hat{\beta}_k$):

$$SI_t = \sum_{k^*=1}^{K^*} \hat{\beta}_{k^*} S_{k^*,t} \tag{5}$$

where SI_t is either $BCSI_t$ or $IPSI_t$, K^* is the subset of K=137 macroeconomic announcements selected using 95% confidence level for each country Equation (4). The $BCSI_t$ and $IPSI_t$ which result from Equation (5) represent estimates respectively of $\theta_2 \epsilon_t^{news_t}$ from Equation (2) and $\phi_2 \epsilon_t^{news_t}$ from Equation (3).

The economic literature has recently acknowledged the relevance of a meaningful surprise index. For instance, Scotti (2016) constructs both a surprise and an uncertainty index that weight market-based news using the contributions of the variables to common factors; Altavilla et al. (2017) aggregate macroeconomic news using a measure of their high-frequency impact on bonds, and show that their surprise index explains a relevant share of yield behaviour. Our contribution to this literature is twofold. First, we aggregate only statistically significant surprises selected by applying an automated model selection procedure, as illustrated in Section 3.1 (more details of the results are available upon request from authors). Second, we construct a $BCSI$ and an $IPSI$.

The interpretation of the surprise index sign is as follows. When the economy is doing well during expansionary periods, a positive surprise indicates that the release was even better than expectations (insufficient optimism or unjustified pessimism). Conversely, a negative surprise indicates that the economic performance was less than expected (over-optimism or insufficient pessimism). In recessionary periods, the mechanism has to be read in a negative light: when the value of the surprise index is negative, the economy is performing worse than even unfavourable expectations (insufficient pessimism or unjustified optimism); when it is positive, this is due not to an economic improvement but to excessive pessimism / insufficient optimism.

The resulting surprise indices are then used to approximate the structural shocks to

be included in a VAR framework in the next step of the analysis: the "news" shocks on confidence and economic activity, defined as the part of business confidence and industrial production explained by the macroeconomic announcement surprises. This methodology allows us to distinguish between shocks to expectations related to the country's economic activity and those unrelated (sentiment).

3.3 Time-Varying impact of Macro Announcement Surprises

This step of our empirical analysis involves estimating the time-varying impact of macroeconomic announcement surprises on the $BCSI$ and $IPSI$. This step also allows us to account for structural breaks caused by exogenous shocks, such as the COVID-19 pandemic or Brexit.

In line with Elenev et al. (2024), who provide strong evidence of a countercyclical sensitivity of the stock market to news across a wide range of macroeconomic news announcements, we investigate the time-varying effects of news to Business Confidence and Industrial Production by adopting a similar approach to Gardner et al. (2022) and Swanson and Williams (2014), In particular, we isolate the time-varying response of confidence and economic activity to macroeconomic announcement surprises via the estimation for each country of the following specification via nonlinear least-squares:

$$y_t = \gamma_j + \sum_{j=2000}^{2023} \delta_j SI_t \times Year_j + \eta_t \tag{6}$$

where y_t is, as in (4), either rate of change of Business Confidence or of Industrial Production indices, γ_j is a set of time-varying constants (equal to 1 during year j = 2000, 2001, ... , 2023), SI_t is one of two surprise indices, namely $BCSI_t$ in the equation with the Business Confidence as the dependent variable, and $IPSI_t$ in the equation with the Industrial Production as the dependent variable, interacted with year dummy variables $Year_j$ from 2000 to 2023, δ_j measure the time-varying impact, η_t is the error.

Figures 1 - 2 plot the estimates of $\hat{\delta}_{j,i}$ over time, along with 95 per cent confidence error bands. The upper part of Figures 1 - 2 shows that the impact of macroeconomic announcement surprises on the US $BCSI$ and $IPSI$ indices is statistically significant throughout the entire time horizon here considered, except only for the years 2012, 2014 and 2017. The other very relevant point that emerges from Figure 1 is that the announcements' surprise impact on the US Business Confidence is greater than the full sample average (greater than 1) during the periods 2000-2003, 2008-2011, 2015-2016, which correspond to periods of market turbulence and financial crises: the Dot.com crisis (2000-2001), the Global Financial crisis (2008-2009). The impact on the US $IPSI$ index is also greater than average during the crisis periods, although different ones: 2008-2010 (the Global Financial crisis) and 2020-2021 (the Covid-19 pandemic). The time-varying impact for other countries shows a similar pattern, with slight differences: a greater-than-average effect (in some cases marginal) is shown during the European Sovereign debt crisis (2010-2011, only for Japan, Germany, France and Italy) and in the first two years (2020-2021) of the Covid-19 pandemic. A statistically significant negative peak in 2018 occurred for the UK, probably due to the turbulence related to the implementation of the European Union Withdrawal Act two years after the Brexit referendum in 2016.

[Insert Figures 1 - 2 about here]

Next, we undertake a VAR analysis between the surprise indices, the $BCSI_t$ and the $IPSI_t$ to empirically investigate the transmission mechanism from macroeconomic surprise shocks to economic confidence and the economic activity to test the *news view* (Barsky and Sims, 2012) hypothesis against the *animal spirits* one.

3.4 Transmission mechanism of macroeconomic surprises

This section investigates the transmission mechanism from macroeconomic announcement surprises to business confidence and economic activity (industrial production). We build upon the work of Levchenko and Pandalai-Nayar (2020), Barsky and Sims (2011, 2012) to distinguish between news and sentiment. Specifically, we provide new evidence by using the information coming from macroeconomic announcement surprises to estimate the new business confidence surprise indices and industrial production surprise indices, as illustrated in Section 3.2, to approximate news shocks under Equations (2) and (3).

As noted by Levchenko and Pandalai-Nayar (2020), it is not possible to identify the three shocks in the system given by Equations (2) and (3), based on only Industrial Production and an expectation variable, here approximated by the Business Confidence index. Thus, to measure the relationship between macroeconomic announcement surprises, confidence and economic activity, we estimate a Vector Auto-Regressive (VAR) framework, including first the $BCSI_t$, which isolates the effect of announcement surprises on business confidence ($\phi_2 \epsilon^{news_t}$ from Equation (3)), the $IPSI_t$, which represents the shock of surprises on the economic activity ($\theta_2 \epsilon^{news_t}$ from Equation (2)), the Business Confidence index (BC_t) as an expectation variable (e_t from Equation (3)) and finally the Industrial Production index (ipi_t from Equation (2)). In more detail, we estimate four-variable systems for each country of the following type: $x_t = [BCSI_t, IPSI_t, e_t, ipi_t]$.

The reduced-form finite-order VAR representation is:

$$x_t = \psi(L)x_{t-1} + \eta_t \tag{7}$$

where $\psi(L)$ is a polynomial in the lag operator of order 3, $\eta_t \sim N(0, \Omega)$ is the vector of residuals with variance-covariance matrix Ω. The VAR baseline models are estimated through OLS, including equation-specific constants. To recover orthogonal shocks, we

use a Cholesky decomposition, with $\Omega = PP^T$, where P is the unique lower-triangular Cholesky factor with non-negative diagonal elements.

We order the surprise indices first, as in Corneli et al. (2023), consistently with the assumption the information arrival is exogenous. In particular, the $BCSI_t$, which represents that part of Business Confidence explained by macroeconomic announcement surprises, is ordered first (before the $IPSI_t$), to isolate the role played by Business Confidence in the transmission mechanism from the surprise shocks to economic activity. In addition, the assumption that the surprise indices are exogenous is consistent with the *News View* hypothesis, and it has been confirmed by Granger causality tests.

It is worth stressing that $BCSI_t$ is introduced into the VAR to proxy future productivity (shocks), which partly acts as a common component in the news shocks, and to better isolate the role of confidence in the transmission mechanism. It is ordered second to explore if future productivity news shocks serve as common shocks in the economy (Levchenko and Pandalai-Nayar, 2020)

[Insert Figure 3 about here]

The impulse response of the US economic activity to a one standard deviation shock on $BCSI_t$ (which isolates the macroeconomic announcement surprises on the Business Confidence index) reaches a peak of 17.6% in thirteen months (in the other countries it goes from a minimum of 13.4% for Germany to a maximum of 24.0% for France, see Figure 3), while the response to $IPSI_t$ (which represents the direct effect of macroeconomic announcement surprises on Industrial Production index) hits a maximum of 20.6% in two months (in the other countries it goes from a minimum of 11.2% for Spain to a maximum of 26.2% for France, see Figure 4). At the same time, economic activity reacts positively and persistently to Business Confidence innovations. Figure 3 shows that US Industrial Production response to Business Confidence innovations reaches a peak of 11.1% after 13 months (in the other countries, it goes from a minimum of 5.7%

for the UK to a maximum of 21.8% for Japan).

[Insert Figure 4 about here]

The IRFs are also statistically significant and positive, as expected: a positive surprise index shock means that macroeconomic releases during the t-th month were mainly better than expected by market agents. As a consequence, business confidence improves, economic agents increase their propensity to invest, and economic activity grows (Figure 5 also shows the positive effect of the improvement of business confidence on economic activity).

[Insert Figure 5 about here]

Responses of economic activity to business confidence surprise indices are also quite persistent: they don't return to the beginning pre-shock level before 28 months for the US, supporting the *News View* hypothesis.

Further evidence of the role of macroeconomic announcement shocks for economic activity can be drawn from the variance decomposition analysis. Figure 6 shows that surprise shocks have a prevalent role in explaining the forecast error variances of the economic activity on impact (79.2% for the US as a sum of the contribution of $BCSI_t$ and $IPSI_t$, from a minimum of 46.5% for Japan to a maximum of 79.6% for Italy). In some cases, it gains relevance over the simulation horizon: for the US, it reaches a peak in two months (83.9%). Then it stabilises in the long run: for the US around 68%, for all the other countries from a minimum of 56% for Germany to a maximum of 73% for France).

The role played by the $BCSI$ shock in the fraction of economic activity variance explained by announcement surprise shocks (see the bar graphs in dark grey of Figure 6) is smaller on impact (4.7% for the United States, from a minimum of 1.1% for Japan to a maximum of 43.2% for Spain) but becomes predominant over time (54.0% in the

longer term for the US, from a minimum of 21.1% for the UK, the only country in the panel here considered for which it remains on a minority level, to a maximum of 61.1% for Spain).

[Insert Figure 6 about here]

3.5 Sensitivity analysis

The results from the VAR model in Equation (7) are valid to extensive robustness checks. Figure 7 reports the sensitivity analysis conducted on IRFs of economic activity after a one-standard deviation shock on the $BCSI_t$ for the United States (other IRFs for the full set of countries are available upon request).

The first issue regards our identification strategy, which relies on a Cholesky decomposition conditional on a vector with surprise indices ordered first. Despite being in line with the literature and useful to test the *news view* versus the *animal spirits* hypothesis, this assumption is debatable. Therefore, the variable ordering in the VAR transmission mechanism is changed: the $IPSI_t$ is ordered first, before the $BCSI_t$ and excluded in the VAR. Panel 1) of Figure 7) shows that the IRFs of economic activity are still positive, persistent over time and statistically significant in the case of $IPSI_t$ ordered first (blue line) and without $IPSI_t$ (red line). This last result confirms that the presence of $IPSI_t$ in the VAR doesn't affect the industrial production IRF to a business confidence shock but improves the variance decomposition, as previously illustrated in Figure 6. In addition, to show that news shocks are orthogonal to macro aggregates, the variable ordering in the VAR transmission mechanism is inverted. As explained above, the new shock may include common shocks prevalent in the economy. As in Barsky and Sims (2011) and Levchenko and Pandalai-Nayar (2020), we order the surprise index after the macro variables. Panel 7) of Figure 7) confirms that the IRF of the business confidence surprise index is not statistically significant at 95% to an industrial production shock.

Second, our sample covers several periods of severe economic and financial turbulence. To show that the results do not depend on the choice of the sample period, we replicate the IR analysis over alternative sub-samples of the same length (8 years), such as 2000-2007, 2008-2015, and 2015-2023. As can be seen in Panel 2 of Figure 7, the responses show similar paths and persistence as the baseline but with slightly different magnitudes. The responses are all statistically significant and consistent with the *news view* hypothesis.

Third, we estimate the surprise index using an automatic model selection procedure with a 95% confidence level filter to estimate Equation (4). To demonstrate that the results are valid both by adopting different confidence levels and without adopting any automatic selection method, we estimate surprise indices by applying alternative confidence level filters to the automated model selection procedure (in particular 90% level of confidence and 99% level of confidence) and without applying any automatic selection method. The responses reported in Panel 3) of Figure 7 confirm the robustness of the baseline.

Fourth, we estimate the baseline specification by applying alternative estimation methodologies such as switching VAR, Bayesian VAR (BVAR) with Litterman Minnesota prior, Bayesian VAR (BVAR) with Giannone et al, (2015) prior. The switching VAR is introduced to model possible structural breaks in the time series due to exogenous shocks, and again the IRFs reported in Panel 4) of Figure 7 show a profile similar to that of the baseline.

Fifth, our results may be affected by the presence of misspecification of the econometric model. We include additional macroeconomic variables in the transmission mechanism to control for a common component, which may affect the causal relationship between news shocks, confidence, and industrial production. In particular, we consider the role played by the labour market (unemployment rate), inflation (consumer price index), monetary policy (approximated by the 3-month interbank Libor rate), and the

exchange rates (US dollar real exchange rate). The findings are unchanged.

Sixth, for the same reason, we include other control variables more related to financial markets and to economic policy uncertainty by adding to the VAR the Economic Policy Uncertainty index (Baker et al, 2016), the 10 Years US Government Bond Yields, the Dow Jones Industrial Average Stock index. In this case, too, the results remain unchanged.

[Insert Figure 7 about here]

A final experiment to add to the rich list of sensitivity analyses reported above is to explore the impact of non-linearities in the transmission mechanism from surprises to economic activity through the business cycles. To this aim, we implemented Jorda's local projection method (Jorda, 2005; Ramey and Zubairy, 2018) to estimate state-dependent impulse response functions in states of financial distress (stability) and optimism (pessimism). The results (available upon request) confirm the validity of the *news view* hypothesis in both states of the economy.

4 Conclusions

In this paper, we introduce two new indices - Business Confidence Surprise index and Industrial Production Index - to analyse the transmission mechanism from economic confidence to economic activity using the new information coming from the unexpected component of a large set of macroeconomic releases.

We show that macroeconomic announcement surprises can predominantly explain the dynamics of Business Confidence and Industrial Production for a panel of advanced economies. Relevant macroeconomic announcement surprises are selected by applying an automated model selection procedure *Autometrics*.

We then isolate the time-varying impact of macroeconomic announcement surprises

over the different business cycles. Time-varying estimates illustrate that macroeconomic announcement surprises have a statistically significant impact on confidence and economic activity during almost the entire sample period and that the impact is greater than the full sample average during periods of turbulence.

In addition, we explore the transmission mechanism from macroeconomic surprise shocks to economic confidence and to economic activity. Our original contribution to the literature consists of isolating the role played by confidence to explain the effect of the arrival of unexpected relevant macroeconomic information on economic activity. The responses of business confidence and industrial production to surprise shocks provide robust evidence that news arrival persistently affects confidence and economic activity, thus confirming the *news view* hypothesis. The variance decomposition analysis highlights the effectiveness of this approach: macroeconomic surprise shocks, particularly those on confidence we have initially isolated, have a predominant role in explaining Business Confidence and Industrial Production in the long run.

Finally, the approach we adopted allows us to verify that the "news view" effects are significantly stronger in adverse conditions (periods of financial distress and low economic confidence).

References

[1] Acharya, S., Benhabib, J., & Huo, Z. (2021). The anatomy of sentiment-driven fluctuations. *Journal of Economic Theory*, 195, 105280.

[2] Altavilla, C., Giannone, D., & Modugno, M. (2017). Low frequency effects of macroeconomic news on government bond yields. *Journal of Monetary Economics*, 92, 31-46.

[3] Andersen, T. G., Bollerslev, T., Diebold, F. X., & Vega, C. (2003). Micro effects of macro announcements: Real-time price discovery in foreign exchange. *American Economic Review*, 93(1), 38-62.

[4] Angeletos, G. M., Collard, F., & Dellas, H. (2020). Business-cycle anatomy. *American Economic Review*, 110(10), 3030-3070.

[5] Baker, S. R., Bloom, N., & Davis, S. J. (2016). Measuring economic policy uncertainty. *The Quarterly Journal of Economics*, 131(4), 1593-1636.

[6] Balduzzi, P., Elton, E. J., & Green, T. C. (2001). Economic news and bond prices:

Evidence from the US Treasury market. *Journal of Financial and Quantitative analysis*, 36(4), 523-543.

[7] Barsky, R. B., & Sims, E. R. (2011). News shocks and business cycles. *Journal of Monetary Economics*, 58(3), 273-289.

[8] Barsky, R. B., & Sims, E. R. (2012). Information, animal spirits, and the meaning of innovations in consumer confidence. *American Economic Review*, 102(4), 1343-77.

[9] Bauer, M. D., & Swanson, E. T. (2023). An alternative explanation for the "fed information effect". *American Economic Review*, 113(3), 664-700.

[10] Beaudry, P., & Portier, F. (2004). An exploration into Pigou's theory of cycles. *Journal of Monetary Economics*, 51(6), 1183-1216.

[11] Beaudry, P., & Portier, F. (2014). News-driven business cycles: Insights and challenges. *Journal of Economic Literature*, 52(4), 993-1074.

[12] Benhabib, J., & Farmer, R. E. (1994). Indeterminacy and increasing returns. *Journal of Economic Theory*, 63(1), 19-41.

[13] Benhabib, J., Liu, X., & Wang, P. (2016). Sentiments, financial markets, and macroeconomic fluctuations. *Journal of Financial Economics*, 120(2), 420-443.

[14] Benhima, K., & Cordonier, R. (2022). News, sentiment and capital flows. *Journal of International Economics*, 137, 103621.

[15] Blanchard, O. (1993). Consumption and the Recession of 1990-1991. *The American Economic Review*, 83(2), 270-274.

[16] Blanchard, O. J., L'Huillier, J. P., & Lorenzoni, G. (2013). News, noise, and fluctuations: An empirical exploration. *American Economic Review*, 103(7), 3045-70.

[17] Caruso, A. (2019). Macroeconomic news and market reaction: Surprise indexes meet nowcasting. *International Journal of Forecasting*, 35(4), 1725-1734.

[18] Castle, J. L., Doornik, J. A., & Hendry, D. F. (2012). Model selection when there are multiple breaks. *Journal of Econometrics*, 169(2), 239–246.

[19] Castle, J. L., Doornik, J. A., & Hendry, D. F. (2023). Robust discovery of regression models. *Econometrics and Statistics.*, 26, 31-51.

[20] Chahrour, R., & Jurado, K. (2018). News or noise? The missing link. *American Economic Review*, 108(7), 1702-1736.

[21] Cochrane, J. H. (1994). Permanent and transitory components of GNP and stock prices. *The Quarterly Journal of Economics*, 109(1), 241-265.

[22] Corneli, F., Ferriani, F., & Gazzani, A. G. (2023). Macroeconomic news, the financial cycle and the commodity cycle: the Chinese footprint. *Economic Letters* 231, 111269.

[23] Doornik, J. A. (2009). Autometrics. In *Castle, J., & Shephard, N. (Eds.). The Methodology and Practice of Econometrics: A Festschrift in Honour of David F. Hendry.* OUP Oxford. (2009), pp. 88–121.

[24] Elenev, V., Law, T. H., Song, D., & Yaron, A. (2024). Fearing the Fed: How Wall Street reads Main Street. *Journal of Financial Economics*, 153, 103790.

[25] Enders, Z., Kleemann, M., & Müller, G. J. (2021). Growth expectations, undue optimism, and short-run fluctuations. *Review of Economics and Statistics*, 103(5), 905-921.

[26] Faccini, R., & Melosi, L. (2022). Pigouvian cycles. *American Economic Journal:*

Macroeconomics, 14(2), 281-318.

[27] Farmer, R. E., & Guo, J. T. (1994). Real business cycles and the animal spirits hypothesis. *Journal of Economic Theory*, 63(1), 42-72.

[28] Farmer, R. E. (2012). Confidence, crashes and animal spirits. *The Economic Journal*, 122(559), 155-172.

[29] Farmer, R. E. (2013). Animal spirits, financial crises and persistent unemployment.*The Economic Journal*, 123(568), 317-340.

[30] Farmer, R. E. (2016). The evolution of endogenous business cycles. *Macroeconomic Dynamics*, 20(2), 544-557.

[31] Gardner, B., Scotti, C., & Vega, C. (2022). Words speak as loudly as actions: Central bank communication and the response of equity prices to macroeconomic announcements. *Journal of Econometrics*, 231(2), 387-409.

[32] Giannone, D., Lenza, M., & Primiceri, G. E. (2015). Prior selection for vector autoregressions. *Review of Economics and Statistics*, 97(2), 436-451.

[33] Gürkaynak, R. S., & Wright, J. H. (2013). Identification and inference using event studies. *The Manchester School*, 81, 48-65.

[34] Hall, R. E. (1993). Macro theory and the recession of 1990-1991. *The American Economic Review*, 83(2), 275-279.

[35] Hardouvelis, G. A. (1988). Economic news, exchange rates and interest rates. *Journal of International Money and Finance*, 7(1), 23-35.

[36] Hendry, D. F., Johansen, S., & Santos, C. (2008). Automatic selection of indicators in a fully saturated regression. *Computational Statistics*, 23, 317–335

[37] Jordà, Ò. (2005). Estimation and inference of impulse responses by local projections. *American Economic Review*, 95(1), 161-182.

[38] Levchenko, A. A., & Pandalai-Nayar, N. (2020). TFP, news, and "sentiments": The international transmission of business cycles. *Journal of the European Economic Association*, 18(1), 302-341.

[39] Marczak, M., & Proietti, T. (2016). Outlier detection in structural time series models: The indicator saturation approach. *International Journal of Forecasting*, 32(1), 180-202.

[40] Nam, D., & Wang, J. (2019). Mood swings and business cycles: Evidence from sign restrictions. *Journal of Money, Credit and Banking*, 51(6), 1623-1649.

[41] Ramey, V. A., & Zubairy, S. (2018). Government spending multipliers in good times and in bad: evidence from US historical data. *Journal of Political Economy*, 126(2), 850-901.

[42] Scotti, C. (2016). Surprise and uncertainty indexes: Real-time aggregation of real-activity macro-surprises. *Journal of Monetary Economics*, 82, 1-19.

[43] Swanson, E. T., & Williams, J. C. (2014). Measuring the effect of the zero lower bound on medium-and longer-term interest rates. *American Economic Review*, 104(10), 3154-3185.

5 Tables and Figures

Table 1: *US Macroeconomic Announcements*

Announcements	**Measurement** (i)	**# Obs** (ii)	**Frequency** (iii)	**Timing of release** (iv)
GDP (Advanced)	q/q ann. % ch.	88	Q	7:30/8:30AM
GDP (Preliminary)	q/q ann. % ch.	87	Q	8:30AM
GDP (Final)	q/q ann. % ch.	88	Q	7:30/8:30/9:30AM
ISM composite	Diffusion ind. 0=50	217	M	8:55/9/10/11 AM
Leading Indicator	Index 2016=100	264	M	9/9:50/11AM
Ind. Production index	y/y % ch.	264	M	8:15/8:51/9:15PM
Capacity Utilization	% rate	264	M	8:15/8:51/9:15PM
Business Inventories	m/m % ch	264	M	8:30/9/10AM
Factory Orders	m/m % ch	264	M	9/10/11AM - 3PM
ISM Manufacturing	Diffusion ind. 0=100	264	M	9/10/10:26/11AM
PMI Manufacturing (Final)	Diffusion ind. 0=50	115	M	various (8:58AM to 9:45AM)
Chicago PMI	Diffusion ind. 0=51	280	M	various (8:17 to 11AM)
Durable Goods (Preliminary)	m/m % ch	90	M	7:30/8:30AM
Durable Goods (Final)	m/m % ch	257	M	7:30/8:30/9/10AM
Personal income	m/m % ch	264	M	7:30/8:30/9/10AM
Personal consumption	m/m % ch	227	M	7:30/8:30/9:30AM
Retail Sales index	y/y % ch	247	M	7:30/8:30AM
Consumer credit	mln $	264	M	2/3/4PM
Cons. Confidence (CB)	Index 1985=100	264	M	various (9AM to 11AM)
Cons. Confidence (MU, Prel.)	Index 1966:Q1=100	263	M	various (8:55AM to 11AM)
Cons. Confidence (MU, Final)	Index 1966:Q1=101	264	M	various (8:55AM to 11AM)
New House Sales	k units	264	M	8/9/10AM
S&Ps Case-Shiller's	y/y % ch	181	M	8/9AM - 14:15PM
Construction Spending	m/m % ch	264	M	9/10/11AM
Housing Starts	mln units	264	M	7:30/8:30AM
CPI (yearly)	y/y % ch	231	M	7:30/8:30AM
CPI (monthly)	m/m % ch	264	M	7:30/8:30AM
Core CPI (yearly)	y/y % ch	231	M	7:30/8:30AM
Core CPI (monthly)	m/m % ch	264	M	7:30/8:30AM
PPI (yearly)	y/y % ch	230	M	7:30/8:30/9:30AM
PPI (monthly)	m/m % ch	264	M	7:30/8:30/9:30AM
Unemployment	% rate	264	M	7:30/8:30/9:30AM
Non-Farm Payroll Change	k units	264	M	7:30/8:30/9:30AM
Initial Jobless Claims	k units	940	W	7:30/8:30/9:30AM
Public Deficit	mln $	264	M	various (11AM to 16PM)
Commercial Trade Balance	mln $	264	Q	7:30/8:30AM

Notes: The table summarises the main features of the US macroeconomic announcements. In Column (iii), Q stands for Quarterly and M for Monthly frequency. Sample period: 3 January 2000- 28 April 2023.

Table 2: *Japanese and UK Macroeconomic Announcements*

Announcements	**Measurement** (i)	**# Obs.** (ii)	**Frequency** (iii)	**Timing of release** (iv)
Japanese announcements				
GDP (Preliminary)	q/q ann. % ch.	78	Q	0:50/1:50AM
GDP (Final)	q/q ann. % ch.	78	Q	0:50/1:50AM
Ind. Prod. index (Prel.)	y/y % ch.	252	M	0:50/1:50AM
Unemployment	% rate	280	M	various (0:00 AM to 3:30 AM)
CPI (yearly)	y/y % ch.	260	M	0:00/0:30/1:00/1:30 AM
CPI core (yearly)	y/y % ch.	200	M	0:30/1:30/6:00 AM
PPI (yearly)	y/y % ch.	235	M	0:50/1:50AM
PPI (monthly)	m/m % ch	279	M	0:50/1:50AM
Retail Sales index (Prel.)	m/m % ch	241	M	0:50/1:50AM
Tankan Business Conf.	Diffusion ind.	93	Q	0:50/1:50AM
PMI Manufacturing	Diffusion ind. 0=50	252	M	various (1:30AM to 7:30AM)
Consumer confidence	Diffusion ind. 0=50	229	M	various (6:00 to 8:00 AM)
M3	y/y % ch.	179	M	0:50/1:50AM
UK announcements				
GDP (Advanced)	y/y % ch.	74	Q	10:30AM
GDP (Preliminary)	y/y % ch.	93	Q	8:00/10:30AM
GDP (Final)	y/y % ch.	93	Q	8:00/10:30/11:30 AM
Ind. Prod. index	y/y % ch	280	M	8:00/10:30 AM
Unemployment	% rate	252	M	8:00/10:30 AM 3:00 PM
CPI (yearly)	y/y % ch.	239	M	8:00/10:30AM
CPI (monthly)	m/m % ch	232	M	8:00/10:30AM
CPI core (yearly)	y/y % ch.	212	M	8:00/10:30AM
PPI (yearly)	y/y % ch.	280	M	7:59/8:00/10:30AM
PPI (monthly)	m/m % ch	280	M	7:59/8:00/10:30AM
Retail Sales index (Prel.)	y/y % ch.	280	M	8:00/10:30AM
PMI Composite	Diffusion ind. 0=50	153	M	10:30AM
PMI Manufacturing	Diffusion ind. 0=50	229	M	9:30/10:30AM
Consumer confidence	Diffusion ind.	272	M	various (1:00 AM to 8:20 PM)
M4	y/y % ch	266	M	10:30/11:30 AM

Notes: The table summarises the main features of the Japanese and the UK macroeconomic announcements. In Column (iii), Q stands for Quarterly and M for Monthly frequency. Sample period: 3 January 2000 - 28 April 2023.

Table 3: *German and French Macroeconomic Announcements*

Announcements	**Measurement** (i)	**# Obs** (ii)	**Frequency** (iii)	**Timing of release** (iv)
German announcements				
GDP (Preliminary)	y/y % ch.	82	Q	8:00/10:00AM
GDP (Final)	y/y % ch.	92	Q	8:00/9:30AM
GDP (Quarterly - Prel.)	q/q ann. % ch.	81	Q	8:00/10:00AM
GDP (Quarterly - Fin.)	q/q ann. % ch.	96	Q	various (8:00AM to 9:30AM)
Ind. Prod. index (Yearly)	y/y % ch.	264	M	various (7:40AM to 5:45PM)
Ind. Prod. index (Monthly)	m/m % ch.	264	M	various (7:40AM to 5:45PM)
Unemployment	% rate	281	M	various (9:16AM to 11:24AM)
CPI (yearly)	y/y % ch.	243	M	8:00/10:30AM
CPI (monthly)	m/m % ch.	243	M	8:00/10:30AM
PPI (yearly)	y/y % ch.	280	M	8:00/8:15AM
PPI (monthly)	m/m % ch	280	M	8:00/8:15AM
Retail Sales index	y/y % ch.	281	M	various (7:45 to 8:13PM)
PMI Composite	Diffusion ind. 0=50	110	M	9:30/9:55AM
PMI Manufacturing	Diffusion ind. 0=50	229	M	9:55AM
Consumer confidence	Diffusion ind. 0=50	202	M	various (8:00AM to 1:00PM)
IFO Business Climate Ind.	Index 2015=100	194	M	various (8:00AM to 4:00PM)
ZEW Current Situation Ind.	Diffusion ind.	231	M	11:00AM
ZEW Ec. Expectations Ind.	Diffusion ind.	261	M	various (11:00AM to 4:00PM)
French announcements				
GDP (Advanced)	y/y % ch.	17	Q	7:30AM
GDP (Preliminary)	y/y % ch.	91	Q	various (7:30AM to 7:00PM)
GDP (Final)	y/y % ch.	91	Q	various (7:30AM to 9:11AM)
GDP (Advanced - Quarterly)	q/q % ch.	21	Q	various (7:30AM to 8:50AM)
GDP (Preliminar - Quarterly)	q/q % ch.	91	Q	various (7:30AM to 7:00PM)
GDP (Final - Quarterly)	q/q % ch.	91	Q	various (7:30 to 8:50AM)
Ind. Prod. index	y/y % ch	291	M	various (8:40 to 9:50AM)
Ind. Prod. index	m/m % ch	291	M	various (8:40 to 9:50AM)
Unemployment	% rate	157	M/Q	various (7:30AM to 10:30PM)
CPI (yearly)	y/y % ch.	291	M	various (7:30AM to 8:50AM)
CPI (monthly)	m/m % ch	288	M	various (7:30AM to 8:50AM)
PPI (yearly)	y/y % ch.	281	M	various (8:40AM to 9:50AM)
PPI (monthly)	m/m % ch	281	M	various (8:40AM to 9:50AM)
Retail Sales index	y/y % ch.	270	M	7:30/8:45/8:50AM
PMI Composite	Diffusion ind. 0=50	122	M	9:50AM
PMI Manufacturing	Diffusion ind. 0=50	241	M	9:50AM
Consumer confidence	Index 2015=100	279	M	various (8:40 AM to 10:01 PM)

Notes: The table summarises the main features of the German and the French macroeconomic announcements. In Column (iii), Q stands for Quarterly and M for Monthly frequency. Sample period: 3 January 2000 - 28 April 2023.

Table 4: *Italian and Spanish Macroeconomic Announcements*

Announcements	**Measurement** (i)	**# Obs** (ii)	**Frequency** (iii)	**Timing of release** (iv)
Italian announcements				
GDP (Preliminary)	y/y % ch.	75	Q	various (9:00AM to 12:00PM)
GDP (Final)	y/y % ch.	89	Q	various (9:00AM to 14:30AM)
GDP (Quarterly - Prel.)	q/q ann. % ch.	77	Q	various (9:00AM to 12:00PM)
GDP (Quarterly - Fin.)	q/q ann. % ch.	88	Q	various (9:00AM to 14:30AM)
Ind. Prod. index (Yearly)	y/y % ch.	285	M	various (9:00AM to 12:30PM)
Ind. Prod. index (SA - Yearly)	y/y % ch.	285	M	various (9:00AM to 12:30PM)
Ind. Prod. index (Monthly)	m/m % ch.	225	M	various (9:00AM to 12:30PM)
Unemployment (SA - Quarterly)	% rate	23	Q	various (9:00AM to 10:00AM)
Unemployment	% rate	143	M	various (9:00AM to 12:00PM)
Unemployment (Quarterly)				
Industrial Orders (Yearly)	y/y % ch.	201	M	various (9:00AM to 1:00PM)
Industrial Orders (Monthly)	m/m % ch.	202	M	various (9:00AM to 1:00PM)
Industrial Turnover (Yearly)	y/y % ch.	212	M	various (9:00AM to 1:00PM)
Industrial Turnover (Monthly)	m/m % ch.	212	M	various (9:00AM to 1:00PM)
CPI (NIC - Yearly)	y/y % ch.	152	M	various (9:00AM to 7:38PM)
CPI (IPCA - Yearly)	y/y % ch.	236	M	various (9:00AM to 12:00PM)
CPI (NIC - Monthly)	m/m % ch.	152	M	various (9:00AM to 7:38PM)
CPI (IPCA - Monthly)	m/m % ch.	205	M	various (9:00AM to 6:35PM)
PPI (Yearly)	y/y % ch.	222	M	various (9:00AM to 1:00PM)
PPI (Monthly)	m/m % ch	223	M	various (9:00AM to 1:00PM)
Retail Sales index (Yearly)	y/y % ch.	281	M	various (9:00AM to 12:00PM)
Retail Sales index (Monthly)	m/m % ch.	225	M	various (9:00AM to 12:00PM)
Spanish announcements				
GDP (Preliminary)	y/y % ch.	73	Q	9:00AM
GDP (Final)	y/y % ch.	85	Q	various (8:50AM to 11:15AM)
GDP (Preliminar - Quarterly)	q/q % ch.	113	Q	9:00AM
GDP (Final - Quarterly)	q/q % ch.	85	Q	various (8:50AM to 11:15AM)
Ind. Prod. index (Yearly)	y/y % ch.	280	M	various (8:49AM to 10:35AM)
Ind. Prod. index (Monthly)	m/m % ch	93	M	9:00AM
Unemployment	% rate	137	M/Q	various (8:15AM to 7:00PM)
CPI (yearly)	y/y % ch.	254	M	various (8:58 to 9:34AM)
CPI (monthly)	m/m % ch	255	M	various (8:58 to 9:34AM)
PPI (yearly)	y/y % ch.	243	M	9:00AM
PPI (monthly)	m/m % ch	242	M	9:00AM
Retail Sales index	y/y % ch.	211	M	9:00/9:06AM
PMI Composite	Diffusion ind. 0=50	110	M	9:15AM
PMI Manufacturing	Diffusion ind. 0=50	110	M	9:15AM
Consumer Confidence index	Index 2015=100	52	M	various (10:00 to 10:07AM)

Notes: The table summarises the main features of the Italian and the Spanish macroeconomic announcements. In Column (iii), Q stands for Quarterly and M for Monthly frequency. Sample period: 3 January 2000 - 28 April 2023.

Table 5: *Summary Descriptive Statistics*

Variables	**Frequency** (i)	**Source** (ii)	**Max** (iii)	**Min** (iv)	**Mean** (v)	**StDev** (vi)
Business Confidence Indices						
United States	M	OECD	102.13	95.73	99.97	1.16
Japan	M	OECD	101.71	96.79	100.15	1.13
United Kingdom	M	OECD	105.59	93.45	100.32	2.15
Germany	M	OECD	103.53	95.97	100.48	1.42
France	M	OECD	103.96	94.79	100.37	1.52
Italy	M	OECD	102.66	96.35	100.46	1.19
Spain	M	OECD	103.09	94.41	100.41	1.68
Industrial Production Indices						
United States	M	OECD	103.21	83.86	92.02	4.90
Japan	M	OECD	119.45	79.63	102.01	7.14
United Kingdom	M	OECD	113.32	88.57	101.46	5.66
Germany	M	OECD	107.71	71.31	92.84	8.72
France	M	OECD	115.29	68.06	103.60	6.13
Italy	M	OECD	133.29	58.30	111.23	11.78
Spain	M	OECD	136.26	70.14	111.38	12.79
Economic Policy Uncertainty Indices						
United States	M	OECD	503.96	44.78	139.63	65.57
Japan	M	OECD	237.68	47.60	107.22	31.84
United Kingdom	M	OECD	1141.80	29.03	215.38	152.88
Germany	M	OECD	844.85	28.43	181.17	144.16
France	M	OECD	547.63	16.59	197.54	106.52
Italy	M	OECD	279.39	31.70	113.12	40.69
Spain	M	OECD	407.42	23.32	117.09	56.81

Notes: The table reports frequency, source and summary statistics for Business Confidence, Industrial Production, and Economic Policy Uncertainty Indices. In Column (i), M indicates monthly frequency. Sample period: January 2000 - April 2023.

Table 6: *Macroeconomic Surprises Effects on the US Business Confidence*

		$\hat{\beta}_{k^*}$		
P-value filters	**None**	**90%**	**95%**	**99%**
Announcements	(i)	(ii)	(iii)	(iv)
US Leading Indicator	0.095	0.106	0.104	0.117
US Ind. Prod. index	0.123	0.143	0.140	0.160
US Factory Orders	-0.143	-0.156	-0.169	-0.149
US ISM Manuf.	0.117	0.163	0.189	0.180
US Chicago PMI	0.122	0.096	-	0.079
US Durable Goods (Final)	0.123	0.107	0.129	0.108
US Personal income	0.140	0.126	0.183	0.131
US Ret. Sales index	0.224	0.197	0.167	0.150
US Cons. Conf. (CB)	0.112	0.152	0.164	0.163
US New House Sales	-0.112	-0.182	-0.167	-0.171
US Unemployment	-0.310	-0.329	-0.332	-0.273
US Initial Jobless Claims	-0.098	-0.092	-0.067	-0.086
Ja. PPI (y/y)	0.124	0.276	0.231	0.272
Ja. Tankan B. Conf. index	0.174	0.120	-	-
UK Ind. Prod. (m/m)	0.731	0.321	0.195	0.203
UK CPI core (y/y)	0.600	0.736	0.665	0.501
UK Cons. Conf.	0.414	0.367	0.416	0.371
Ger. CPI (m/m)	-0.142	-0.167	-0.094	-
Ger. Cons. Conf. index	0.230	0.205	0.191	0.155
Fr. Ind. Prod. index (m/m)	-0.143	-0.205	-0.164	-0.223
Fr. CPI (y/y)	-1.035	-0.174	-0.173	-0.173
Fr. CPI (m/m)	-0.632	-0.235	-0.188	-0.224
Fr. PMI Composite	0.630	0.646	0.540	0.643
It. Gdp q/q Final	0.345	0.162	0.240	0.085
It. Ind. Prod. index (SA, m/m)	0.640	0.537	0.539	0.574
It. Unemployment rate (M)	-0.646	-0.526	-0.522	-0.564
It. Ind. orders (m/m)	0.278	0.337	0.195	0.283
It. PPI (y/y)	0.285	0.287	0.207	0.307
Sp. Ind. Prod. index (y/y)	-0.585	-0.506	-0.438	-0.483
Sp. PMI Manuf.	0.337	0.401	0.341	0.344
Adj. R^2	**0.500**	**0.596**	**0.584**	**0.566**

Notes: The table reports the coefficients of macroeconomic surprises on the US Business Confidence index, following Equation (4). All standard errors of estimates are corrected for autocorrelation and heteroscedasticity (HAC Newey-West st. errors). Columns (i)-(iv) report estimated $\hat{\beta}_{k^*}$, where k^* going from 1 to K^* indicates only the sub-set of announcements identified with an automated model selection algorithm to be significant at three different confidence levels (90, 95 and 99%). Sample period: January 2000 - April 2023.

Table 7: *Macroeconomic Surprises Effects on the US Industrial Production*

		$\hat{\beta}_{k^*}$		
P-value filters	**None**	**90%**	**95%**	**99%**
Announcements	(i)	(ii)	(iii)	(iv)
US GDP (Final)	0.129	0.146	0.130	-
US Capacity Utilization	-0.052	-0.089	-0.081	-
US Personal income	0.311	0.320	0.257	0.295
US Ret. Sales index	-0.198	-0.142	-0.136	-0.140
US Core CPI (yearly)	0.161	0.151	0.150	0.098
US Non-Farm Payroll Change	0.381	0.506	0.504	0.552
US Initial Jobless Claims	-0.260	-0.233	-0.279	-0.243
Ja. Unemployment	-0.138	-0.109	-0.161	-0.132
Ja. Core CPI (y/y)	-0.115	-0.099	-	-
Ja. Tankan B. Conf. index	-0.119	-0.108	-0.091	-
Ja. Cons. Conf. index	-0.053	-0.065	-0.066	-
UK Ind. Prod. (m/m)	0.512	0.391	0.382	-
UK PPI (y/y)	0.207	0.186	-	-
UK Ret. Sales (y/y)	0.171	0.200	0.140	0.165
UK Cons. Conf.	0.183	0.202	0.167	-
Ger. CPI (m/m)	0.185	0.111	0.115	-
Ger. Cons. Conf. index	0.443	0.529	0.555	-
Ger. IFO index	-0.234	-0.067	-0.059	-
Ger. ZEW index (curr.)	-0.453	-0.533	-0.567	-
Ger. ZEW index (exp.)	0.683	0.656	0.534	-
Fr. GDP (y/y - Final)	0.197	0.230	0.167	0.132
Fr. CPI (m/m)	-5.556	-3.094	-3.029	-
Fr. PPI (y/y)	2.468	1.560	1.524	-
Fr. Ret. Sales index (y/y)	-0.598	-0.088	-	-
Fr. PMI Composite	1.635	0.905	0.833	-
Fr. PMI Manuf.	-1.075	-0.707	-0.682	-0.020
It. Ind. Prod. index (SA, y/y)	0.340	0.244	0.280	0.253
It. CPI (y/y)	-0.172	-0.099	-0.057	-0.082
It. CPI (NIC index y/y)	0.148	0.190	0.149	-
It. PPI (y/y)	-0.144	-0.113	-	-
Sp. GDP (q/q) Final	0.171	0.244	**-**	**-**
Sp. CPI (m/m)	0.047	0.056	0.064	-
Sp. Ret. Sales index (y/y)	-0.119	-0.182	-0.135	-
Adj. R^2	**0.740**	**0.801**	**0.788**	**0.760**

Notes: The table reports the coefficients of macroeconomic surprises on the US IPI, following the Equation (4). All standard errors of estimates are corrected for autocorrelation and heteroscedasticity (HAC Newey-West st. errors). Columns (i)-(iv) report estimated $\hat{\beta}_{k^*}$, where k^* going from 1 to K^* indicates only the sub-set of announcements identified with an automated model selection algorithm to be significant at three different confidence levels (90, 95 and 99%). Sample period: January 2000 - April 2023.

Table 8: *Macroeconomic ann. Surprises Effects on Confidence and Economic activity*

Industrial Production

P-value filters	**None** (i)	**90%** (ii)	**95%** (iii)	**99%** (iv)
United States	0.745	0.801	0.787	0.746
Japan	0.337	0.482	0.448	0.361
United Kingdom	0.469	0.585	0.574	0.548
Germany	0.561	0.670	0.662	0.628
France	0.629	0.729	0.714	0.690
Italy	0.733	0.783	0.775	0.754
Spain	0.731	0.811	0.799	0.784
Average Adj. R_i^2	**0.601**	**0.694**	**0.644**	**0.680**

Business Confidence

P-value filters	**None** (i)	**90%** (ii)	**95%** (iii)	**99%** (iv)
United States	0.500	0.596	0.584	0.566
Japan	0.716	0.775	0.767	0.747
United Kingdom	0.545	0.679	0.636	0.599
Germany	0.707	0.776	0.763	0.761
France	0.586	0.679	0.668	0.650
Italy	0.629	0.715	0.702	0.690
Spain	0.712	0.765	0.760	0.742
Average Adj. R_i^2	**0.628**	**0.712**	**0.697**	**0.679**

Notes: The table reports the adj. R_i^2 of Equation (4) with the Industrial Production and the Business Confidence as the dependent variables, Column (i) reports adj. R_i^2 for the specification, including all the macroeconomic announcements, Columns (ii)-(iv) report adj. R_i^2 for the specifications including announcements significant at 90%, 95% and 99% confidence levels, respectively. Sample period: January 2000 - April 2023.

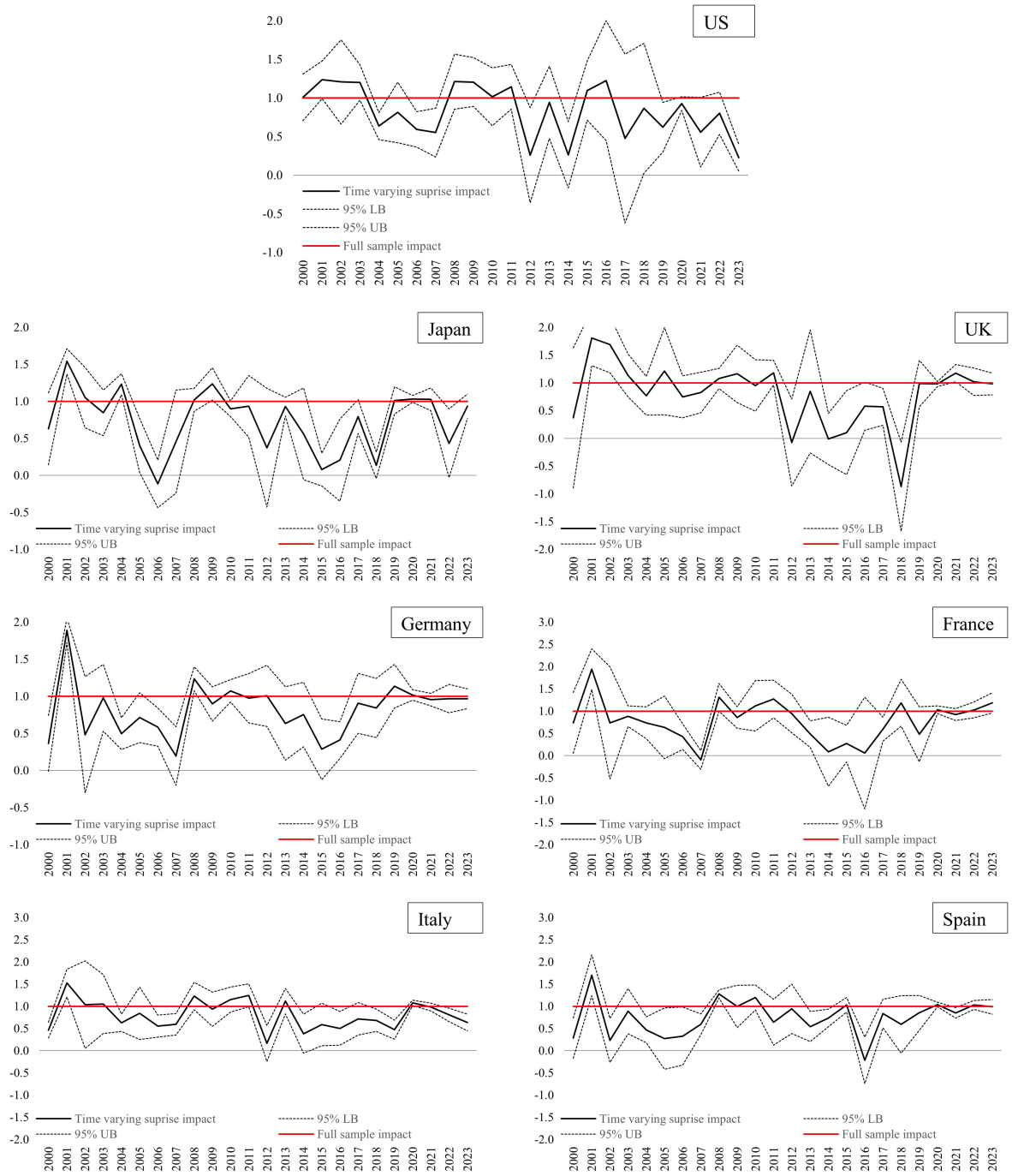

Figure 1: *Time Varying impact of Macro Announcement Surprises on Economic Confidence.* The time-varying impact of surprises on the Business Confidence index is obtained by estimating the following Equation (6). This figure plots the estimates of $\hat{\beta}_j$ for each year (black line), along with 95% confidence error bands (black dotted lines). Sample period: January 2000 - April 2023.

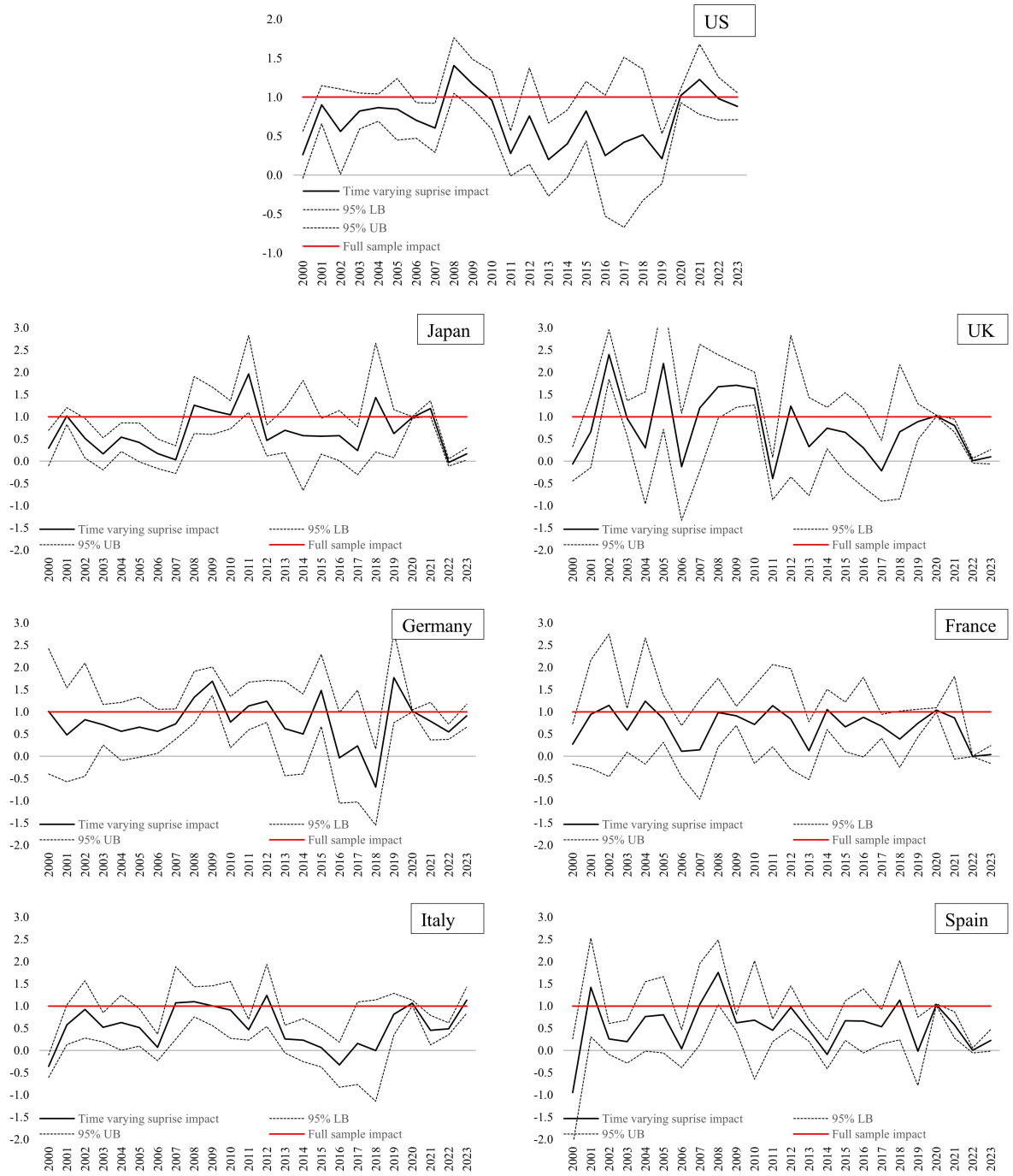

Figure 2: *Time Varying impact of Macro Announcement Surprises on the Economic Activity.* The time-varying impact of surprises on the Industrial Production index is obtained by estimating the following Equation (6). This figure plots the estimates of $\hat{\beta}_j$ for each year (black line), along with 95% confidence error bands (black dotted lines). Sample period: January 2000 - April 2023.

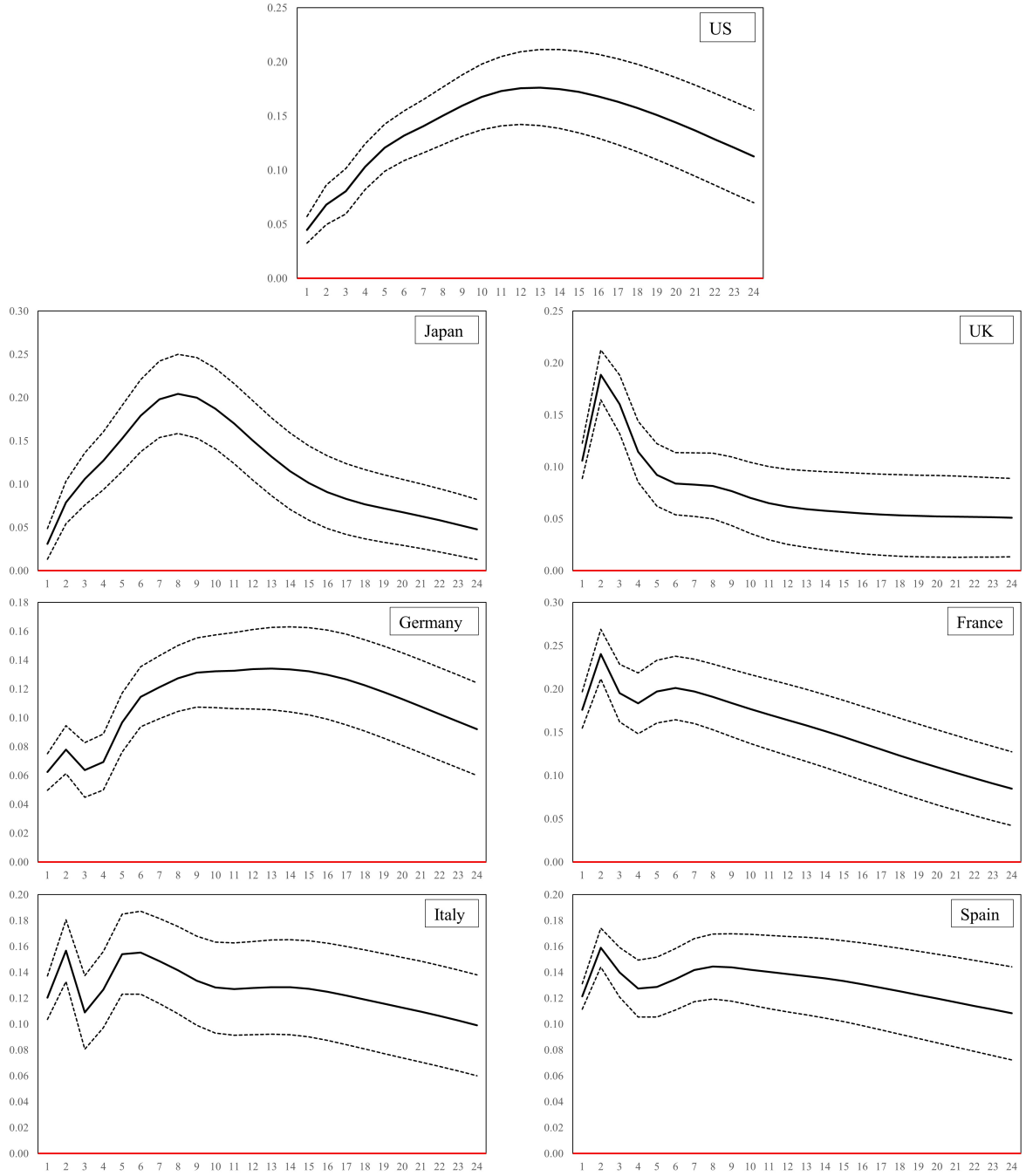

Figure 3: *Economic activity response to an Economic Confidence Surprise shock.* Size of the shock: one standard deviation. Solid line: Point estimates. Dashed lines: 95% confidence interval. Sample period: January 2000 - April 2023.

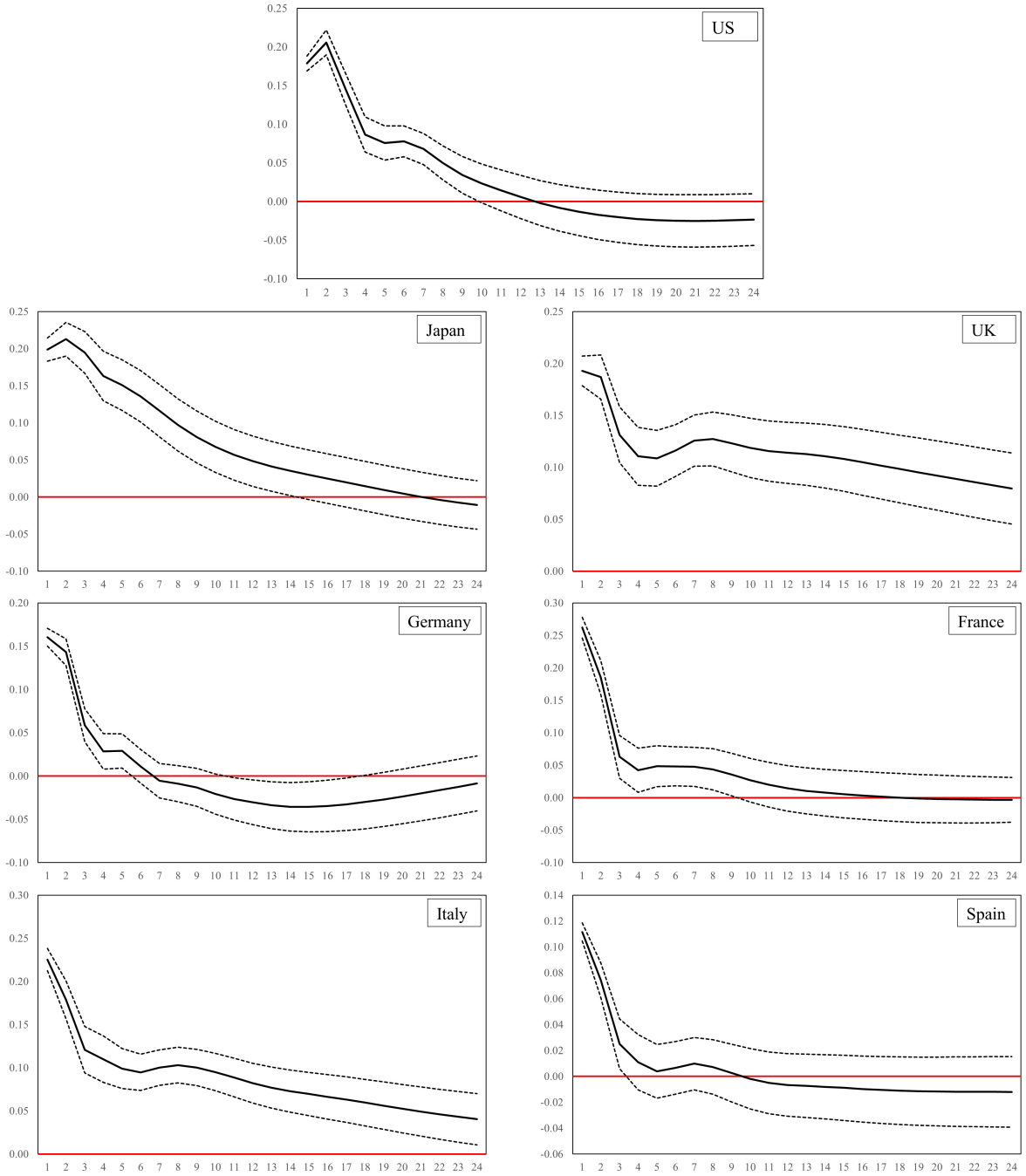

Figure 4: *Economic activity response to an Industrial Production Surprise shock.* Size of the shock: one standard deviation. Solid line: Point estimates. Dashed lines: 95% confidence interval. Sample period: January 2000 - April 2023.

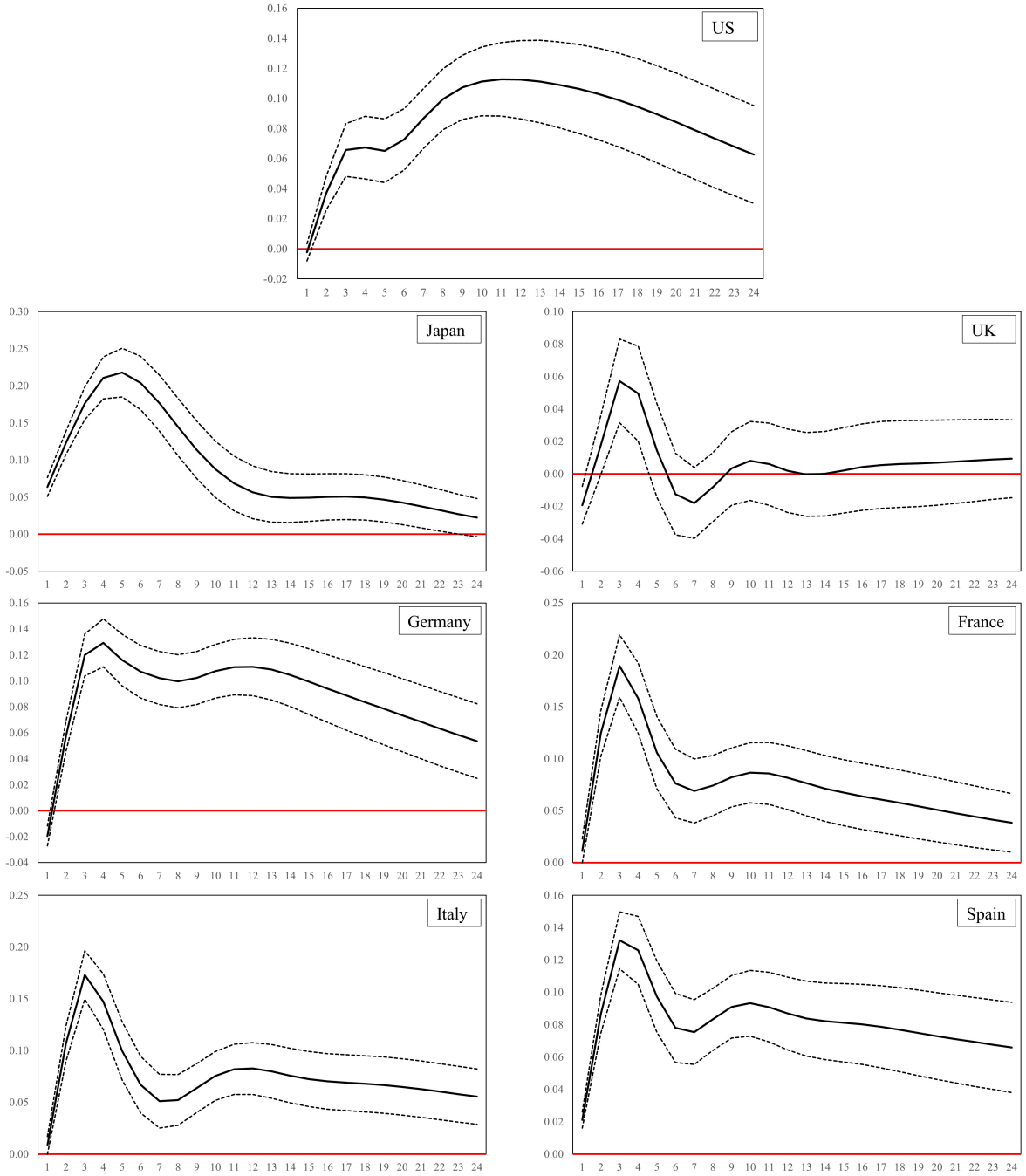

Figure 5: *Economic activity response to a Business Confidence shock.* Size of the shock: one standard deviation. Solid line: Point estimates. Dashed lines: 95% confidence interval. Sample period: January 2000 - April 2023.

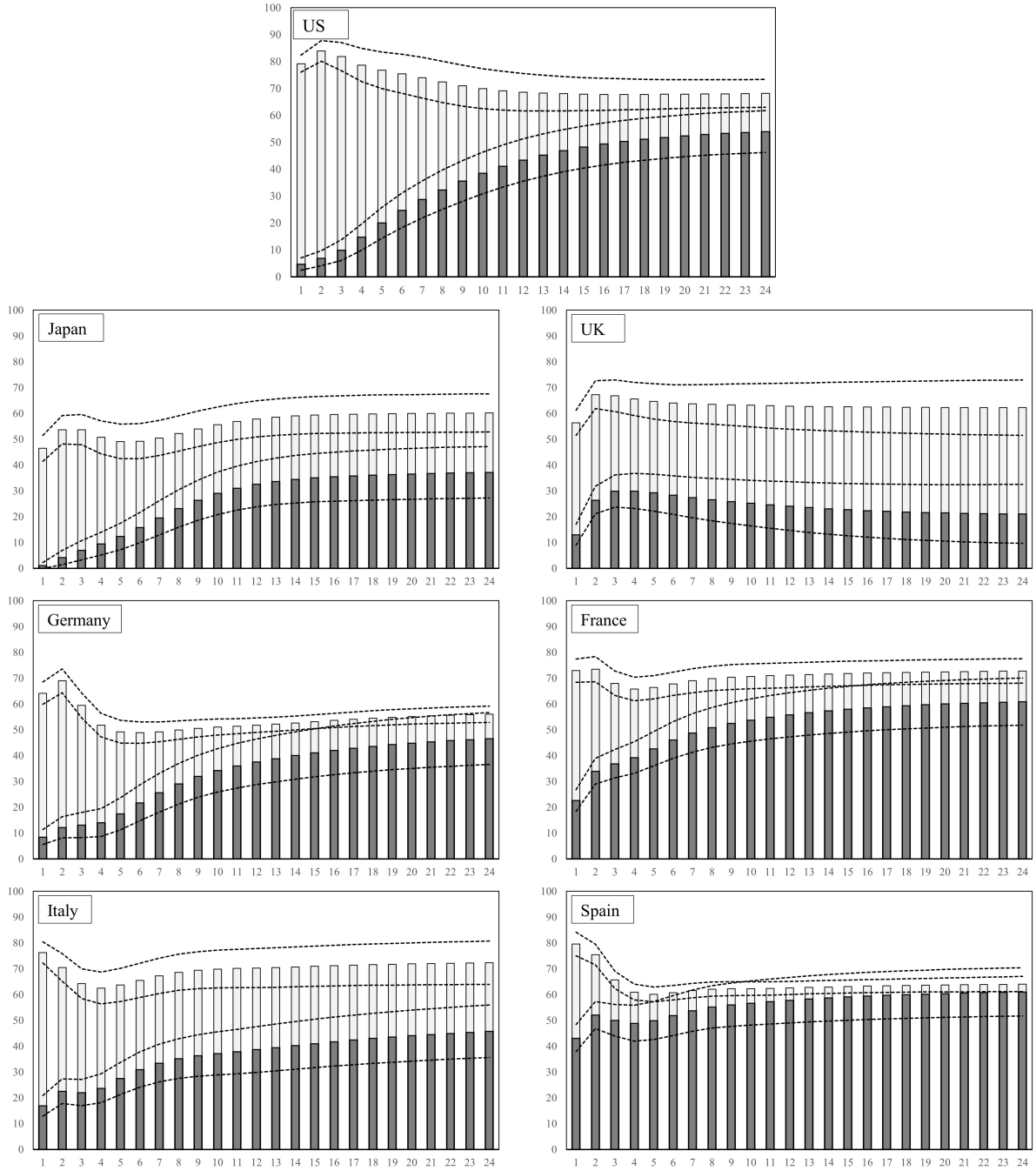

Figure 6: *Economic activity response to a Surprise index shock: Variance Decomposition.* The bar graph in dark grey represents: Percent Industrial Production variance due to Business Confidence Surprise Index. The bar graph in light grey represents: Percent Industrial Production variance due to Industrial Production Surprise Index. Dashed lines: 95 per cent confidence interval estimated with Monte Carlo simulations (100). Sample period: January 2000 - April 2023.

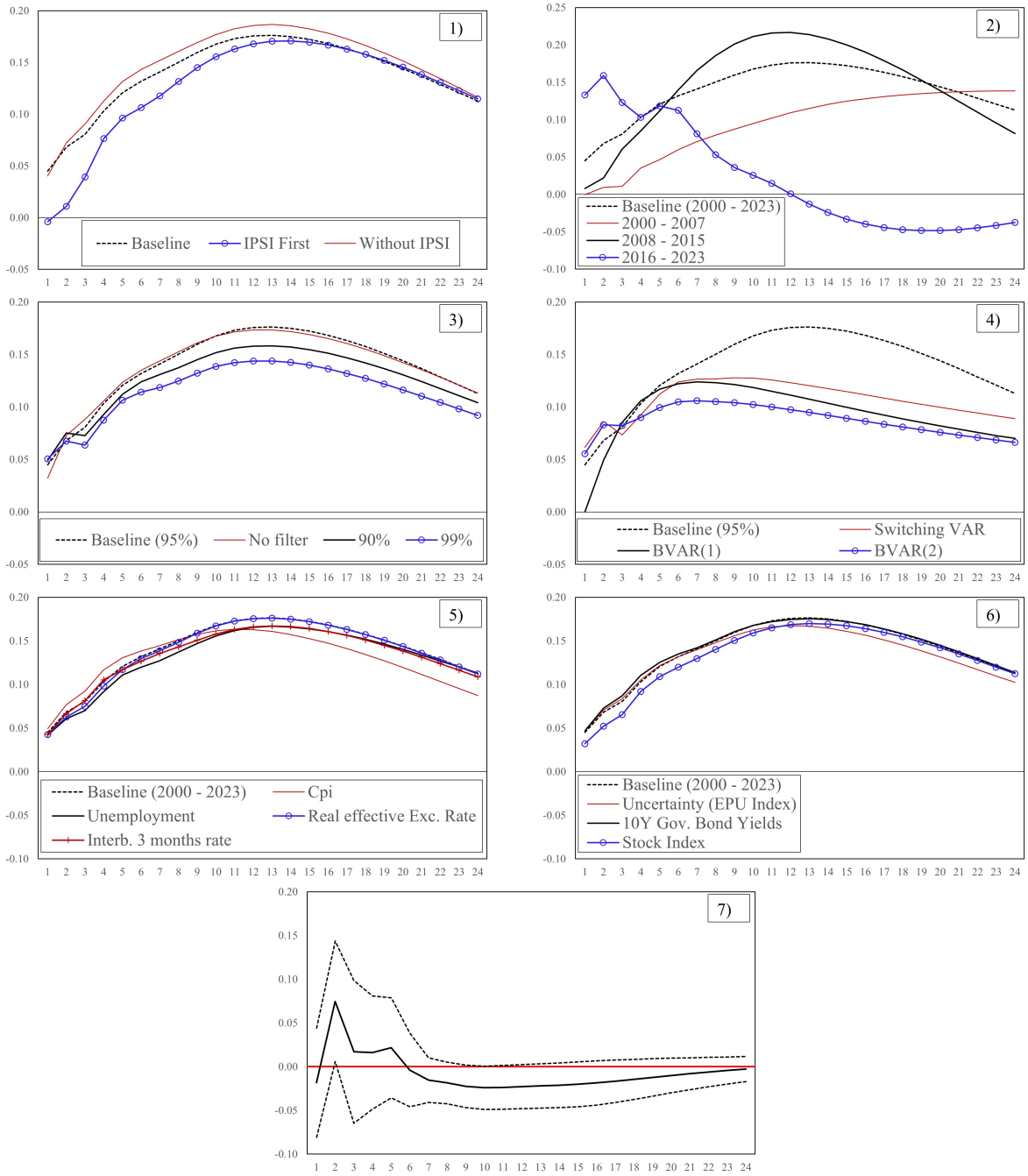

Figure 7: *Sensitivity analysis - US Industrial production response to BCSI shocks.* Size of the shock: one standard deviation of an Economic Confidence SI shock. Dotted black line: Point estimates of baseline. Alternative estimates for the sensitivity analysis are conducted by applying: 1) different ordering in surprise indices ($IPSI$ first, without $IPSI$), 2) alternative samples, 3) alternative surprise indices estimated by applying different significance levels, 90% and 99% to the automated model selection procedure, 4) alternative VAR estimation techniques, 5) the introduction of macroeconomic control variables, 6) the introduction of financial/uncertainty control variables, and 7) alternative ordering in VAR ($BCSI$ last). Sample period: January 2000 - April 2023, except for Panel 2).