EUROPEAN CENTRAL BANK
EUROSYSTEM

Working Paper Series

Niccolò Battistini, Pedro Neves

What drives business expectations? A tale of demand and supply

No 3179

Abstract

This paper develops a novel empirical framework to analyse the drivers of business expectations in the euro area. Using harmonised data from the European Commission's business surveys for manufacturing, services, and construction, we build composite business expectations indices (BEI) for activity and prices. These composite BEI exhibit strong predictive power for near-term real GDP growth and GDP deflator inflation. To identify the underlying forces shaping expectations, we estimate sector-specific structural Bayesian vector autoregression models, combining responses on expectations and reported limits to production. According to the results, demand-side shocks, notably product demand and financial conditions, account for the bulk of fluctuations in business expectations, with heterogeneous effects across sectors. Supply-side shocks, notably materials supply and labour conditions, play a significant role in driving price expectations, especially during the post-pandemic inflationary period. Our results demonstrate the value of a granular survey-based modelling approach for real-time economic analysis and policy assessment.

JEL Classification: C11, E10, E60

Keywords: firms' expectations, structural Bayesian VAR model, euro area, business surveys

Non-technical summary

Understanding what drives the expectations of firms about their future economic conditions is essential for anticipating macroeconomic developments and designing effective policy responses. Business expectations—concerning activity levels and prices—strongly influence firms' decisions on investment, employment, production, and pricing. However, while policymakers often monitor headline indicators from business surveys, they rarely dissect the underlying factors that shape these expectations. This paper bridges that gap by proposing a new, practical framework to identify and quantify the economic drivers of business expectations in the euro area.

The paper develops novel composite business expectations indices (BEI) for activity and prices across three major sectors—manufacturing, services, and construction—drawing on harmonised data from the European Commission's business surveys. These indices are shown to be highly correlated with euro area GDP growth and inflation, making them relevant tools for short-term macroeconomic monitoring.

The core of the study lies in a structural time series model known as a Bayesian Vector Autoregression (BVAR), tailored to each sector. This model integrates firms' expectations with reported obstacles to production—such as weak demand, labour shortages, or financing constraints—and uses these inputs to identify six structural shocks: three on the demand side (product demand, financial conditions, other demand) and three on the supply side (materials supply, labour conditions, other supply). Crucially, the identification relies on the direction and the size of changes in firms' expectations and reported constraints.

The findings indicate that demand shocks—especially those linked to customer demand and financial conditions—are the dominant source of fluctuations in business expectations. On average, these demand forces explain more than half of the variation in both activity and price expectations. Supply shocks, by contrast, have a more modest impact on activity but play a substantial role in shaping price expectations, particularly during periods of high inflation, such as the post-pandemic years.

The analysis also reveals important sectoral differences. For example, financial conditions matter more for manufacturing and construction, which are capital-intensive, while services are more sensitive to product demand. Labour-related supply shocks are especially relevant in services, while materials shortages are more prominent in manufacturing and construction.

The paper also examines key episodes. During the global financial and sovereign debt crises,

falling expectations were largely driven by demand-side factors, such as tight credit conditions and weak customer demand. In contrast, during the COVID-19 pandemic and the subsequent inflationary period, both demand and supply shocks played critical roles: restrictions on movement and uncertainty initially suppressed expectations, while reopening effects and supply bottlenecks later fuelled inflationary pressures.

Overall, the paper provides a simple, updateable toolkit for policymakers to interpret business expectations in real time and to distinguish between supply and demand forces. This enhances policymakers' ability to diagnose the economic situation accurately and tailor their policy responses accordingly.

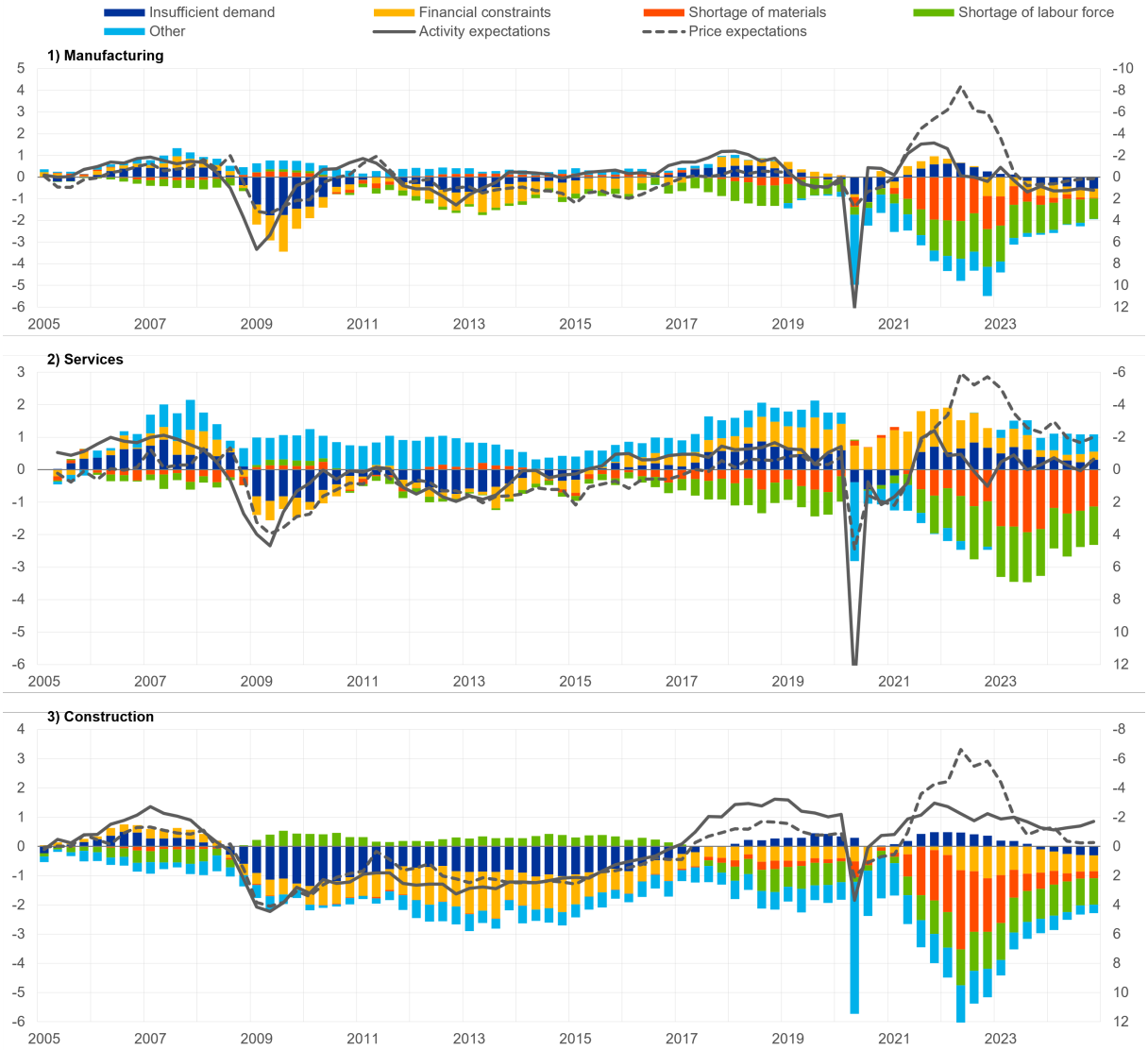
1 Introduction

Business expectations are crucial determinants of firms' investment, employment, production, and pricing decisions, and thus play a fundamental role in shaping economic dynamics, as shown by empirical evidence (Gennaioli, Ma and Shleifer, 2016; Boneva et al., 2020; Enders, Hünnekes and Müller, 2022; Born et al., 2023). Thus, business expectations have attracted increasing attention from academic and policy circles. Among academics, a large body of research has focussed on the expectations formation process, showing that firms shape their beliefs by collecting and processing a broad set of information, including current and future conditions of customer demand and supply chains, labour and financial markets, and other economic and institutional aspects (Angeletos and La'O, 2013; Coibion, Gorodnichenko and Kumar, 2018). Among policymakers, several institutions have designed business surveys to elicit the role of these various factors in determining firms' expectations (e.g., the European Commission's Business Survey and the European Central Bank's Survey on Access to Finance for Enterprises).

Academic work on business expectations has yielded important theoretical insights, but it mostly relies on firm-level micro data and sophisticated empirical methods to tease out the determinants of firms' beliefs. As such, these approaches are rarely adopted by policy institutions, which instead aim to distil clear signals from simple frameworks applied to large, harmonised survey datasets on a regular basis. Conversely, policy institutions routinely collect and report headline survey balances or simple composite indices, but they rarely decompose these aggregates into their underlying structural drivers.

For instance, in the case of the euro area, policy institutions regularly comment on developments in business activity and price expectations as well as the factors reported to limit firms' production from the European Commission's (EC) business surveys, such as those in Figure 1. Typically, policy institutions observe the dynamics of business activity and price expectations to assess the near-term outlook on real and nominal economic developments, and then look at fluctuations in factors limiting production to gain some intuition on the main drivers of business expectations. While providing important insights, this approach does not establish a formal quantitative framework to link shifts in sentiment to their underlying economic forces. Indeed, activity and price expectations broadly co-moved with limits from insufficient demand and financial constraints during the global financial crisis and the sovereign debt crisis. However, these co-movements largely broke down with the outbreak of the COVID-19 pandemic and the ensuing

Figure 1: Business activity and price expectations and factors limiting production across sectors



Sources: European Commission DG-ECFIN, authors' calculations.
Notes: This figure shows the standardised levels of business activity and price expectations and factors limiting production manufacturing (panel 1), services (panel 2) and construction (panel 3). For details on the definition of the variables, see Section 2.

inflationary period, during which limits associated with "other" factors and limits from shortage of materials and labour force, respectively, played a prominent role. Ultimately, the observed co-movements of indicators of business expectations and perceptions cannot quantify the role of all the different forces at play, which is crucial to assess the near-term economic outlook and design an appropriate policy response.

To address these concerns, this paper develops a parsimonious, time series-based model that (i) exploits the richness of the official business surveys, (ii) generates easy-to-update, bottom-up

indices at the aggregate level, and (iii) uncovers the role of demand and supply shocks that drive these indices. In this way, this paper provides policymakers with an actionable toolkit for monitoring and assessing business expectations on an ongoing basis. To this end, the paper uses the quarterly business survey data on expectations and limits to production provided by the EC at the sectoral level and proceeds in three steps.

In a first step, the paper constructs a novel composite business expectations indices (BEI) for activity and prices based on a simple weighted average of the corresponding metrics for each considered sector, namely manufacturing, (market) services, and construction. In a second step, it estimates the same structural Bayesian vector autoregression (SBVAR) model for each sector to assess the role played by the underlying drivers of the BEI for activity and prices. Applying the algorithm by Rubio-Ramírez, Waggoner and Zha (2010) to firms' replies on expected activity and prices as well as the factors limiting production, the model identifies three demand drivers (product demand, financial conditions, and other demand), pushing activity and price expectations in the same direction, as well as three supply drivers (materials supply, labour conditions, and other supply), exerting pressures on activity and price expectations in opposite directions. In a third step, on this basis, the effects of these drivers on aggregate business activity and price expectations are recovered by aggregating their contributions to the sectoral indices consistently with the weighting scheme used to calculate the composite BEI.[1]

Focussing on the economic relevance of our bottom-up index, the composite BEI for activity and prices exhibit good correlation properties with respect to near-term real and nominal economic developments in the euro area. Specifically, these indices, measured at the beginning of each quarter, are good predictors of the year-on-year real GDP growth and GDP deflator inflation recorded at the end of the same quarter, broadly in line with other survey-based indices commonly used by practitioners and policy institutions (e.g., other European Commission's survey data as well as S&P Global's Purchasing Managers' Index). Hence, understanding the drivers of the composite BEI can shed light on the drivers of actual economic outcomes through the lens of firms' beliefs.

Turning to the structural analysis of the drivers of business expectations, we assess the role of the identified drivers both on average over the sample, through a forecast error variance

[1]The results for the historical decomposition of the composite BEI aggregated from sectoral estimates, shown in Figure A.2 Section 4.2, qualitatively and quantitatively largely similar to those obtained from a direct estimation of the same SBVAR model on the composite BEI for activity and prices and the weighted average of the limits on production, as shown in Figure A.7.

decomposition, and during specific episodes, through a historical decomposition. The variance decomposition indicates that demand shocks—particularly those related to product demand and financial conditions—are the predominant contributors to fluctuations in business expectations, explaining 57% of the variance in activity expectations and 63% in price expectations of the composite BEI after one year. Financial conditions shocks are especially relevant for manufacturing and construction, reflecting their sensitivity to interest rates and financing conditions, while product demand shocks are the main drivers in services. Sectoral dynamics differ markedly: supply-side shocks, especially those related to materials, dominate in manufacturing and construction, whereas labour-related supply shocks are more relevant for services.

Historical decompositions confirm these differences and illustrate the shifting nature of dominant shocks across crises. During the global financial crisis, financial conditions and product demand shocks were the primary drivers of the downturn in all sectors, with supply shocks playing a more limited role. In contrast, during the pandemic, business expectations were hit by a combination of other demand shocks—reflecting restrictions on mobility and uncertainty—and supply shocks, particularly adverse shocks to labour conditions in services and materials supply in manufacturing and construction. More recently, in the post-pandemic inflationary period, supply-side constraints related to geopolitical tensions and labour shortages continued to depress activity and fuel price expectations, while the tightening of financial conditions curbed demand, especially in manufacturing. These results highlight the value of our structural identification approach in disentangling complex macroeconomic narratives and monitoring drivers of business expectations in real time across key sectors.

Finally, additional exercises support and extend these results in three directions. First, we show that our baseline shock decomposition is broadly robust to excluding the post-pandemic period, while the post-2020 sample mainly helps to sharpen the demand-versus-supply interpretation of the "other" factor shocks, particularly in services. Second, we validate the overall demand/supply split implied by our granular, survey-structure identification by comparing it with a simpler bivariate SBVAR model based only on activity and price expectations: the small-scale model yields a very similar narrative, with demand-driven downturns pre-pandemic and a larger role for supply forces in the post-pandemic inflation episode. Third, we document that the identified drivers of expectations also provide timely signals about the drivers of realised dynamics in euro area real GDP and GDP deflator dynamics, most notably with supply contributions to inflation in hard data lagging those in price expectations during the recent inflation surge.

This paper contributes to two strands of literature. First, it relates to the growing work on the determinants of business expectations. Early studies such as Karadeniz and Özçam (2010), Gennaioli, Ma and Shleifer (2016) and Angeletos and La'O (2013) emphasise the role of sentiment and information frictions in shaping firms' beliefs. Recent contributions by Coibion, Gorodnichenko and Kumar (2018), Enders, Hünnekes and Müller (2022) and Antonovica, de Esteban Curiel and Rodríguez Herráez (2023) provide firm-level evidence on how expectations are formed based on diverse information sets, including macroeconomic variables, demographics and financial conditions. Born et al. (2023) and Boneva et al. (2020) further highlight how these expectations relate to firm-level decisions and aggregate outcomes. However, most of this literature relies on micro data and rarely provides tools suited for policy monitoring using aggregate survey indicators. We contribute to the empirical literature on the determinants of business expectations by identifying structural shocks through sign and magnitude restrictions recovered directly from survey data, as opposed to conventional hard data, allowing to interpret a broad range of shocks based on the structure of the survey.[2]

Second, the paper contributes to the literature on sectoral dynamics, particularly the heterogeneity in business cycle transmission across sectors. From a granular perspective, seminal works by Gabaix (2011), Acemoglu, Akcigit and Kerr (2016) and, more recently, Ghassibe (2021) and Baqaee and Farhi (2024) established the role of sectors and their interactions through input-output linkages as sources and propagators of shocks to the overall economy. From an aggregate perspective, Tase (2019) for the US and Battistini and Gareis (2024*b*) for the euro area find that sectoral shifts are more pronounced during recessions and retain information for the near-term outlook. Moreover, De Graeve and Schneider (2023) highlight the role of sectoral shocks in driving business cycle fluctuations. Specifically, De Santis (2024) and Bańbura, Bobeica and Martínez Hernández (2023) examine the sector-specific propagation of supply shocks during recent crises. Meanwhile, Ascari, Bonam and Smadu (2024) study the role of global supply chain pressures in driving inflation dynamics. Brignone and Mazzali (2025) present a dualistic view of euro area fluctuations driven by supply and demand forces across industries. These studies underscore the importance of disaggregated modelling to account for sector-specific shocks and propagation mechanisms. This paper complements these studies by focussing on expectations, rather than movements in actual data, similarly to Sebbesen and Oberhofer (2024). However,

[2]For instance, De Santis (2024) identifies supply chain and energy shocks using survey data from the S&P Global's Purchasing Managers Index (PMI) survey.

unlike their structural model of production networks, the framework in this paper offers a more parsimonious time-series approach tailored to regular policy use.

The remainder of the paper is organised as follows. 2 describes the data and the performance of the novel bottom-up indicators for business activity and price expectations. Section 3 lays out the empirical methodology. Section 4 presents the results on the role of structural drivers in explaining fluctuations in business activity and price expectations on average (via forecast error variance decomposition) and over specific episodes (via historical decompositions). Section 5 conducts additional exercises to check the robustness of our baseline estimates, as well as to compare their implications with the messages implied by simpler specifications for soft and hard data. Section 6 concludes.

2 Data

This analysis relies on data from the European Commission business surveys. These surveys provide information about firms' perceptions and expectations related to several economic concepts, based on harmonised questionnaires collecting replies from around 135,000 firms across several sectors for all European Union Member Countries. In our analysis, we use data for near-term expected changes in activity and price and perceived limits to production for manufacturing, construction and (market) services for the euro area as a whole at either a monthly or a quarterly frequency, depending on the indicator.

As regards the indicators for business activity and price expectations, we rely on the monthly questionnaire. We measure activity by looking at the overall balance between positive ("increase") and negative ("decrease") replies to Q5 ("How do you expect your production to change over the next three months?") for manufacturing, Q3 ("How do you expect your demand to change over the next three months?") for services, and Q4 ("How do you expect your firm's total employment to change over the next 3 months?") for construction.[3] Moreover, we measure

[3]The questionnaire is broadly harmonised across sectors, but some questions slightly differ due to the nature of the sector. To measure business activity expectations, we use the closest counterpart of production for services and construction, constituting, respectively, demand and order books. More information about the survey can be found on the methodological guidelines. For construction, the choice of question would be between Q4 (our preferred option) and Q3 ("Do you consider your current overall order books to be...?"), as the net balances of answers to those questions provide the two equally-weighted sub-indices used in the computation of the construction confidence index. Ultimately, we opt for Q4 because employment expectations are more correlated with construction real GVA growth compared to order books. This is not surprising, also in the light of the practice in some countries (e.g., Italy) of using monthly employment hard data to compute (together with annual productivity figures) monthly construction output.

price expectations by looking at the overall balance between positive ("increase") and negative ("decrease") replies to the questions and Q6, Q6 and Q5 ("How do you expect your (selling) prices to change over the next three months?") for manufacturing, services and construction, respectively.

As regards the indicators for the perceived limits to production, we use data from the quarterly questionnaire. More precisely, we use the questions Q8, Q7 and Q2 ("What main factors are currently limiting your production (building activity)?") for manufacturing, services and construction, respectively. Specifically, we use the share of replies for each option ("none", "insufficient demand", "shortage of labour force", "shortage of material and/or equipment", "financial constraints" or "other factors").[4]

In order to match the monthly and quarterly survey data, we turn the monthly responses into quarterly by considering only the response to the survey on the first month of each quarter, so that it matches the period when the quarterly survey is conducted and ensuring consistency between the timing of the two responses. Our sample period ranges from Q1 1999 for construction, Q1 2002 for manufacturing and Q1 2004 for services until Q4 2024 for all sectors. These ranges are motivated by our focus on the euro area and, in the case of manufacturing and services, are constrained by limited data availability. All data are seasonally adjusted.

Based on these sectoral data, we calculate bottom-up indicators of business activity and price expectations for the total economy using a weighted average of the corresponding indicators for the three sectors.[5] A remarkable indication of the economic relevance of our bottom-up composite business expectations index (BEI) for both activity and prices is their good correlation with hard economic data. Table 1 shows the correlation of both composite BEIs with hard data recorded at the end of the same quarter. As shown in the table, the BEI for activity has a correlation of 0.92 with real GDP year-on-year growth when using a pre-pandemic sample and 0.89 when looking at the full sample without the pandemic (2020-2021), i.e. the no-pandemic sample. The BEI for activity performs well relative to other commonly used survey measures: its correlation with hard data is comparable to the one of the European Commission's economic

[4] In the construction survey, which exceptionally provides monthly replies to this question, an additional reply option is available, "weather conditions". For the sake of cross-sectoral consistency, this option is not included in this analysis, and hence weather is implicitly considered as a residual driver of business expectations.

[5] The weights are based on sector shares in total gross value added after excluding non-market services activities (included in the NACE Rev. 2 classification as O, P and Q, and corresponding to public administration, defence, education, human health, and social work activities). After being re-scaled, the weights correspond to around 22% for manufacturing, 7% for construction and 71% for services.

Table 1: Correlation between soft and hard data for activity and prices

		No-pandemic sample			Pre-pandemic sample			Full sample		
		EC	PMI	BEI	EC	PMI	BEI	EC	PMI	BEI
Activity	level	0.90	0.80	0.88	0.92	0.88	0.91	0.79	0.74	0.77
	year-on-year	0.61	0.41	0.63	0.70	0.45	0.68	0.76	0.72	0.84
Prices	level	0.33	0.72	0.83	0.54	0.60	0.63	0.35	0.68	0.79
	year-on-year	-0.19	-0.09	0.03	0.16	0.02	0.05	-0.12	-0.07	0.04

Sources: Eurostat, European Commission, S&P Global, authors' calculations.
Notes: The table reports the contemporaneous correlation coefficients between real GDP year-on-year growth for activity and GDP deflator year-on-year inflation for prices, on the one hand, and the specific indicator indicated in the column, either in levels (first and third rows) or in year-on-year differences (second and fourth rows), on the other hand. "EC" refers to the European Commission's economic sentiment index for activity and consumer price 12-month-ahead expectations for prices, "PMI" refers to S&P Global's purchasing managers' index (PMI) composite output for activity and prices charged for prices, and "BEI" refers to the bottom-up business expectations indices for activity and prices developed in this paper. "No-pandemic sample" refers to the period between Q1 2006 and Q4 2024, excluding the period between Q1 2020 and Q4 2021. "Pre-pandemic sample" refers to the period between Q1 2006 and Q4 2019. "Full sample" refers to the period between Q1 2006 and Q4 2024. For the sake of comparability, all quarterly indices for soft data rely on the observation in the first month in each quarter.

sentiment indicator (ESI), which is based on a much broader set of indicators including expectations from retailers and consumers, and even higher than the one of the purchasing managers' index (PMI) composite output from S&P Global across all samples.[6] The BEI for prices has a correlation of 0.63 with GDP deflator year-on-year inflation in the pre-pandemic sample and 0.83 in the no-pandemic sample. Thus, it exhibits an even better performance compared to the other considered survey-based measures, with a larger correlation with hard data than the European Commission's consumer price 12-month-ahead expectations and the PMI composite prices charged across all samples. Lastly, these strong correlations also hold at the sectoral level when considering each individual survey indicator by sector, for activity and prices, used in the calculation of the BEI, against sectoral value added and deflator data, as seen in Table A.2 in the Appendix.[7]

[6] As shown in Table A.1 in the Appendix, the notable correlation of the BEI for activity with hard data also applies when considering quarter-on-quarter real GDP growth, albeit to a lower extent compared with the correlation with year-on-year growth. The higher correlation with year-on-year, rather than quarter-on-quarter, dynamics in hard data is a common feature of soft indicators (see Table A.1). Hence, we opt to keep year-on-year growth as our main benchmark specification for hard data, as this transformation better aligns with the long-term business cycle dynamics captured by soft data. As illustrated in table A.1, the correlation of the indicator with one year ahead GDP growth is rather weak, but consistent with other survey indicators.

[7] Our price expectations indicator also correlates well with the diverse HICP components, both at the aggregate and sectoral level. These correlations are shown in Table A.3.

3 Methodology

We use a structural Bayesian Vector Autoregression (SBVAR) model with sign and magnitude restrictions to identify the drivers of business expectations across sectors and quantify their impact on the BEI for activity and prices across sectors and in the overall economy. For each sector, we estimate the following reduced-form BVAR model:

$$y_t = A_0 + \sum_{j=1}^{p} A_j y_{t-j} + u_t, \tag{1}$$

where y_t is a $n \times 1$ vector of endogenous variables, A_j, for $j = 1, ..., p$, are $n \times n$ matrices of autoregressive coefficients, A_0 is a $n \times 1$ vector of intercepts, and $u_t \sim \mathcal{N}(\mathbf{0}, \Sigma_u)$ is a $n \times 1$ vector of reduced-form shocks, and Σ_u is their $n \times n$ covariance matrix.

In each sector-specific BVAR model, y_t contains activity and price expectations as well as the various factors limiting production, namely insufficient demand, financial constraints, shortage of materials, shortage of labour force, and other factors (as detailed in Section 2). Activity and price expectations enter the model in standardised levels, whereas the limits on production enter the model in standardised first differences. The choice between level and differences is motivated by the specification of the questions, which are phrased in terms of changes for our preferred measures of activity and prices and in terms of (constraints on) levels for the factors limiting production.[8] The choice for the standardisation is motivated by the identification strategy, which relies on a comparable magnitude for the endogenous variables.

As regards the identification strategy, a standard practice in the empirical literature is to assume that the reduced-form residuals u_t are linked to the structural shocks ϵ_t via a matrix of impact effects such that $u_t = B\epsilon_t$. In our analysis, the structural identification proceeds via sign and magnitude restrictions on B (Uhlig, 2005; Rubio-Ramírez, Waggoner and Zha, 2010; De Santis and Zimic, 2018). To the best of our knowledge, the application of such restrictions on a full set of survey data to identify structural shocks is novel in the empirical literature.

As shown in Table 2, the identification strategy disentangles six structural shocks. Each shock relates to a specific factor and induces either demand-side or supply-side co-movements

[8] Moreover, this choice has the appeal to provide a narrative for the level of expectations, which is the most accurate indicator of economic activity (as described in Section 2), without introducing a (spurious) trend in a stationary process such as the BEI, as would be the case for a specification in differences. Our results do not vary substantially, either quantitatively or qualitatively, if all variables enter the model in levels or in first differences. Results with different transformations of the data are available from the authors upon request.

Table 2: Identification strategy through sign and magnitude restrictions

	Demand			Supply		
	Product demand	Financial conditions	Other demand	Materials supply	Labour conditions	Other supply
Activity expectations	+	+	+	+	+	+
Price expectations	+	+	+	−	−	−
Insufficient demand	−, min					
Financial constraints		−, min				
Shortage of materials				−, min		
Shortage of labour force					−, min	
Other			−, min			−, min

Notes: The table reports the restrictions on the contemporaneous impact of different structural shocks (across columns) on different endogenous variables (across rows). In each cell, "+" ("–") refers to a strictly positive (negative) impact, whereas "min" refers to the minimum impact across factors limiting production (i.e., across the five bottom rows).

in activity and price expectations. First, each (expansionary) factor-specific shock is assumed to increase activity expectations and induce the largest decline in the limits on production of the corresponding factor compared to the limits in other factors. Second, this shock induces an increase in price expectations, if it belongs to the set of demand shocks, or a decrease in price expectations, if it belongs to the set of supply shocks, in line with standard economic theory. On the demand side, a positive product demand shock reflects a decline in insufficient demand, while a positive financial conditions shock lowers financial constraints, in both cases raising activity and price expectations.[9] On the supply side, a positive materials supply shock reduces shortages of materials, while a positive labour conditions shock moderates shortages of labour force, in both cases lifting activity and thwarting price expectations.[10] Finally, two further shocks capture a reduction in other limits on production, typically related to regulatory measures and uncertainty not captured by the remainder factors, and an improvement in activity expectations. These other factors cannot be clearly assigned to a set of demand or supply shocks, given the broad range of disturbances they may represent, mainly after the outbreak of the COVID-19 pandemic.[11] This

[9] Financial conditions shocks capture a broad range of demand-side shocks, such as shocks to monetary policy, fiscal policy and credit supply affecting firms' balance sheet conditions and liquidity needs.

[10] Labour conditions shocks could reflect either labour demand shocks, e.g., stemming from labour hoarding or other changes in firm-specific preferences, or labour supply shocks, e.g., stemming from migration or other worker-specific conditions. These types of shocks have been shown to induce supply-side dynamics on activity and prices (e.g., Kurozumi and Zandweghe, 2022).

[11] As shown in Figure 1, the share of respondents selecting other factors limiting production rose after the sovereign debt crisis across sectors, possibly related to increasing risk aversion, climate transition policies as well as domestic and foreign policy uncertainty. At the onset of the COVID-19 pandemic, it increased substantially and remained persistently above pre-pandemic levels, most likely reflecting the impact of mandatory and voluntary restrictions on mobility, supply bottlenecks and global value chains disruptions, geopolitical tensions, new

way, our identification restrictions allow for both other demand shocks, inducing an increase in price expectations, and other supply shocks, reducing price expectations. Note that, although one shock is left unrestricted, the set of restrictions is large and, especially due to the "minimum" restrictions, it implies a magnitude restriction on the impact of each shock on each limit to production.[12]

Each sector-specific model includes $p = 4$ lags and is estimated with Bayesian techniques. This involves specifying prior distributions for the model parameters, estimating the posterior distributions using the data, and then drawing inference from these posterior distributions.[13] We opt for the widely-used Minnesota-Inverse Wishart prior, where the covariance matrix of the innovations is random and there are various layers of shrinkage implemented via dummy observations (e.g., Del Negro and Schorfheide, 2011).[14] The direction of the shrinkage is governed by a set of hyper-parameters: (i) the prior tightness for the autoregressive coefficients of order one; (ii) the prior tightness for the autoregressive coefficients of higher lags; (iii) the weight on its own-persistence; (iv) the weight on the co-persistence of the data; and (v) the weight for the priors of the covariance matrix of innovations. The prior hyper-parameters are chosen to maximise the marginal data density (Giannone, Lenza and Primiceri, 2015). Finally, we perform a COVID-19 heteroscedasticity adjustment to account for the distortion that the pandemic caused in the survey data, by applying the method by Lenza and Primiceri (2022).[15]

4 Results

In this section, we present the results of our estimated SBVAR models. In a first step, we focus on the forecast error variance decomposition to understand the role played by the identified shocks in driving business expectations on average. In a second step, we focus on the historical decomposition to assess how different shocks affected business expectations in specific episodes.

regulatory requirements for the green transition, as well as economic and trade policy uncertainty. These events can hardly be associated with single demand or supply roots, most likely having mixed natures, thus motivating the further disaggregation between other demand and supply shocks.

[12] The computational time is reduced by parallelising the toolbox by Canova and Ferroni (2021).

[13] For our inference, we use 1,000 draws from the posterior distribution. Parallelising the code on 24 cores, it takes more than 14 hours to estimate the models for the three sectors.

[14] To reflect the stationarity of our data, we adjust the standard assumption by the Minnesota prior for the first lag of the autoregressive coefficient of each variable, from 1 (implying a random walk) to 0.5 (implying a partially persistent autoregressive process). The tightness of the prior is anyway optimised, as described below.

[15] Specifically, we choose Q1, Q2 and Q3 2020 as the outliers, as the estimated scaling factors for the volatility tend to become much smaller and fluctuate around 1 (i.e. the value consistent with no heteroscedasticity) thereafter. Our results do not substantially change when we extend the number of quarters up to Q4 2021.

In both cases, we first consider the results for the composite BEI for activity and prices, which are aggregated from the sectoral results using the same weighting scheme applied to obtain the BEI for activity and prices.[16] We then zoom in the sectoral indices for manufacturing, services and construction to enrich the overall narrative with cross-sectoral dynamics. As the identification strategy restricts all the impulse response functions (IRFs) of interest, we explore the results of the SBVAR model via forecast error variance decompositions and historical decompositions.[17]

4.1 Forecast error variance decomposition

This section analyses the results from the forecast error variance decomposition (FEVD) derived from our model. This analysis is essential to assess the relative importance of various structural shocks in explaining the variability of business expectations at various forecast horizons on average over the entire sample. The results for the composite BEI and sectoral expectations on impact and after one year, that is at horizons $t + h$ for $h = 0, 4$, are reported in Table 3.

First, demand factors, especially product demand and financial conditions, are the dominant sources of fluctuations in business expectations across all sectors, accounting for 57% for activity and 63% for prices of the total variance of the composite BEI after one year. This finding aligns with existing literature, which identifies demand shocks as key drivers of economic activity at business cycle frequencies (Blanchard and Quah, 1989; Christiano, Eichenbaum and Evans, 1999), and especially during periods of economic turmoil, such as those characterising the first two decades of the euro area (i.e., the global financial crisis and the sovereign debt crisis). Other demand factors also play a significant role, possibly reflecting the demand-driven disturbances caused by pandemic developments (as discussed below in Section 4.2). Focussing on activity expectations, product demand shocks are the largest drivers of dynamics in the composite BEI (24.2%), as well as services and construction, on impact. Financial conditions shocks affect manufacturing and construction to a larger extent (22.6% and 22.5%, respectively) relative to services (19.3%); as these sectors are considered to be more interest-rate sensitive, due to the capital intensity and the long supply chains of their production process. However, due to

[16] Our baseline is to consider the historical decomposition of the composite BEI on the basis of the aggregation of the sectoral historical decompositions in order to ensure full consistency between the composite BEI and sectoral expectations. As a robustness check, we have also considered historical decomposition and impulse response functions produced by a direct estimation of the same SBVAR model on the composite BEI for activity and prices and the weighted average of the sectoral limits on production. As shown in Figure A.7, the baseline results are qualitatively and quantitatively largely in line with those obtained from a direct estimation on the composite BEI.

[17] We include the IRFs in Figure A.1 in Appendix A in view of the cross-sectoral differences in the magnitude and the persistence of the responses of business expectations to the several shocks.

Table 3: Forecast error variance decomposition on impact and after one year

Activity expectations														
	Product demand		Financial conditions		Other demand		Materials supply		Labour conditions		Other supply		Residual	
Horizon	0	4	0	4	0	4	0	4	0	4	0	4	0	4
Total	24.2	23.6	20.2	20.5	17.7	13.1	7.4	6.1	7.1	10.6	11.1	13.1	12.2	13.0
Manufacturing	19.7	21.5	22.6	15.3	13.0	14.4	11.1	9.5	10.0	8.2	11.3	16.8	12.3	14.3
Services	25.7	24.2	19.3	21.9	19.1	12.5	6.1	4.8	6.3	11.9	11.2	12.1	12.2	12.6
Construction	22.8	24.4	22.5	22.4	17.3	15.9	9.6	8.6	6.4	4.2	9.4	12.2	12.0	12.4
Price expectations														
	Product demand		Financial conditions		Other demand		Materials supply		Labour conditions		Other supply		Residual	
Horizon	0	4	0	4	0	4	0	4	0	4	0	4	0	4
Total	25.5	28.4	14.0	19.1	16.1	15.8	7.7	7.3	7.7	8.0	13.5	8.0	15.5	13.4
Manufacturing	27.0	25.8	12.9	12.3	13.6	19.1	11.4	10.7	5.2	11.0	15.2	8.0	14.7	13.1
Services	25.6	29.4	14.3	21.4	16.3	14.1	6.1	6.0	8.6	7.4	13.2	8.1	15.9	13.6
Construction	20.0	26.2	13.9	17.0	23.7	22.5	12.1	9.2	5.8	5.1	10.6	7.9	13.9	12.1

Note: The table reports the shares of the total variance of business expectations explained by the structural shocks (in percentages) at forecast horizon $t + h$ for $h = 0, 4$ quarters. "Total" refers to the weighted average of the sectors in line with the weighting scheme used for the BEI.

different transmission mechanisms (more delayed for services, and more immediate for manufacturing), the role of financial conditions shocks rises for the former over time, whereas it declines for the latter. Considering price expectations, product demand shocks are the foremost drivers of fluctuations for the composite BEI (25.5% on impact, 28.4% after one year), while financial conditions shocks instead play a relatively small role on impact (14.0%) but a larger one after one year (19.1%) reflecting a delayed transmission to prices.

Second, supply factors, although less influential than demand forces, contribute more to price expectations than to activity for all sectors on impact (28.8% against 25.6% for the composite BEI), suggesting that supply conditions tend to have a greater impact on prices on average, as shown especially during the recent inflationary shock (and discussed below in Section 4.2). Moreover, on the supply side, other supply shocks appear to be the main drivers of business expectations for both activity and prices on impact (11.1% and 13.5% for the respective composite BEI), highlighting the important role of the post-pandemic sample, when other factors limiting production showed the largest fluctuations, to identify supply shocks. Our identified shocks capture most of the dynamics (more than 85% of the one-year-ahead forecast variance) of activity and price expectations.

Finally, there are two interesting aspects emerging from the FEVD of the factors limiting

production observed in the data (see Table A.4 in Appendix A). First, factor-specific shocks (e.g., product demand shocks) are the main sources of fluctuations in the corresponding factors (e.g., limits from insufficient demand) across most sectors.[18] This result indicates that the dynamics of the factors limiting production are essential in identifying our shocks. Importantly, this result is not mechanically implied by our identification strategy. In fact, for each factor-specific shock and corresponding factor, our strategy imposes a restriction on the *impact relative to other factors* (i.e., across the five bottom rows of Table 2), rather than on the *contribution relative to other shocks* (i.e., across the columns of the same table). Second, a large portion of the volatility of each factor is explained by shocks other than the corresponding factor-specific shocks.[19] This result thus warns against interpreting the observed factors limiting production as proxies for the underlying structural forces, a common practice among policy institutions.

4.2 Historical decomposition

In this section, we analyse the historical decomposition derived from our model. We focus on two major episodes with a broad range of demand and supply shocks on business expectations in the euro area. First, we look at the period spanning the global financial crisis and the sovereign debt crisis. Second, we consider the COVID-19 pandemic and the post-pandemic period.

4.2.1 Global financial crisis and sovereign debt crisis

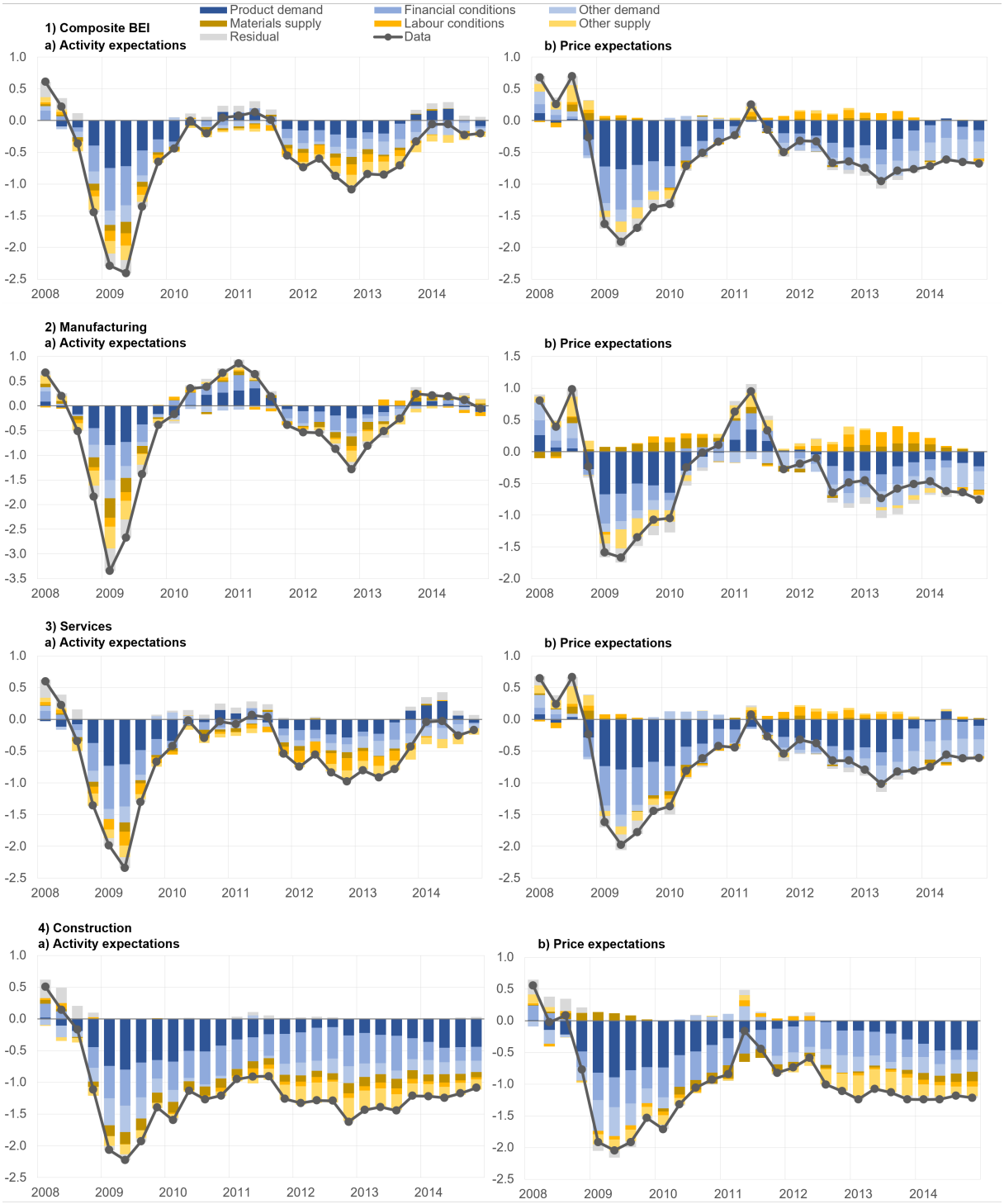
Figure 2 shows the contributions from our identified shocks on the demand side (in different shades of blue) and the supply side (in different shades of yellow) to the standardised levels of business expectations for activity (panels a) and prices (panels b) for the composite BEI (panel 1), manufacturing (panel 2), services (panel 3) and construction (panel 4).

Our findings for the period of the global financial crisis and the sovereign debt crisis align with the widely accepted view of a demand-driven recession, with supply factors playing a notable

[18] As shown in Table A.4 in Appendix A, across sectors, shocks from product demand, financial conditions, materials supply, labour conditions, and the combination of other demand and other supply explain the largest fraction of the variance of insufficient demand, financial constraints, shortages of materials, shortages of labour force, and others, respectively. This is not the case only for (1) materials supply in services and (2) labour conditions shocks in (a) services and (b) the composite BEI. In these instances, other supply shocks are the main drivers of shortages of materials and shortages of labour force (especially due to the effect of large swings in other factors in the post-pandemic period).

[19] Considering the second largest shock for each factor on impact across all sectors, the variance of insufficient demand, financial constraints, shortages of materials, and others is explained by shocks to financial conditions, other demand, other supply, and product demand, respectively. For shortages of materials and shortages of labour force in services, the second largest drivers are materials supply shocks and labour conditions shocks, respectively, in line with the results previously outlined.

Figure 2: Historical decomposition of business expectations during the global financial crisis and the sovereign debt crisis



Notes: This figure shows the contributions from the identified shocks to fluctuations in (the standardised levels of) of activity (panels a) and price (panels b) expectations for the composite BEI (panel 1), manufacturing (panel 2), services (panel 3) and construction (panel 4). "Residual" refers to the sum of the contributions from the unidentified residual shock and the initial conditions.

role on the latter (Furlanetto, Ravazzolo and Sarferaz, 2019, Pasimeni, 2022, Bańbura, Bobeica and Martínez Hernández, 2023, Ascari, Bonam and Smadu, 2024, De Santis, 2024, Brignone and Mazzali, 2025). During the global financial crisis of 2008-2010, financial conditions and product demand shocks were the most prominent drivers of the decline in business activity and price expectations. The relatively large role of financial conditions shocks reflects the financial nature of the crisis, which originated in the US mortgage market and quickly spread to the global financial system, then affecting euro area firms' liquidity and financial performance and resulting in an increase in unemployment, decrease in income, and a fall in aggregate demand.

During the later phase, namely the sovereign debt crisis of 2011-2013, financial conditions first and product demand later played again a prominent role. This reflected the financial turmoil induced by the interaction between weak sovereign and bank balance sheets, rippling through the overall corporate sector. However, unlike during the global financial crisis, other demand–possibly reflecting persistent risk aversion and savings glut–kept business expectations for activity and, to a larger extent, prices below long-term averages until the end of 2014.[20] This second crisis dip reflects a more prominent role of supply forces, namely via the contribution of other supply factors, potentially reflecting hysteresis effects from the two consecutive recessions originated from the supply side, leaving permanent damages to potential output (Blanchard, Cerutti and Summers, 2015; Ball, 2014; Benigno and Fornaro, 2018), as well as the effects from oil shocks during that period (Brignone and Mazzali, 2025).

Across sectors, demand-side shocks drove most of the dynamics in business expectations for the three sectors during the global financial crisis and the sovereign debt crisis. In manufacturing and services, financial conditions shocks played a relatively larger role in the global financial crisis, while other demand shocks became relatively more prominent in the sovereign debt crisis. On the supply side, more differences are noticeable. Adverse materials supply shocks played an important role in manufacturing and construction during the global financial crisis, reflecting long supply chains in the production processes of these sectors, leading to a pronounced sensitivity to input costs. Conversely, adverse labour conditions shocks had a sizeable impact on services in the sovereign debt crisis, reflecting the labour intensity of this sector, while other supply shocks show a more prominent role for manufacturing and construction.

[20] Interestingly, price expectations remained below their long-term average until 2017, significantly later compared with activity expectations, which returned to their long-term average already in 2015. Weak demand factors were the main determinants of these persistently subdued price expectations, which–albeit referring to short-run price expectations–may have signalled some de-anchoring of business expectations, according to evidence on US firms by Candia, Coibion and Gorodnichenko (2024) and Coibion and Gorodnichenko (2025).

4.2.2 COVID-19 pandemic and post-pandemic period

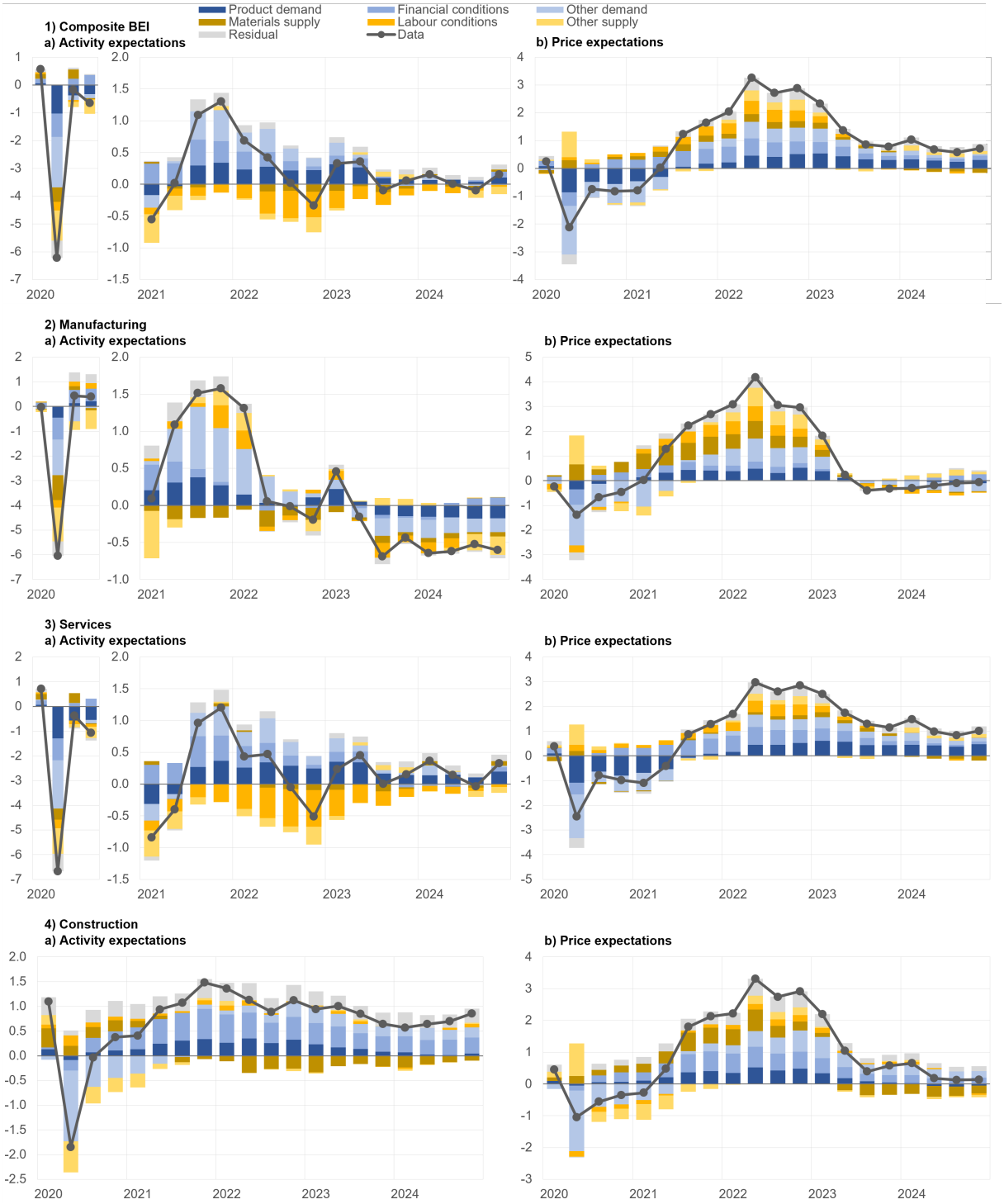
Figure 3 shows the contributions from our shocks between Q1 2020 and Q4 2024 for the COVID-19 pandemic and the post-pandemic period. Our findings, including the outbreak of the COVID-19 pandemic and its aftermath, underscore the complexity of the configuration of shocks hitting the euro area economy. This period was characterised by mandatory and voluntary restrictions on mobility, followed by supply chain disruptions and Russia's invasion of Ukraine, which led to the commodity and energy inflation surge and the ensuing ECB's monetary policy tightening. Hence, over this period, supply-side shocks had significantly more prominence than they did during the global financial crisis and the sovereign debt crisis, in line with recent studies (Bańbura, Bobeica and Martínez Hernández, 2023; Ascari, Bonam and Smadu, 2024; De Santis, 2024; Brignone and Mazzali, 2025).

At the outbreak of the COVID-19 pandemic in Q2 2020, business activity expectations plummeted predominantly driven by other demand shocks, largely reflecting the mandatory and voluntary restrictions on mobility due to government measures and heightened uncertainty regarding the spread of the pandemic, as well as other supply shocks, stemming from unprecedented disruptions in global supply chains.[21] As demand-side factors prevailed, price expectations also fell deep below long-term averages. These patterns were qualitatively similar across sectors, hitting both export-oriented manufacturing sectors and contact-intensive services sectors (Battistini and Stoevsky, 2021; Meinen and Serafini, 2021; Gunnella, Krustev and Schuler, 2021).

Between the second half of 2020 and the end of 2021, business expectations for activity and prices recovered as restrictions on mobility were lifted and uncertainty receded, as the economy reopened, leading to a surge in demand. At the same time, these reopening effects exacerbated supply bottlenecks, which hampered activity expectations and exerted further upward pressures on price expectations. Taken together, these developments induced a relatively quick rise in activity expectations, which reached their peak in Q4 2021. This rise stemmed from other demand shocks, which reflected reopening effects both in manufacturing (due to the build-up of inventories in the face of supply bottlenecks; Andersson and Le Breton, 2022) and services (owing to contact-intensive activities; Andersson, Battistini and Stoevsky, 2021). The rise in demand also originated from financial conditions shocks (most notably in services and construction),

[21] Note that the results shown for Q2 2020 fully capture the peak of lockdowns and mobility restrictions, as the survey for this quarter was conducted in April 2020 (as detailed in section 2). Conversely, the results for Q1 2020 relate to the survey results conducted in January 2020 – a good counterfactual for what the model results yield in "normal" times, before the pandemic hit.

Figure 3: Historical decomposition of business expectations during the COVID-19 pandemic and the post-pandemic period



Notes: This figure shows the contributions from the identified shocks to fluctuations in (the standardised levels of) of activity (panels a) and price (panels b) expectations for the composite BEI (panel 1), manufacturing (panel 2), services (panel 3) and construction (panel 4). "Residual" refers to the sum of the contributions from the unidentified residual shock and the initial conditions.

owing to monetary and fiscal policy measures that supported firms' liquidity and stable financial markets, as well as product demand (similarly across sectors). This was only partly compensated by supply-side factors, mainly due to labour shortages (especially in services). In contrast, these developments led to a relatively delayed and prolonged surge in price expectations by Q4 2021, with supply-side factors prevailing up to Q2 2021, mainly materials supply in manufacturing and construction and labour conditions in services, and demand-side factors building up thereafter (Bańbura, Bobeica and Martínez Hernández, 2023; De Santis and Stoevsky, 2023).

In 2022 and 2023, the prevalence of supply-side factors contributed to stagflationary forces depressing activity expectations and exacerbating price expectations. In 2022, Russia's invasion of Ukraine and the ensuing energy crisis thwarted activity expectations, while exerting upward pressures on price expectations, mainly owing to shocks to other supply, potentially reflecting heightened geopolitical risks (mainly manufacturing), and materials supply, owing to soaring input costs in energy-intensive sectors (especially manufacturing and construction; Battistini, Bobasu and Gareis, 2023). At the same time, gains in firm profitability (Botelho, 2024) and favourable relative factor prices (Consolo and Foroni, 2024) allowed many firms (especially in the labour-intensive services sector) to hoard workers despite weakening economic prospects, further contributing to lower activity expectations and higher price expectations. However, subsiding reopening effects (Battistini and Gareis, 2023) and tightening monetary policy (Battistini and Gareis, 2024*a*) dramatically reduced the contributions from other demand (mainly in manufacturing, particularly affected by the de-stocking of inventories; Lebastard, Olivero and Pongetti, 2024) and financial conditions shocks (similarly across sectors) to activity first and prices later on. By mid-2023, activity and price expectations had declined from their post-pandemic peaks, and they hovered around their long-term averages thereafter. In the second half of 2024, business activity expectations started picking up again, thanks to easing financial conditions shocks, amidst loosening monetary policy, but were still hampered by other supply shocks, possibly due to rising geopolitical tensions and trade policy uncertainty (Maruhn, Morris and Slavík, 2025).

5 Additional exercises

In this section we report additional empirical exercises that further validate and extend on the results presented in the benchmark version of the model. The estimation and identification details follow the same specifications detailed in Section 3, unless otherwise stated. We provide

all additional results in Appendix A.

5.1 The role of the post-pandemic period

Section 4.2.2 highlighted how the COVID-19 pandemic and its aftermath induced notable sources of volatility on business expectations, arising from a combination of distinct demand and supply shocks. In particular, as detailed in Sections 1 and 2, the share of "other factors" reported to limit firms' production increased notably after 2020, further motivating the explicit inclusion of this factor to identify further structural (demand and supply) shocks. Hence, one could question the relevance of shocks arising from other factors in explaining fluctuations in business expectations before the COVID-19 pandemic. To this end, we proceed to analyse whether the exclusion of the post-pandemic sample materially reduces the contribution of these shocks to activity and price expectations. Note that our benchmark specification applies the Lenza and Primiceri (2022) heteroscedasticity correction, which accounts for the time-varying volatility in the estimated residuals induced by the restrictions on mobility at the height of the COVID-19 pandemic. Hence, in this exercise, we aim to assess whether there is some unmodelled time variation in the volatility of the other demand and supply shocks that may bias our results.

Table A.5 shows the FEVD for the model estimated up to Q4 2019. Overall, the differences between the pre-pandemic sample and the full sample are not substantial. This evidence shows that the identification and the assessment of the impact of the proposed structural shocks are largely robust to the exclusion of the post-pandemic period. However, some interesting differences emerge for some sectors and shocks. Specifically, relative to the full sample, the contribution from other supply shocks declines for activity on impact (from 11.1% to 7.9%), while it increases for activity after four quarters (from 13.1% to 23.2%) and for prices both on impact (from 13.5% to 15.9%) and after four quarters (from 8.0% to 13.6%). Hence, other supply shocks seem to be important sources of fluctuations in business expectations in the pre-pandemic sample, especially at longer horizons, presumably because they captured limits on production reflecting longer-term policy changes (e.g., related to climate transition). At the same time, the contribution from other demand shocks decreases at all horizons for both activity (from 17.7% to 15.9% at $t = 0$ and from 13.1% to 11.1% at $t = 4$) and prices (from 16.1% to 13.1% at $t = 0$ and from 15.8% to 12.2% at $t = 4$), relative to the full sample. Therefore, during the post-pandemic period, other demand shocks appear to be important, especially on impact, reflecting their role in driving near-term developments in business expectations (e.g., related to restrictions on mobility and uncertainty).

Overall, these results suggest that the post-pandemic period is important to capture the demand vs. supply nature of other factors, while it does not substantially alter the assessment of their combined importance in driving business expectations.

Moreover, the historical decomposition in Figure A.8 shows the larger role of supply-side shocks in business expectations during the pre-pandemic sample, relative to the full sample. The role of supply shocks during the sovereign debt crisis increases substantially, driven mostly by the results on services business expectations. The prevalence of supply shocks during this period is common in the literature (Rathke, Streicher and Sturm, 2022; Brignone and Mazzali, 2025). However, the IRFs for services show that the dynamics of supply shocks behave as expected only in the very short run, with the response of price expectations turning positive after two periods, behaving like a demand shock (Figure A.9).

In sum, the model appears to properly capture the importance of each shock regardless of the inclusion of the post-pandemic period, but the dynamics of supply shocks are better captured, mainly for services, when this period is included. This result is expected when considering the dimension of supply shocks hitting the euro area after 2020, which motivated a broad range of literature that identifies diverse types of supply shocks using narrative restrictions based on this sample period (De Santis, 2024; Ascari, Bonam and Smadu, 2024; López et al., 2025).

5.2 The role of the granular demand and supply factors

A natural question arising from our identification strategy relates to whether and how the inclusion of several demand- and supply-side factors alters the overall assessment of the role of demand and supply forces in driving business expectations. This assessment could be biased if, for instance, any of these disturbances were to be incorrectly allocated to its demand or supply nature, or the set of factors were to be missing other relevant drivers. To validate our granular shock decomposition based on the structure of the survey, we estimate a bivariate SBVAR model including only business activity and price expectations detailed in Section 2. We then compare the implied balance between demand and supply forces in this small-scale model with that in the benchmark SBVAR model. The bivariate model is estimated using standard sign restrictions, as shown in Table 4, whereby a demand (supply) shock moves price and activity expectations in the same direction (opposite directions).

Figure A.10 shows the historical decomposition for the bivariate SBVAR model. The estimation is performed using monthly data on activity and price expectations instead of quarterly,

Table 4: Identification strategy through sign restrictions of the bivariate SBVAR model

	Demand shock	Supply shock
Activity expectations	+	+
Price expectations	+	–

Notes: The table reports the restrictions on the contemporaneous impact of structural shocks on endogenous variables. "+" ("–") refers to a strictly positive (negative) impact.

to ensure that no important dynamics on expectations are omitted.[22] The shares attributed to demand and supply shocks in this specification match well the results of our baseline decomposition, which are aggregated into their total demand and supply contributions in Figure A.11 for clarity. Specifically, this ensures the robustness of the identification of the main drivers of business expectations during recession periods, with demand shocks playing a larger role in the financial and debt crises, and supply shocks having a more prominent role in driving the inflationary surge after the pandemic outbreak.[23] We interpret these findings as a validation of our baseline specification, which digs further into the structural drivers of these disturbances without compromising on their proper identification as a demand or a supply shock.

5.3 Early signals for the drivers of actual real and nominal developments

Business expectations constitute a leading indicator of economic activity, as firms take their production, price setting, employment and investment decisions based on the expected economic outlook. Indeed, as described in Section 2 and illustrated in Table 1, the composite BEI for activity and prices released at the beginning of a specific quarter are highly correlated with the real GDP and the GDP deflator outcomes realised over that quarter (and released only the following one). In this section, we take a step further and explore whether, and to what extent, the drivers of business expectations identified by our benchmark model provide early signals on the drivers of actual economic activity and prices. To this end, we estimate a bivariate SBVAR model on (quarter-on-quarter growth rates of) real GDP and the GDP deflator for the euro area, sourced from Eurostat. The shocks are identified using the same set of restrictions of the bivariate specification described in Section 5.2 and shown in Table 4, mapping activity expectations into

[22] As detailed in section 2, a monthly specification for the baseline model is not possible, as data on the factors limiting production is available at the quarterly frequency only. Estimating the bivariate model using quarterly data provides similar results as the monthly specification.

[23] For the sake of brevity, we omit the sectoral results for this estimation, which also perform similarly to the baseline model.

real GDP and price expectations into the GDP deflator. As noted by Giannone and Primiceri (2024), a simple bivariate decomposition falls short of identifying the origin of different underlying forces. However, it still serves as a relevant benchmark, as it provides an assessment of demand and supply forces based on their overall effects on activity and prices.

Figure A.12 shows the historical decompositions of the model. The results are broadly consistent with recent studies based on similar specifications (see, e.g., Chart B.1 of Giannone and Primiceri, 2024). Moreover, they suggest that the drivers of actual real and nominal developments tend to align with those of business activity and price expectations over the entire sample. Most notably, demand shocks tended to play a major role before the pandemic, while supply shocks appeared to be an important source of fluctuations in the post-pandemic period. Interestingly, during the recent inflationary period, the contributions from adverse supply shocks to the GDP deflator, which reached their peak in the course of 2023, lagged those to the composite BEI for prices, which surged already at the start of 2022. Overall, these results validate our model as a proper toolkit for policymakers to not only understand the underlying drivers of business expectations, but also to assess, and possibly anticipate, the drivers of actual economic developments, and thus adjust their policy responses accordingly.

6 Conclusions

In this paper, we propose a novel empirical framework to analyse the drivers of business expectations in the euro area, building bottom-up composite business expectations indices (BEI) for activity and prices from sectoral survey data. Leveraging harmonised data from the European Commission's business surveys, we construct timely indicators that are strongly correlated with real GDP growth and GDP deflator inflation. Using sector-specific structural Bayesian VAR models, we identify six underlying drivers—three on the demand side and three on the supply side—based on firms' reported limits to production. The empirical results demonstrate that demand-side shocks are the predominant contributors to fluctuations in business expectations over the business cycle, while supply-side forces play an important role in shaping price expectations and explaining cross-sectoral heterogeneity. Across sectors, on the demand side, financial conditions shocks are especially relevant for manufacturing and construction, reflecting their capital-intensive nature and sensitivity to financing conditions, while product demand shocks are the most important drivers in services. On the supply side, shortages of materials play a

dominant role in manufacturing and construction, whereas labour shortages are more influential in services.

Historical decompositions reveal substantial heterogeneity in the dominant shocks across both time and sectors. During the global financial crisis and sovereign debt crisis, demand shocks—mainly linked to deteriorating financial conditions—drove the fall in expectations across all sectors. The pandemic period was marked by a combination of severe supply disruptions and heightened uncertainty, with manufacturing and construction hit by shortages of materials and services affected by labour constraints and mobility restrictions. In the post-pandemic phase, stagflationary dynamics emerged, with rising input costs and geopolitical risks depressing expectations in manufacturing and construction, while services remained relatively more resilient, partly supported by stronger labour hoarding and a slower pass-through of tightening financial conditions. Further results highlight the robustness of our conclusions to the consideration of the pre-pandemic sample alone and the consideration of the simple bivariate SBVAR model for business activity and price expectations. Moreover, they validate the model as an appropriate toolkit to capture early signals on the underlying drivers of actual economic developments.

These results highlight the importance of sector-specific analysis to understand aggregate dynamics and support policy design. Our framework offers a transparent and easily updateable tool to track the evolving drivers of business expectations and could be extended to include cross-sectoral spillovers or to forecast sectoral activity in real time. We believe this paper opens several promising avenues for future research for which our work can be extended. First, by performing a similar analysis across the diverse countries in the euro area, in view of examining cross-country heterogeneity on firms' expectations. Second, a further decomposition of the sectoral variation into aggregate and sector-specific shocks could shed light on whether the diverse sectors are exposed to the similar underlying drivers of business expectations. Lastly, a further comparison of our uncovered shocks to business expectations with other macro shocks identified in the literature, apart from those analysed in section 5.3, could highlight the role of timely-available survey data in retrieving relevant economic shocks.

References

Acemoglu, D., U. Akcigit, and W. Kerr. 2016. "Networks and the macroeconomy: An empirical exploration." *NBER Macroeconomics Annual*, 30: 273–335.

Andersson, Malin, and Gwenaël Le Breton. 2022. "The role of the inventory cycle in the current recovery." *Economic Bulletin Boxes*, 2.

Andersson, Malin, Niccolò Battistini, and Grigor Stoevsky. 2021. "Economic developments and outlook for contact-intensive services in the euro area." *Economic Bulletin Boxes*, 7.

Angeletos, George-Marios, and Jennifer La'O. 2013. "Sentiments." *Econometrica*, 81(2): 739–779.

Antonovica, Arta, Javier de Esteban Curiel, and Beatriz Rodríguez Herráez. 2023. "Factors that determine the degree of fulfilment of expectations for entrepreneurs from the business incubator programmes." *International Entrepreneurship and Management Journal*, 19: 261–291.

Ascari, Guido, Dennis Bonam, and Andra Smadu. 2024. "Global supply chain pressures, inflation, and implications for monetary policy." *Journal of International Money and Finance*, 142: 103029.

Ball, Laurence. 2014. "Long-term damage from the Great Recession in OECD countries." *European Journal of Economics and Economic Policies*, 11(2): 149–160.

Baqaee, David Rezza, and Emmanuel Farhi. 2024. "Networks, Barriers, and Trade." *Econometrica*, 92(2): 505–541.

Battistini, Niccolò, Alina Bobasu, and Johannes Gareis. 2023. "Who foots the bill? The uneven impact of the recent energy price shock." *Economic Bulletin Boxes*, 2.

Battistini, Niccolò, and Grigor Stoevsky. 2021. "The impact of containment measures across sectors and countries during the COVID-19 pandemic." *Economic Bulletin Boxes*, 2.

Battistini, Niccolò, and Johannes Gareis. 2023. "What role do reopening effects play across countries and sectors?" *Economic Bulletin Boxes*, 6.

Battistini, Niccolò, and Johannes Gareis. 2024*a*. "Monetary policy and the recent slowdown in manufacturing and services." *Economic Bulletin Boxes*, 8.

Battistini, Niccolò, and Johannes Gareis. 2024*b*. "Sectoral dynamics and the business cycle in the euro area." *Economic Bulletin Articles*, 4.

Bańbura, Marta, Elena Bobeica, and Catalina Martínez Hernández. 2023. "What drives core inflation? The role of supply shocks." European Central Bank 2875.

Benigno, Gianluca, and Luca Fornaro. 2018. "Stagnation traps." *The review of economic studies*, 85(3): 1425–1470.

Blanchard, Olivier, Eugenio Cerutti, and Lawrence Summers. 2015. "Inflation and activity–two explorations and their monetary policy implications." National Bureau of Economic Research.

Blanchard, Olivier J, and Danny Quah. 1989. "The dynamic effects of aggregate demand and supply disturbances." *American Economic Review*, 79(4): 655–673.

Boneva, Lena, James Cloyne, Martin Weale, and Tomasz Wieladek. 2020. "Firms' Price, Cost and Activity Expectations: Evidence from Micro Data." *The Economic Journal*, 130(627): 555–586.

Born, Benjamin, Zeno Enders, Gernot J. Müller, and Knut Niemann. 2023. "Chapter 12 - Firm expectations about production and prices: facts, determinants, and effects." In *Handbook of Economic Expectations*. , ed. Rüdiger Bachmann, Giorgio Topa and Wilbert van der Klaauw, 355–383. Academic Press.

Botelho, Vasco. 2024. "Higher profit margins have helped firms hoard labour." *Economic Bulletin Boxes*, 4.

Brignone, Davide, and Marco Mazzali. 2025. "It is all about demand and supply: A dualistic view of the euro area business cycle." Bank of England Staff Working Paper 1124.

Candia, Bernardo, Olivier Coibion, and Yuriy Gorodnichenko. 2024. "The inflation expectations of U.S. firms: Evidence from a new survey." *Journal of Monetary Economics*, 145(S).

Canova, Fabio, and Filippo Ferroni. 2021. "A Hitchhiker's Guide to Empirical Macro Models." Federal Reserve Bank of Chicago Working Paper Series WP-2021-15.

Christiano, Lawrence J, Martin Eichenbaum, and Charles L Evans. 1999. "Monetary policy shocks: What have we learned and to what end?" *Handbook of Macroeconomics*, 1: 65–148.

Coibion, Olivier, and Yuriy Gorodnichenko. 2025. "Inflation, Expectations and Monetary Policy: What Have We Learned and to What End?" National Bureau of Economic Research, Inc NBER Working Papers 33858.

Coibion, Olivier, Yuriy Gorodnichenko, and Saten Kumar. 2018. "How Do Firms Form Their Expectations? New Survey Evidence." *American Economic Review*, 108(9): 2671–2713.

Consolo, Agostino, and Claudia Foroni. 2024. "Drivers of employment growth in the euro area after the pandemic – a model-based perspective." *Economic Bulletin Boxes*, 4.

De Graeve, Ferre, and Jan David Schneider. 2023. "Identifying sectoral shocks and their role in business cycles." *Journal of Monetary Economics*, 140: 124–141.

Del Negro, Marco, and Frank Schorfheide. 2011. "Bayesian Macroeconometrics." In *The Oxford Handbook of Bayesian Econometrics. Oxford Handbooks in Economics*, , ed. John Geweke, Gary Koop and Herman van Dijk. Oxford, UK:Oxford University Press. Chapter 7.

De Santis, Roberto A. 2024. "Supply Chain Disruption and Energy Supply Shocks: Impact on Euro-Area Output and Prices." *International Journal of Central Banking*, 20(2): 193–235.

De Santis, Roberto A., and Grigor Stoevsky. 2023. "The role of supply and demand in the post-pandemic recovery in the euro area." *Economic Bulletin Articles*, 4.

De Santis, Roberto A., and Srečko Zimic. 2018. "Spillovers among sovereign debt markets: Identification through absolute magnitude restrictions." *Journal of Applied Econometrics*, 33(5): 727–747.

Enders, Zeno, Franziska Hünnekes, and Gernot Müller. 2022. "Firm Expectations and Economic Activity." *Journal of the European Economic Association*, 20(6): 2396–2439.

Furlanetto, Francesco, Francesco Ravazzolo, and Samad Sarferaz. 2019. "Identification of financial factors in economic fluctuations." *The Economic Journal*, 129(617): 311–337.

Gabaix, Xavier. 2011. "The Granular Origins of Aggregate Fluctuations." *Econometrica*, 79(3): 733–772.

Gennaioli, Nicola, Yueran Ma, and Andrei Shleifer. 2016. "Expectations and Investment." *NBER Macroeconomics Annual*, 30(1): 379–431.

Ghassibe, Mishel. 2021. "Endogenous Production Networks and Non-Linear Monetary Transmission." Cleveland Fed Working Paper.

Giannone, Domenico, and Giorgio E. Primiceri. 2024. "The Drivers of Post-Pandemic Inflation." National Bureau of Economic Research NBER Working Paper 32859.

Giannone, Domenico, Michele Lenza, and Giorgio E. Primiceri. 2015. "Prior Selection for Vector Autoregressions." *Review of Economics & Statistics*, 97(2): 436 – 451.

Gunnella, Vanessa, Georgi Krustev, and Tobias Schuler. 2021. "Developments in the tourism sector during the COVID-19 pandemic." *Economic Bulletin Boxes*, 8.

Karadeniz, Esra, and Ahmet Özçam. 2010. "The determinants of the growth expectations of the early-stage entrepreneurs (TEA) using the ordinal logistic model (OLM): the case of Turkey." *Economic and Business Review*, 12(1).

Kurozumi, Takushi, and Willem Van Zandweghe. 2022. "Labor Supply Shocks, Labor Force Entry, and Monetary Policy." Federal Reserve Bank of Cleveland Working Papers 22-17.

Lebastard, Laura, Laura Olivero, and Giacomo Pongetti. 2024. "Why did the import intensity of GDP decline in 2023?" *Economic Bulletin Boxes*, 3.

Lenza, Michele, and Giorgio E. Primiceri. 2022. "How to estimate a vector autoregression after March 2020." *Journal of Applied Econometrics*, 37(4): 688–699.

López, Lucía, Florens Odendahl, Susana Párraga, and Edgar Silgado-Gómez. 2025. "The pass-through to inflation of gas price shocks." Banco de España Working Papers 2512.

Maruhn, Franziska, Richard Morris, and Michal Slavík. 2025. "Main findings from the ECB's recent contacts with non-financial companies." *Economic Bulletin Boxes*, 1.

Meinen, Philipp, and Roberta Serafini. 2021. "The economic impact of the pandemic - drivers of regional differences." *Economic Bulletin Boxes*, 1.

Pasimeni, Paolo. 2022. "Supply or Demand, that is the Question: Decomposing Euro Area Inflation." *Intereconomics*, 57(6): 384–393.

Rathke, Alexander, Sina Streicher, and Jan-Egbert Sturm. 2022. "How similar are country-and sector-responses to common shocks within the euro area?" *Journal of International Money and Finance*, 120: 102313.

Rubio-Ramírez, Juan F., Daniel F. Waggoner, and Tao Zha. 2010. "Structural vector autoregressions: Theory of identification and algorithms for inference." *The Review of Economic Studies*, 77(2): 665–696.

Sebbesen, Anja, and Harald Oberhofer. 2024. "The propagation of business expectations within the European Union." *Journal of Applied Econometrics*, 39(6): 1082–1103.

Tase, Manjola. 2019. "Sectoral dynamics and business cycles." *Economics Letters*, 175: 60–63.

Uhlig, Harald. 2005. "What are the effects of monetary policy? Results from an agnostic identification procedure." *Journal of Monetary Economics*, 52(2): 381–419.

Appendix A Additional charts and tables

Table A.1: Additional correlations between soft and hard data for activity

Real GDP	Soft data	No-pandemic sample			Pre-pandemic sample			Full sample		
		EC	PMI	BEI	EC	PMI	BEI	EC	PMI	BEI
year-on-year	level	0.90	0.80	0.88	0.92	0.88	0.91	0.79	0.74	0.77
	year-on-year	0.61	0.41	0.63	0.70	0.45	0.68	0.76	0.72	0.84
quarter-on-quarter	level	0.64	0.71	0.65	0.64	0.74	0.66	0.34	0.67	0.58
	quarter-on-quarter	0.54	0.33	0.51	0.66	0.38	0.61	0.82	0.89	0.93
1-year-ahead year-on-year	level	0.02	0.21	-0.02	0.02	0.23	-0.03	-0.22	-0.27	-0.39
	year-on-year	0.39	0.43	0.32	0.42	0.45	0.34	0.08	0.03	-0.10

Sources: Eurostat, European Commission, S&P Global, authors' calculations.
Notes: The table reports the contemporaneous correlation coefficients between real GDP growth, on the one hand, and the specific indicator indicated in the column, either in levels (first, third and fifth rows) or in differences (second, fourth and sixth rows), on the other hand. "EC" refers to the European Commission's economic sentiment index, "PMI" refers to S&P Global's purchasing managers' index (PMI) composite output for activity, and "BEI" refers to the bottom-up business expectations indices developed in this paper. "No-pandemic sample" refers to the period between Q1 2006 and Q4 2024, excluding the period between Q1 2020 and Q4 2021. "Pre-pandemic sample" refers to the period between Q1 2006 and Q4 2019. "Full sample" refers to the period between Q1 2006 and Q4 2024. For the sake of comparability, all quarterly indices for soft data rely on the observation in the first month in each quarter.

Table A.2: Correlation between soft and hard data for activity and prices across sectors

		No-pandemic sample			Pre-pandemic sample			Full sample		
		EC	PMI	BEI	EC	PMI	BEI	EC	PMI	BEI
Manufacturing										
Activity	level	0.79	0.78	0.84	0.80	0.82	0.85	0.78	0.79	0.78
	year-on-year	0.86	0.50	0.71	0.90	0.56	0.76	0.88	0.65	0.81
Prices	level	-	0.23	0.40	-	-0.39	-0.36	-	0.13	0.30
	year-on-year	-	-0.54	-0.41	-	-0.64	-0.64	-	-0.53	-0.42
Services										
Activity	level	0.80	0.67	0.77	0.93	0.85	0.91	0.74	0.68	0.73
	year-on-year	0.54	0.31	0.45	0.57	0.33	0.52	0.79	0.70	0.79
Prices	level	-	0.74	0.80	-	0.46	0.47	-	0.68	0.73
	year-on-year	-	-0.03	0.02	-	-0.12	-0.07	-	-0.05	-0.01
Construction										
Activity	level	0.77	0.75	0.79	0.80	0.82	0.83	0.68	0.72	0.73
	year-on-year	0.57	0.27	0.54	0.62	0.29	0.56	0.66	0.56	0.68
Prices	level	-	0.57	0.88	-	0.62	0.76	-	0.55	0.85
	year-on-year	-	-0.23	0.03	-	0.04	-0.06	-	-0.12	0.07

Sources: Eurostat, European Commission, S&P Global, authors' calculations.
Notes: The table reports the contemporaneous correlation coefficients between real value added year-on-year growth for activity and sectoral value added deflator year-on-year inflation for prices, on the one hand, and the specific indicator indicated in the column, either in levels (first and third rows) or in year-on-year differences (second and fourth rows), on the other hand. "EC" refers to the European Commission's economic sentiment index for activity, not available at the sectoral level for prices, "PMI" refers to S&P Global's purchasing managers' index (PMI) composite output for activity and prices charged for prices, and "BEI" refers to the bottom-up business expectations indices for activity and prices developed in this paper. "No-pandemic sample" refers to the period between Q1 2006 and Q4 2024, excluding the period between Q1 2020 and Q4 2021. "Pre-pandemic sample" refers to the period between Q1 2006 and Q4 2019. "Full sample" refers to the period between Q1 2006 and Q4 2024. For the sake of comparability, all quarterly indices for soft data rely on the observation in the first month in each quarter.

Table A.3: Correlation between sectoral prices expectations indicators and HICP components

		No-pandemic sample			Pre-pandemic sample			Full sample		
		EC	PMI	BEI	EC	PMI	BEI	EC	PMI	BEI
HICP	level	0.64	0.82	0.87	0.84	0.60	0.60	0.63	0.81	0.86
	year-on-year	0.18	0.22	0.35	0.61	0.26	0.31	0.21	0.26	0.39
HICPX	level	0.26	0.61	0.75	0.51	0.25	0.27	0.25	0.60	0.73
	year-on-year	-0.25	-0.19	-0.08	0.07	-0.22	-0.20	-0.20	-0.13	-0.02
Goods	level	-	0.45	0.63	-	0.11	0.28	-	0.45	0.62
	year-on-year	-	-0.37	-0.24	-	-0.18	-0.13	-	-0.27	-0.15
Services	level	-	0.66	0.73	-	0.27	0.23	-	0.64	0.71
	year-on-year	-	-0.14	-0.10	-	-0.22	-0.21	-	-0.09	-0.03

Sources: Eurostat, European Commission, S&P Global, authors' calculations.
Notes: The table reports the contemporaneous correlation coefficients between HICP inflation and its main components, on the one hand, and the specific prices expectations indicator indicated in the column, either in levels (first and third rows) or in year-on-year differences (second and fourth rows), on the other hand. For HICP and HICPX, price expectations are aggregate for all sectors, while goods and services inflation are compared to manufacturing and services price expectations, respectively. "EC" refers to the European Commission's consumer price 12-month-ahead expectations, "PMI" refers to S&P Global's purchasing managers' index (PMI) composite prices charged for prices, and "BEI" refers to the bottom-up business expectations indices for prices developed in this paper. "No-pandemic sample" refers to the period between Q1 2006 and Q4 2024, excluding the period between Q1 2020 and Q4 2021. "Pre-pandemic sample" refers to the period between Q1 2006 and Q4 2019. "Full sample" refers to the period between Q1 2006 and Q4 2024. For the sake of comparability, all quarterly indices for soft data rely on the observation in the first month in each quarter.

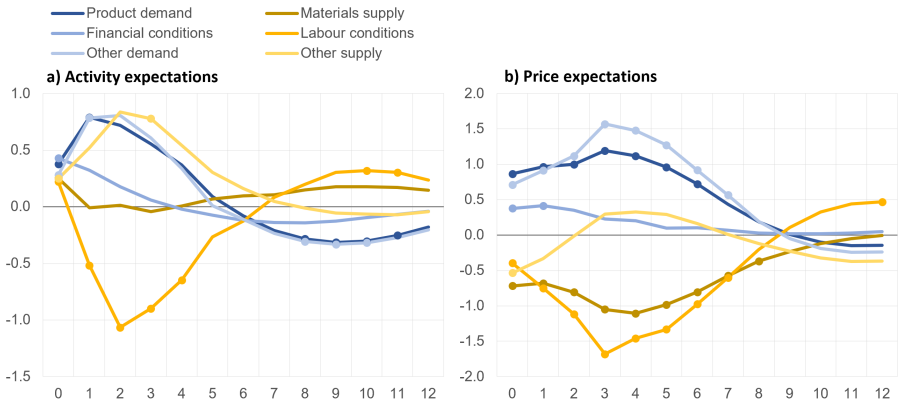
Table A.4: Forecast error variance decomposition on impact and after one year

Insufficient demand														
	Product demand		Financial conditions		Other demand		Materials supply		Labour conditions		Other supply		Residual	
Horizon	0	4	0	4	0	4	0	4	0	4	0	4	0	4
Total	37.9	32.4	10.3	13.4	7.5	8.5	9.5	9.5	10.5	11.0	8.2	9.8	16.0	15.4
Manufacturing	34.8	29.1	16.5	15.0	6.6	9.6	8.7	9.3	8.9	9.8	8.5	11.7	16.1	15.5
Services	39.3	33.5	8.5	13.2	7.4	8.0	9.8	9.5	11.1	11.4	8.1	9.2	15.9	15.2
Construction	33.2	31.0	9.4	10.3	11.0	11.1	9.8	10.2	10.4	11.2	9.0	9.8	17.2	16.5
Financial constraints														
	Product demand		Financial conditions		Other demand		Materials supply		Labour conditions		Other supply		Residual	
Horizon	0	4	0	4	0	4	0	4	0	4	0	4	0	4
Total	10.5	12.6	33.8	28.2	14.8	14.7	8.6	9.3	8.5	10.3	9.1	10.3	14.6	14.5
Manufacturing	13.3	15.3	30.7	24.9	16.1	15.6	6.5	8.5	8.2	8.8	8.6	11.0	16.6	15.9
Services	9.7	11.9	34.9	29.2	14.7	14.6	9.1	9.3	8.6	10.9	9.2	10.2	13.8	13.9
Construction	10.0	11.0	32.9	28.9	12.4	13.4	10.0	12.1	9.1	9.3	9.2	9.5	16.3	15.8
Shortage of materials														
	Product demand		Financial conditions		Other demand		Materials supply		Labour conditions		Other supply		Residual	
Horizon	0	4	0	4	0	4	0	4	0	4	0	4	0	4
Total	11.7	12.8	7.9	9.3	13.0	12.7	26.2	21.2	7.6	9.9	19.2	19.9	14.5	14.3
Manufacturing	16.2	15.2	5.6	7.3	24.9	24.1	30.2	20.7	4.2	10.0	5.4	9.7	13.5	13.0
Services	10.3	12.1	8.5	9.8	9.6	9.3	23.8	20.3	8.7	10.1	24.4	23.6	14.9	14.8
Construction	11.4	11.7	9.3	10.2	10.5	10.5	39.4	33.2	7.6	8.0	9.0	13.3	12.7	13.0
Shortage of labour force														
	Product demand		Financial conditions		Other demand		Materials supply		Labour conditions		Other supply		Residual	
Horizon	0	4	0	4	0	4	0	4	0	4	0	4	0	4
Total	15.2	16.2	8.9	10.3	12.7	13.9	7.4	8.5	20.2	17.2	21.1	19.4	14.6	14.5
Manufacturing	13.2	14.9	7.8	8.5	21.8	20.1	8.3	10.0	24.5	20.1	12.1	14.2	12.2	12.2
Services	15.9	16.6	8.8	10.5	10.2	12.3	7.0	8.0	18.2	15.8	24.6	21.5	15.4	15.4
Construction	13.8	16.4	12.9	13.8	9.6	11.4	8.7	9.2	28.0	22.1	13.5	13.7	13.4	13.4
Others														
	Product demand		Financial conditions		Other demand		Materials supply		Labour conditions		Other supply		Residual	
Horizon	0	4	0	4	0	4	0	4	0	4	0	4	0	4
Total	9.0	10.6	8.6	9.1	23.6	21.5	8.2	8.6	7.5	8.5	30.6	28.5	12.5	13.2
Manufacturing	11.2	13.9	9.6	10.3	13.1	13.5	9.8	10.8	9.0	9.2	33.1	27.4	14.1	15.0
Services	8.3	9.6	8.4	8.8	27.1	24.2	7.5	7.8	6.9	8.1	29.7	28.7	12.1	12.7
Construction	9.4	10.2	7.6	8.5	21.0	19.7	9.7	10.3	9.0	9.6	32.1	30.1	11.2	11.7

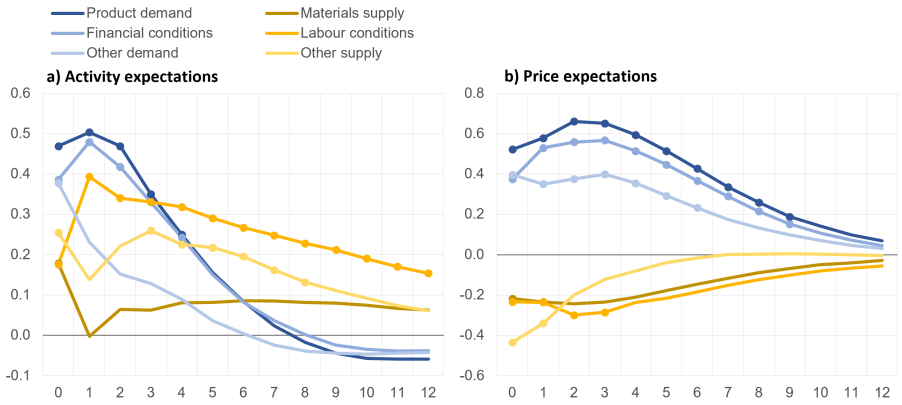
Note: The table reports the shares of the total variance of perceived limits on production explained by the structural shocks (in percentages) at forecast horizon $t + h$ for $h = 0, 4$ quarters. "Total" refers to the weighted average of the sectors.

Figure A.1: Impulse response functions of business expectations to demand and supply shocks

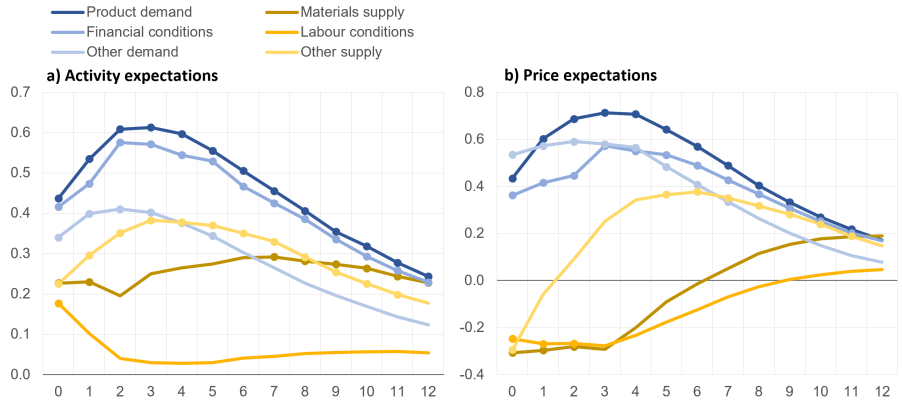
1) Manufacturing



2) Services



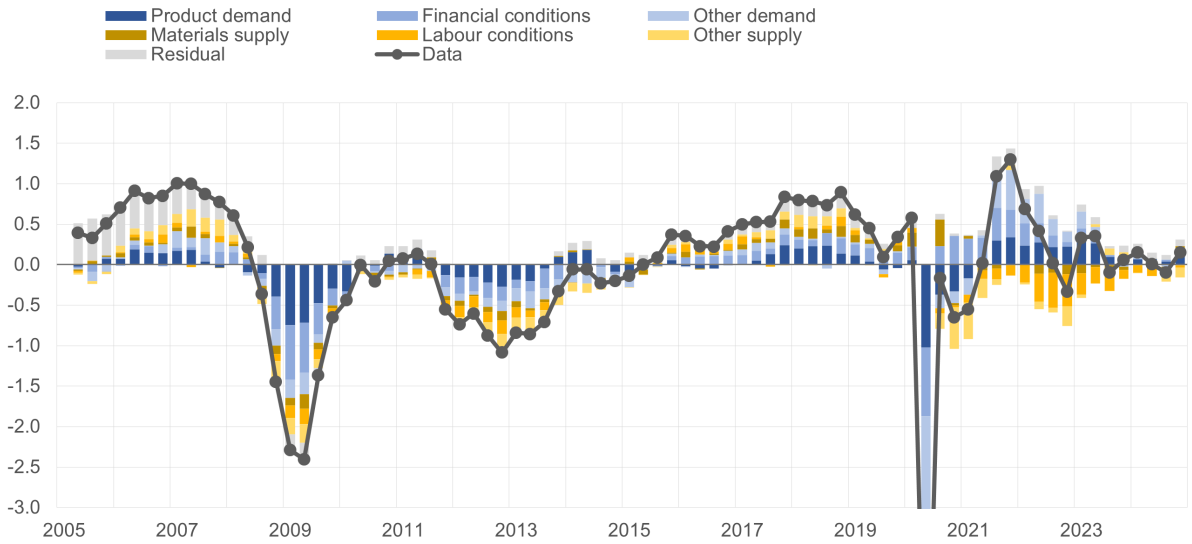
3) Construction



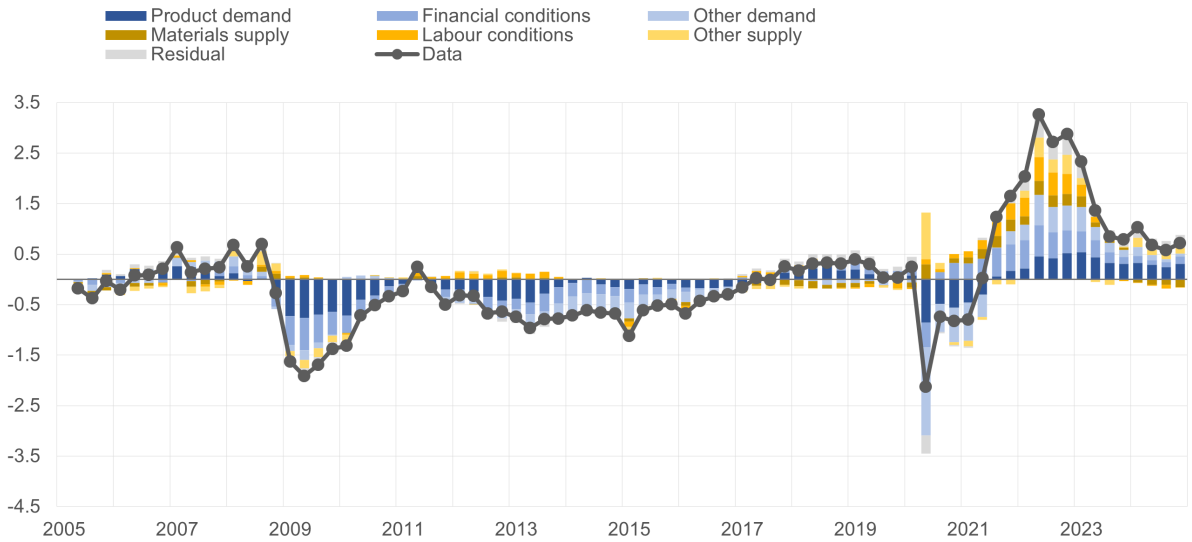
Notes: This figure reports the median impulse response functions (IRFs) of business activity and price expectations (solid lines, with dots if the credible set is significantly different from zero at the 68% level) to different (one-standard deviation) shocks. The identification strategy only requires that the IRFs are significant on impact.

Figure A.2: Historical decomposition of the composite BEI

1) Activity expectations



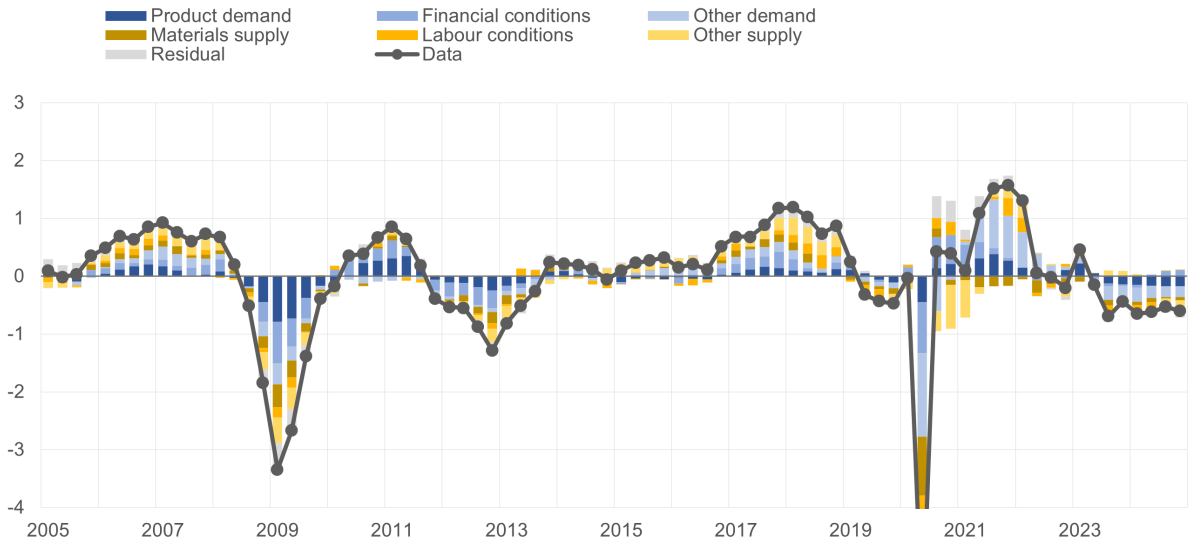
2) Price expectations



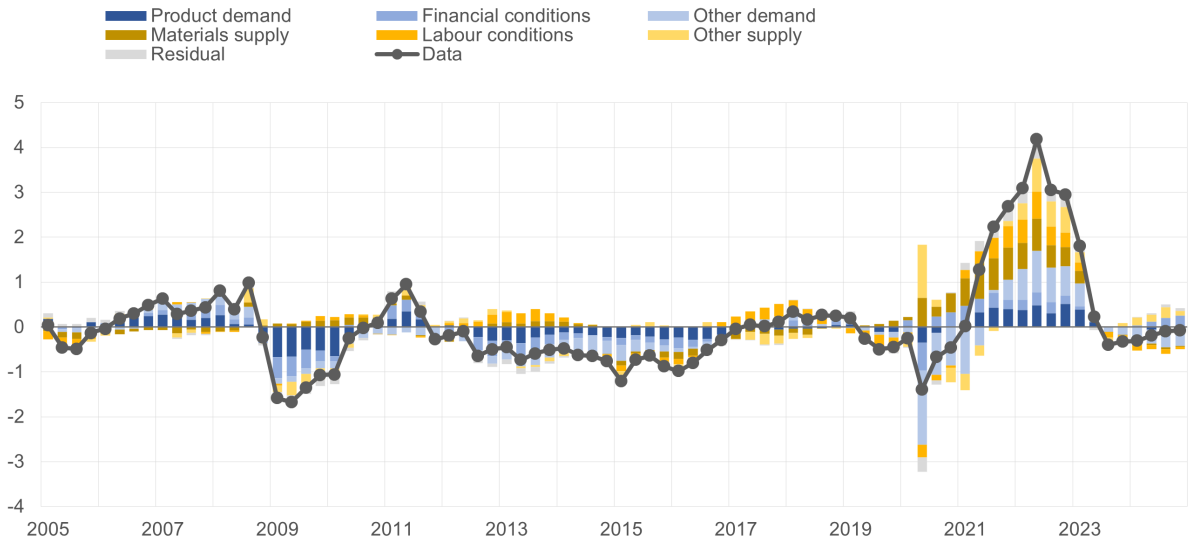
Notes: This figure shows the contributions from the identified shocks to fluctuations in (the standardised levels of) of activity (panel 1) and price (panels 2). "Residual" refers to the sum of the contributions from the unidentified residual shock and the initial conditions.

Figure A.3: Historical decomposition of manufacturing expectations

1) Activity expectations



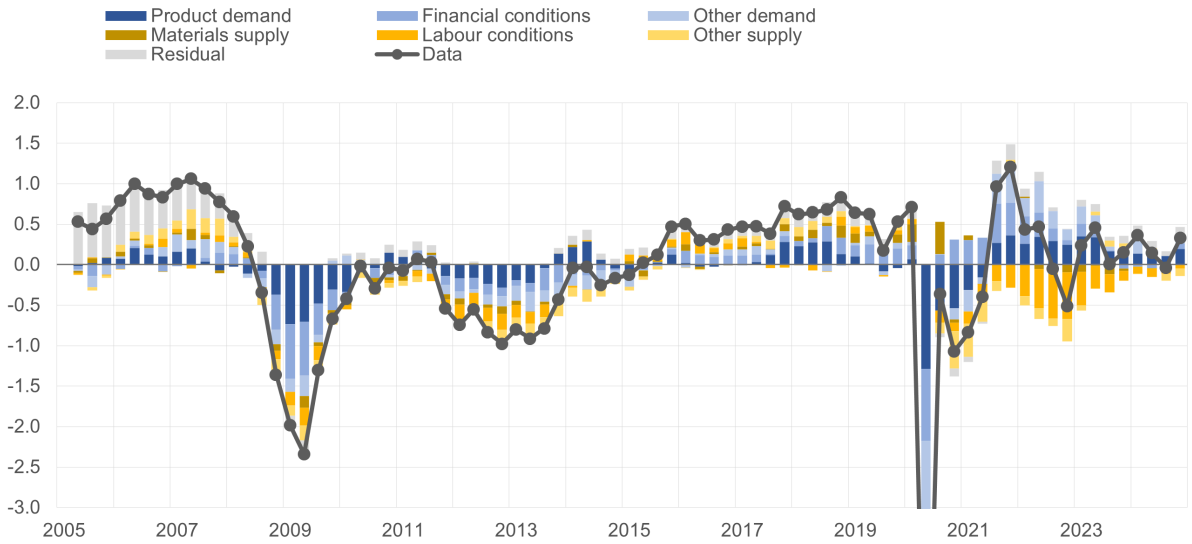
2) Price expectations



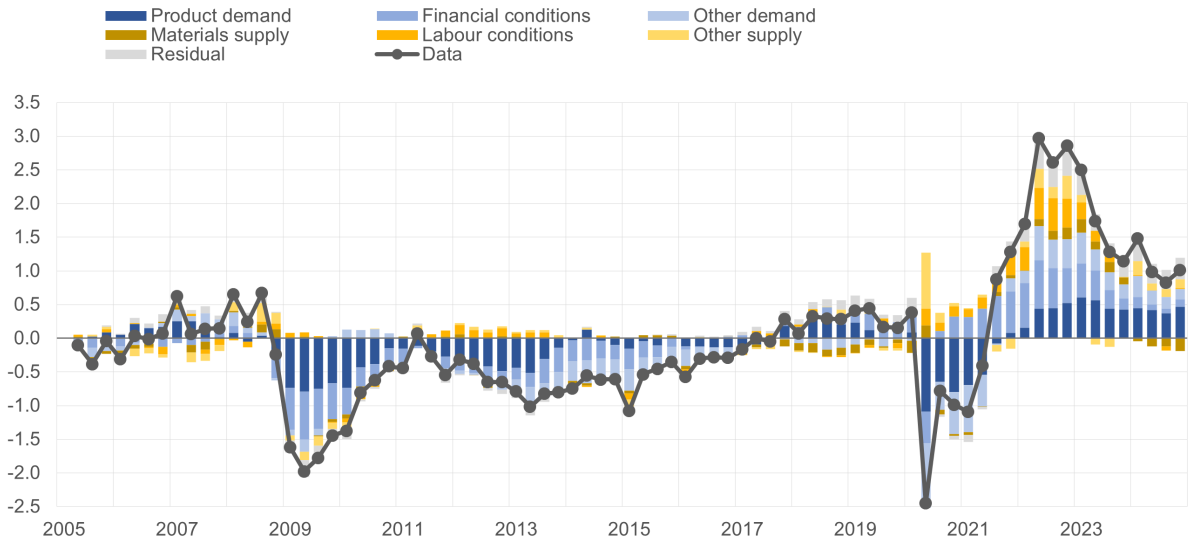
Notes: This figure shows the contributions from the identified shocks to fluctuations in (the standardised levels of) of activity (panel 1) and price (panels 2). "Residual" refers to the sum of the contributions from the unidentified residual shock and the initial conditions.

Figure A.4: Historical decomposition of services expectations

1) Activity expectations



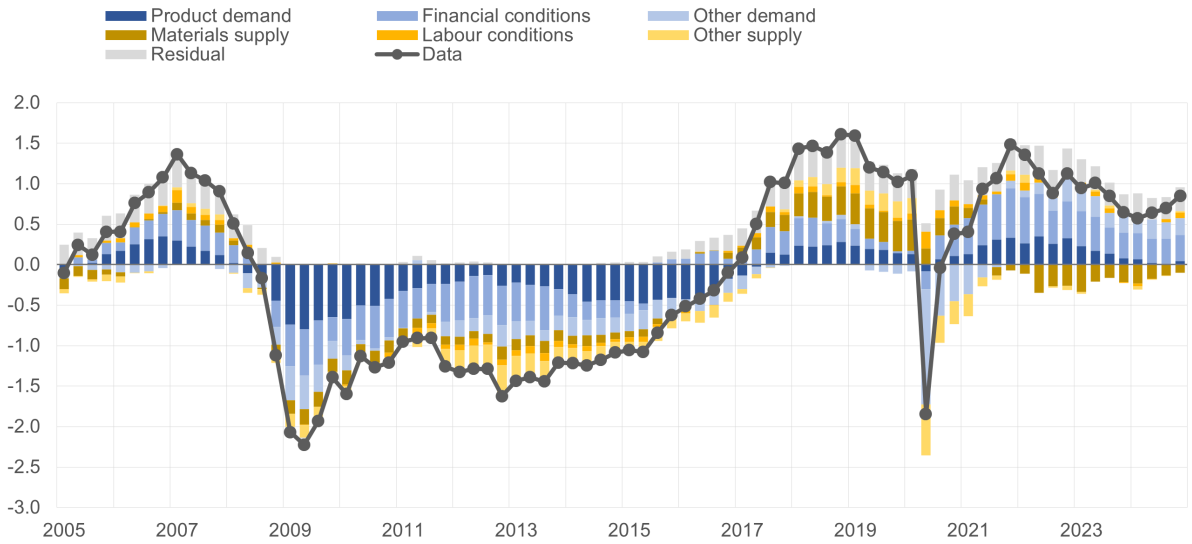
2) Price expectations



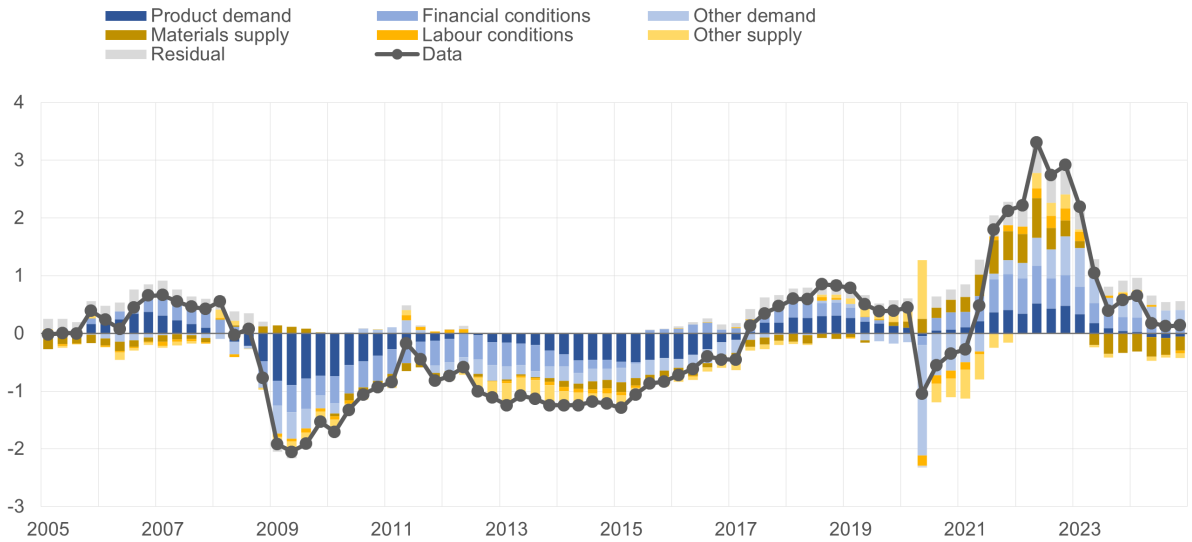
Notes: This figure shows the contributions from the identified shocks to fluctuations in (the standardised levels of) of activity (panel 1) and price (panels 2). "Residual" refers to the sum of the contributions from the unidentified residual shock and the initial conditions.

Figure A.5: Historical decomposition of construction expectations

1) Activity expectations

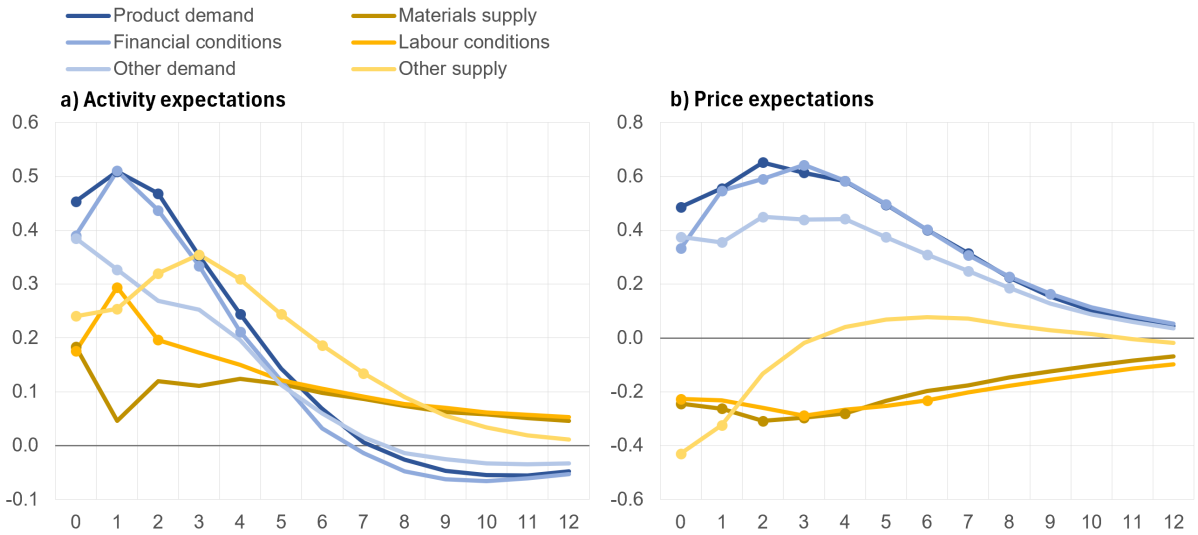


2) Price expectations



Notes: This figure shows the contributions from the identified shocks to fluctuations in (the standardised levels of) of activity (panel 1) and price (panels 2). "Residual" refers to the sum of the contributions from the unidentified residual shock and the initial conditions.

Figure A.6: Impulse response functions of the composite BEI (direct estimation) to demand and supply shocks



Notes: This figure reports the median impulse response functions (IRFs) of business activity and price expectations (solid lines, with dots if the credible set is significantly different from zero at the 68% level) to different (one-standard deviation) shocks. The identification strategy only requires that the IRFs are significant on impact.

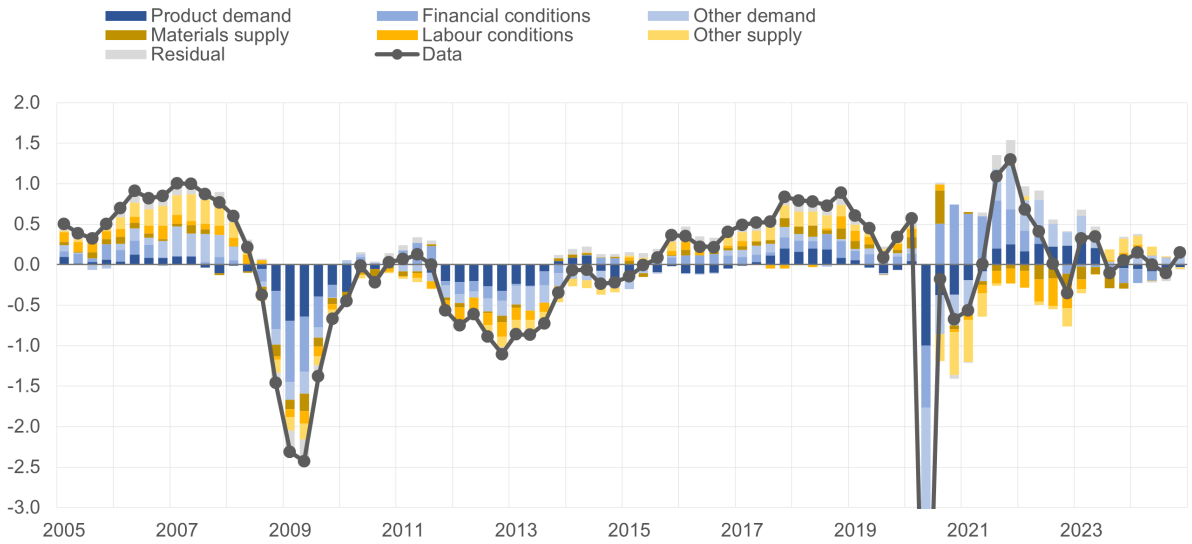
Table A.5: Forecast error variance decomposition on impact and after one year estimated with a pre-pandemic sample

Activity expectations														
	Product demand		Financial conditions		Other demand		Materials supply		Labour conditions		Other supply		Residual	
Horizon	0	4	0	4	0	4	0	4	0	4	0	4	0	4
Total	23.3	15.5	24.0	15.8	15.9	11.1	8.7	11.7	7.4	9.3	7.9	23.2	12.8	13.4
Manufacturing	23.9	15.8	20.9	13.1	18.5	14.4	8.1	9.9	6.2	6.4	9.0	25.1	13.4	15.3
Services	22.9	14.0	25.2	16.1	14.7	9.8	9.0	12.9	8.0	10.6	7.5	23.7	12.6	12.9
Construction	26.3	31.0	22.3	22.0	19.1	13.7	6.2	5.7	4.8	4.4	8.7	10.9	12.4	12.3
Price expectations														
	Product demand		Financial conditions		Other demand		Materials supply		Labour conditions		Other supply		Residual	
Horizon	0	4	0	4	0	4	0	4	0	4	0	4	0	4
Total	23.5	23.8	16.0	20.4	13.1	12.2	8.5	8.3	8.4	7.5	15.9	13.6	14.6	14.2
Manufacturing	27.8	25.0	19.6	17.5	15.2	17.6	7.8	7.3	4.5	5.6	8.6	10.9	16.6	16.0
Services	22.5	22.7	14.8	21.1	11.8	10.1	8.7	9.0	9.6	8.2	18.5	15.1	14.0	13.7
Construction	20.5	32.0	17.8	22.3	19.5	16.2	7.8	4.8	7.7	5.7	11.9	6.1	14.7	12.9

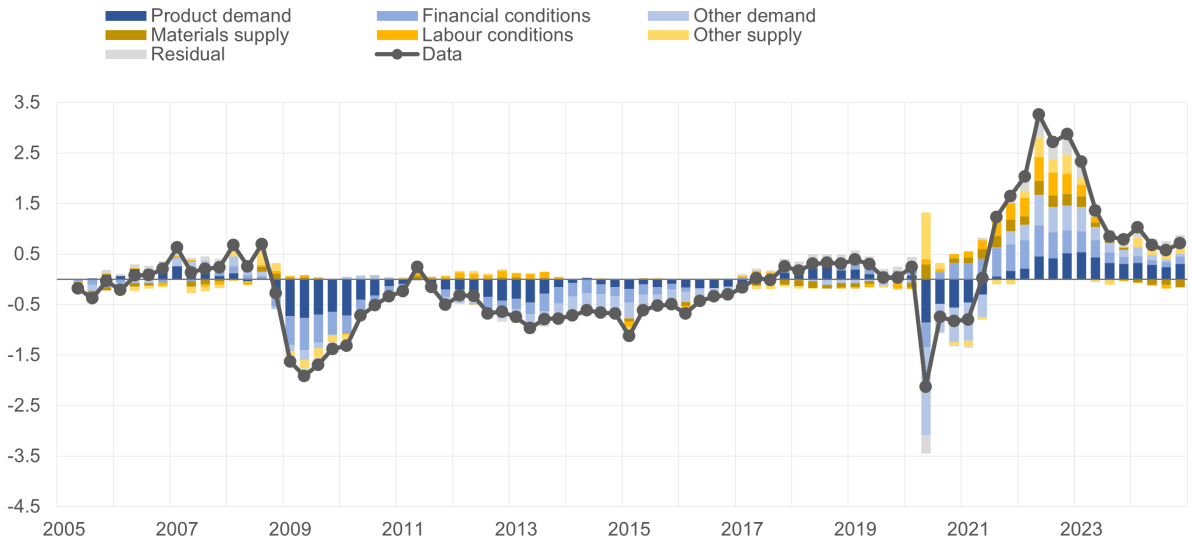
Note: The table reports the shares of the total variance of business expectations explained by the structural shocks (in percentages) at forecast horizon $t+h$ for $h = 0, 4$ quarters. "Total" refers to the weighted average of the sectors in line with the weighting scheme used for the BEI.

Figure A.7: Historical decomposition of the composite BEI (direct estimation)

1) Activity expectations

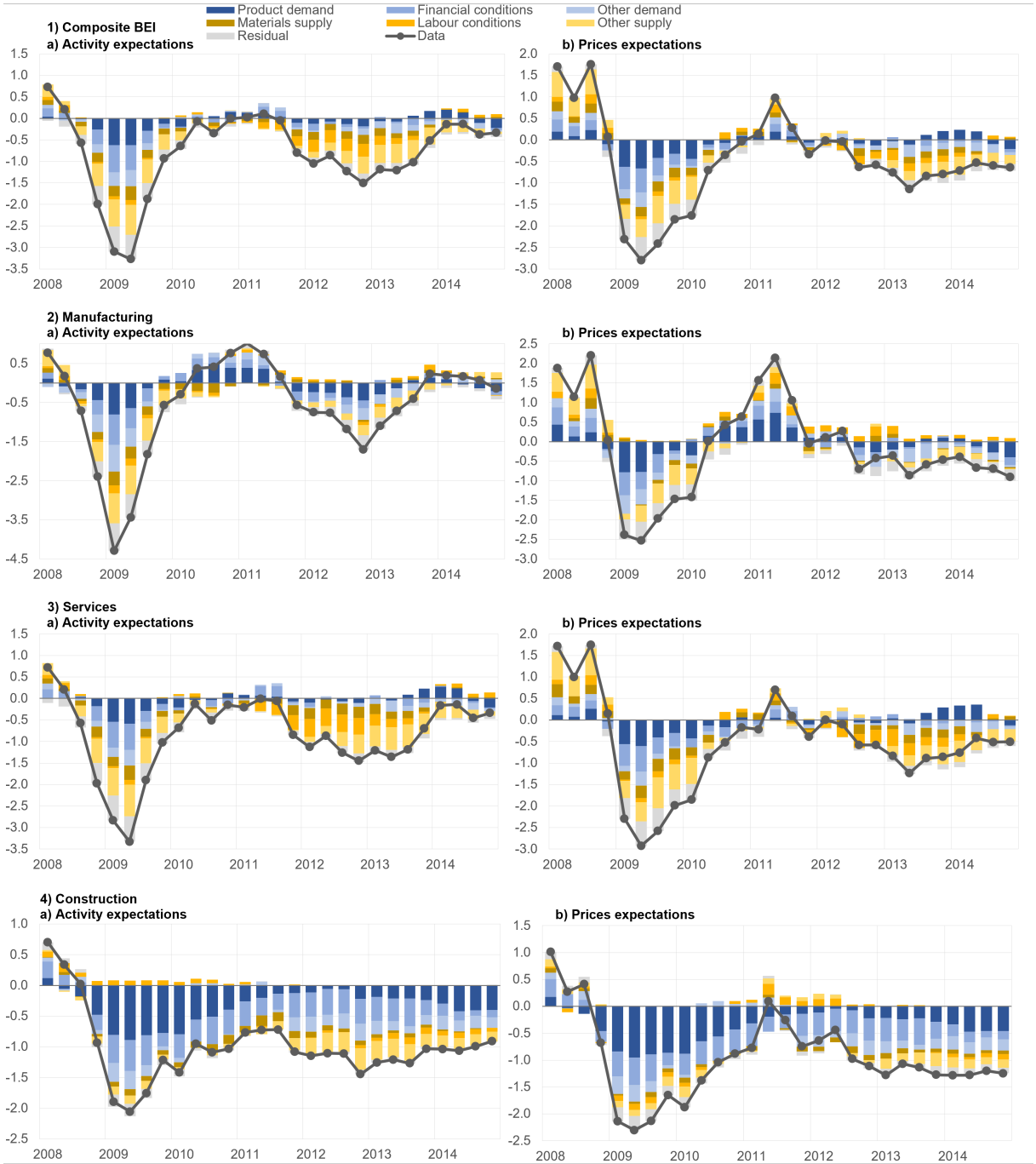


2) Price expectations



Notes: This figure shows the contributions from the identified shocks to fluctuations in (the standardised levels of) of activity (panel 1) and price (panels 2). "Residual" refers to the sum of the contributions from the unidentified residual shock and the initial conditions.

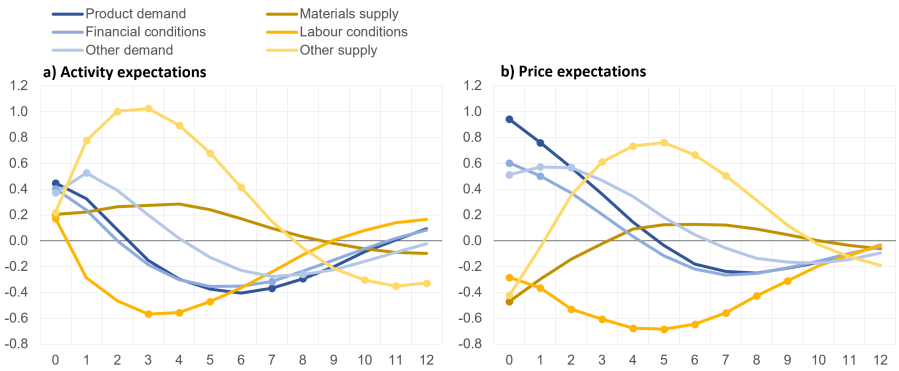
Figure A.8: Historical decomposition of business expectations during the global financial crisis and the sovereign debt crisis estimated with a pre-pandemic sample



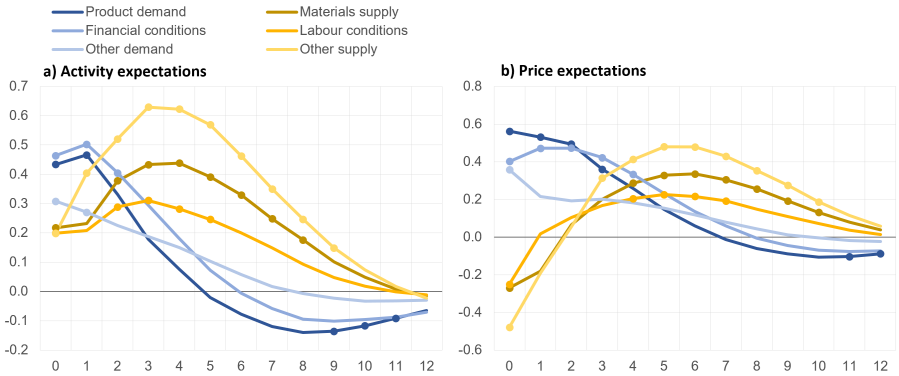
Notes: This figure shows the contributions from the identified shocks to fluctuations in (the standardised levels of) of activity (panels a) and price (panels b) expectations for the composite BEI (panel 1), manufacturing (panel 2), services (panel 3) and construction (panel 4). "Residual" refers to the sum of the contributions from the unidentified residual shock and the initial conditions.

Figure A.9: Impulse response functions of business expectations to demand and supply shocks using a pre-pandemic sample

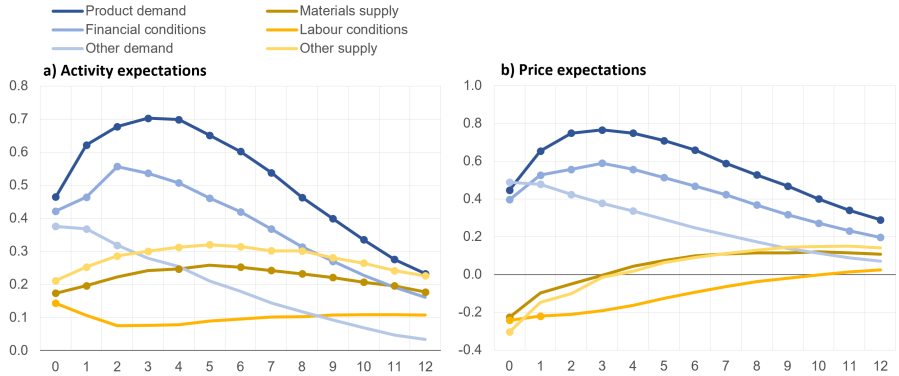
1) Manufacturing



2) Services



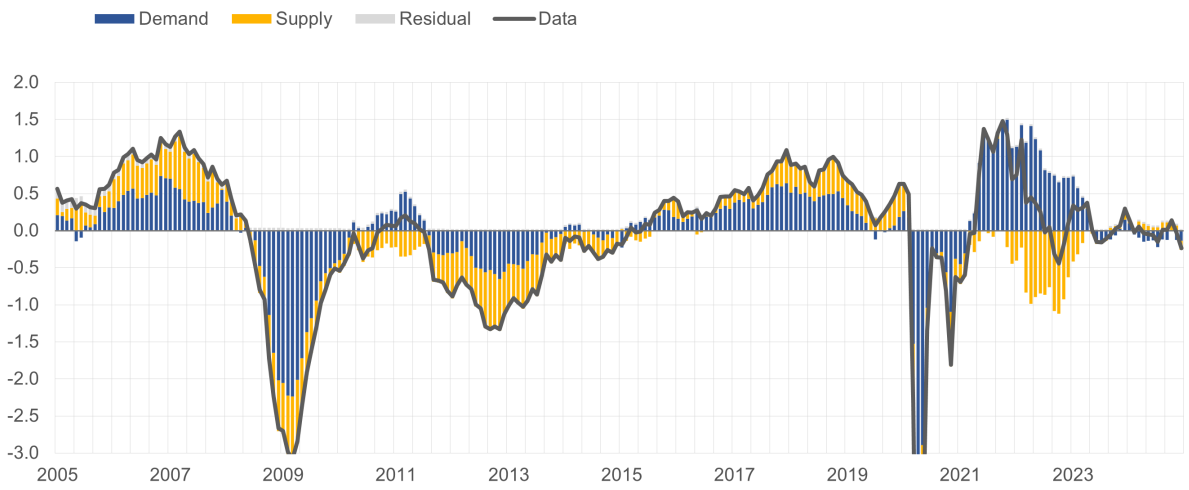
3) Construction



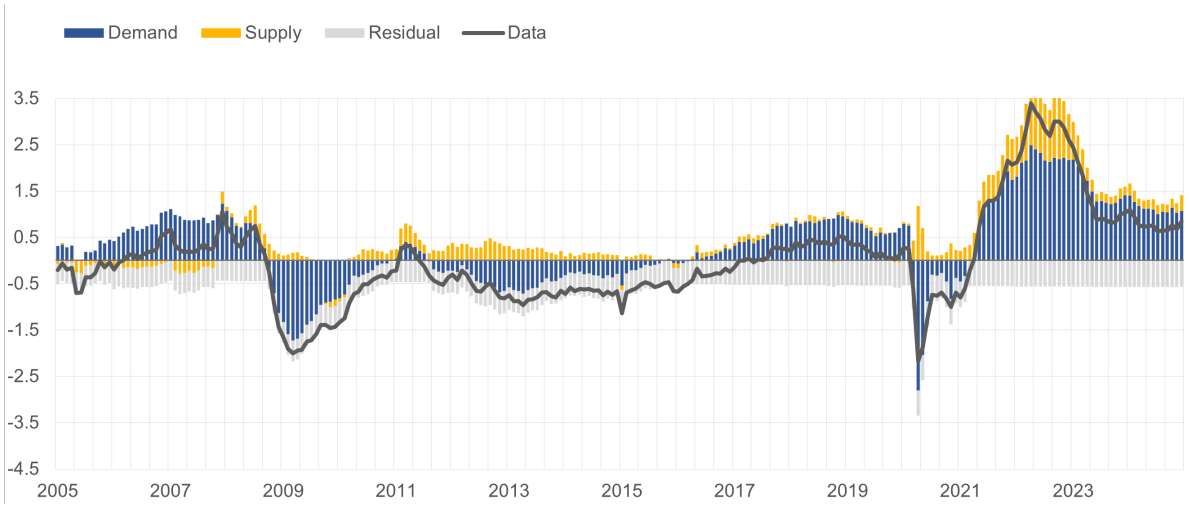
Notes: This figure reports the median impulse response functions (IRFs) of business activity and price expectations (solid lines, with dots if the credible set is significantly different from zero at the 68% level) to different (one-standard deviation) shocks. The identification strategy only requires that the IRFs are significant on impact.

Figure A.10: Historical decomposition of the composite BEI - bivariate monthly model

1) Activity expectations



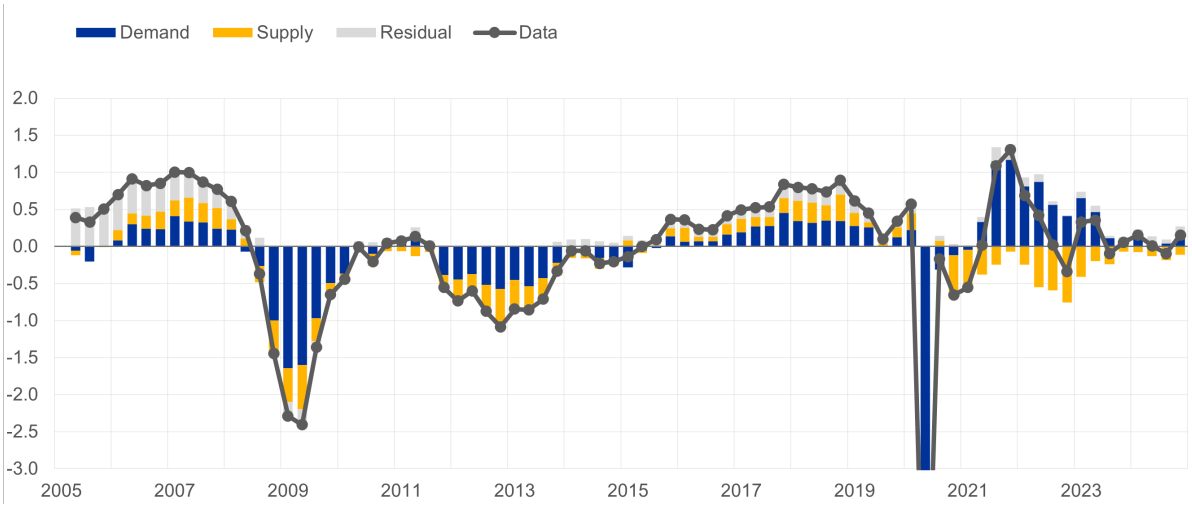
2) Price expectations



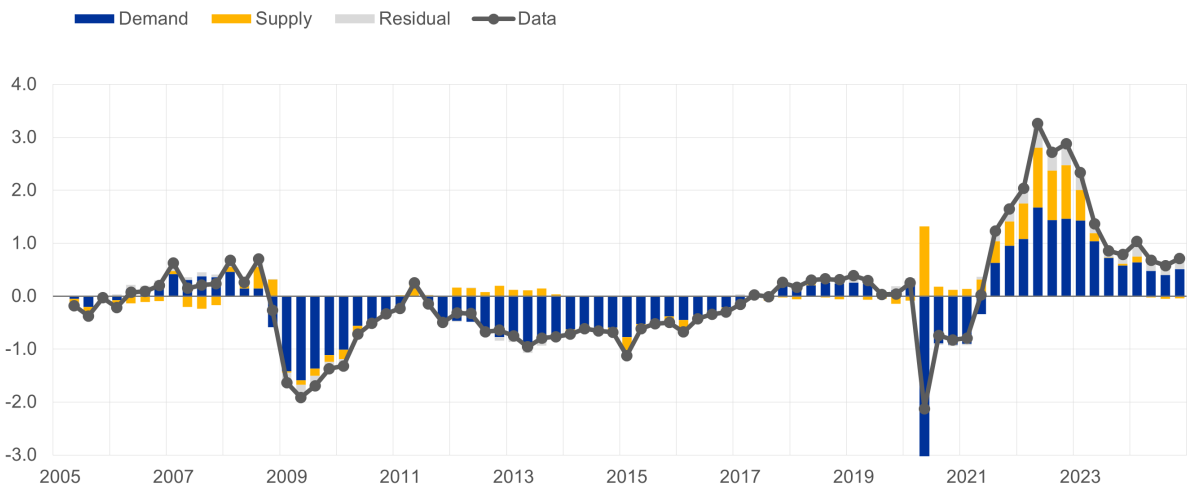
Notes: This figure shows the contributions from the identified shocks to fluctuations in (the standardised levels of) of activity (panel 1) and price (panel 2). "Residual" refers to the sum of the contributions from the unidentified residual shock and the initial conditions. Demand and supply shocks correspond to the sum of all disturbances of the baseline specification. Results are based on the bivariate model detailed in section 5 using monthly data.

Figure A.11: Historical decomposition of the composite BEI - aggregation of demand and supply shocks of baseline estimation

1) Activity expectations



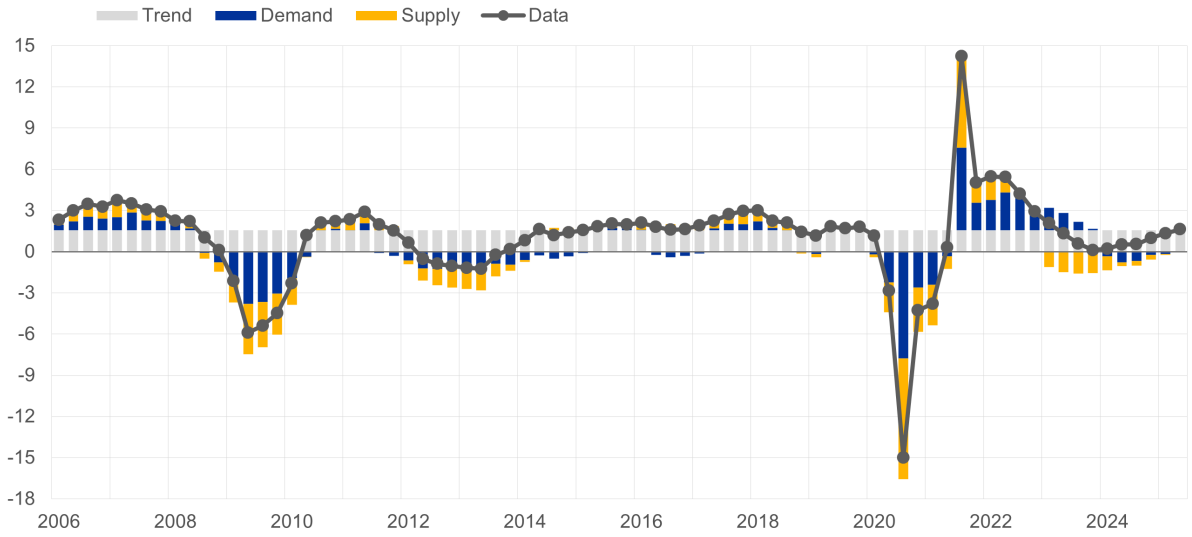
2) Price expectations



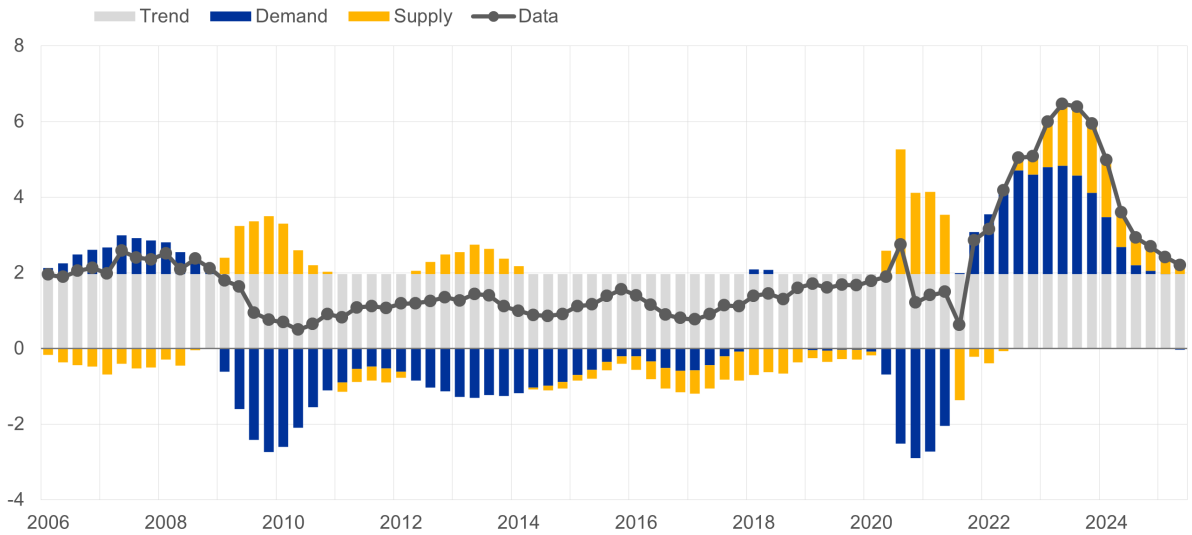
Notes: This figure shows the contributions from the identified shocks to fluctuations in (the standardised levels of) of activity (panel 1) and price (panel 2). "Residual" refers to the sum of the contributions from the unidentified residual shock and the initial conditions. Demand and supply shocks correspond to the sum of all disturbances of the baseline specification.

Figure A.12: Historical decomposition of real GDP and the GDP deflator

1) Real GDP



2) GDP deflator



Notes: This figure shows the contributions from the identified demand and supply shocks to fluctuations in the year-on-year growth rate (approximated by the 4-quarter moving sum of the log first differences) of real GDP (panel 1) and the GDP deflator (panel 2), estimated using a bivariate SBVAR model on their log first differences.

Acknowledgements

We would like to thank Malin Andersson, Oscar Arce, Roberto De Santis, Maarten Dossche, Johannes Gareis, Joan Paredes, Beatrice Pierluigi, and João Sousa, as well as an anonymous referee, for their helpful comments and suggestions. This paper has also benefitted from discussions with participants at seminars at the ECB.
The views expressed in this paper are those of the authors and do not necessarily represent those of the European Central Bank or the Eurosystem.

Niccolò Battistini
European Central Bank, Frankfurt am Main, Germany; email: niccolo.battistini@ecb.europa.eu

Pedro Neves
Maastricht University, Maastricht, The Netherlands; De Nederlandsche Bank, Amsterdam, The Netherlands;
email: pedro.nevesrebeloluis@maastrichtuniversity.nl

Postal address 60640 Frankfurt am Main, Germany
Telephone +49 69 1344 0
Website www.ecb.europa.eu

PDF ISBN 978-92-899-7624-4 ISSN 1725-2806 doi:10.2866/1314188 QB-01-26-012-EN-N