How do supply shocks to inflation generalize? Evidence from the pandemic era in Europe*

Viral V. Acharya
NYU Stern, CEPR, ECGI, NBER

Matteo Crosignani
New York Fed, CEPR

Tim Eisert
Nova School of Business and Economics, CEPR

Christian Eufinger
IESE

March 2025

Abstract

We document how the interaction of supply chain pressures, elevated household inflation expectations, and firm pricing power contributed to the pandemic-era surge in consumer price inflation in the euro area. Initially, supply chain disruptions raised inflation, particularly in manufacturing sectors, through a cost-push channel while also elevating inflation expectations. In turn, higher inflation expectations appear to have lowered price elasticity of consumer demand and strengthened firms' pricing power, enabling even firms in service sectors, that were initially unaffected by supply constraints, to raise markups. Our findings suggest that through this mechanism, localized inflation in sectors sensitive so supply-side shocks can generalize into broad-based inflation.

JEL: E31, E58, D84, L11.

Keywords: inflation expectations, euro area, firm markups, market power, supply chain.

*The views expressed in this paper are those of the authors and do not necessarily represent those of the Federal Reserve Bank of New York, the Federal Reserve System, or any of their staff. We thank Marco del Negro, Michael Weber, Gil Nogueira, Yang Liu, and Lars Norden as well as seminar and conference participants at Yale, Western Finance Association Annual conference, Catolica Lisbon, the Federal Reserve Bank of New York, the Bank of Italy, the European Central Bank, Norges Bank, NHH Bergen, the Danish Central Bank, CEPR Luiss Finance Workshop, Banco de Portugal, CEPR Conference on Financial Intermediation, the "Heterogenous Households, Firms and Financial Intermediaries: Theoretical Insights and Validation with Microdata" conference (Norges Bank), and the CEPR Paris Symposium for valuable comments. We thank Lily Gordon and Jasper Yang for excellent research assistance. Emails: Viral V. Acharya (vva1@stern.nyu.edu); Matteo Crosignani (matteo.crosignani@ny.frb.org); Tim Eisert (tim.eisert@novasbe.pt); Christian Eufinger (ceufinger@iese.edu).

1 Introduction

In response to the outbreak of the COVID-19 pandemic in March 2020, governments and central banks implemented substantial stimulus measures to avert a deep recession. The global economy and aggregate demand rebounded rapidly, leading to a rise in inflation (see Reis (2022a)). Throughout 2021 and 2022, additional supply-side shocks intensified inflationary pressures. Notably, new pandemic waves and the resultant restrictions on economic activity put severe strain on global value chains, resulting in shortages across various sectors. Moreover, energy prices began to climb in 2021 and surged dramatically in early 2022, following the Russian invasion of Ukraine, causing inflation rates to reach their highest levels in four decades in many countries across the globe, and in particular in the euro area. Since 2023, however, in spite of the abatement in these initial catalysts, consumer price inflation has remained entrenched and even generalized across goods and sectors.

We show how supply chain pressures, household inflation expectations, and firm pricing power interacted, fueling the pandemic-era surge, and eventually generalization, in consumer price inflation in the euro area. We start by documenting (i) the increase in production constraints and localized inflation (i.e., inflation in sectors affected by these constraints) starting in late 2020/early 2021, (ii) the rise in household inflation expectations starting in 2020, and (iii) the increase in broad-based inflation (i.e., inflation in sectors not directly affected by production constraints) beginning in the second half of 2021.

Using several cross-sectional and time-series tests, we link these observations through a coherent narrative, illustrated in Figure 1. First, we present evidence of a localized pass-through of supply chain constraints to prices, consistent with a *cost-push channel*. Second, we show that localized supply chain constraints also led to an increase in *inflation expectations*. In response to witnessing higher consumer prices in their consumption basket (*experience channel*), and upon exposure to news regarding supply-side shocks signaling rising costs like delays in cargo ship deliveries (*news channel*), households revised their inflation expectations,

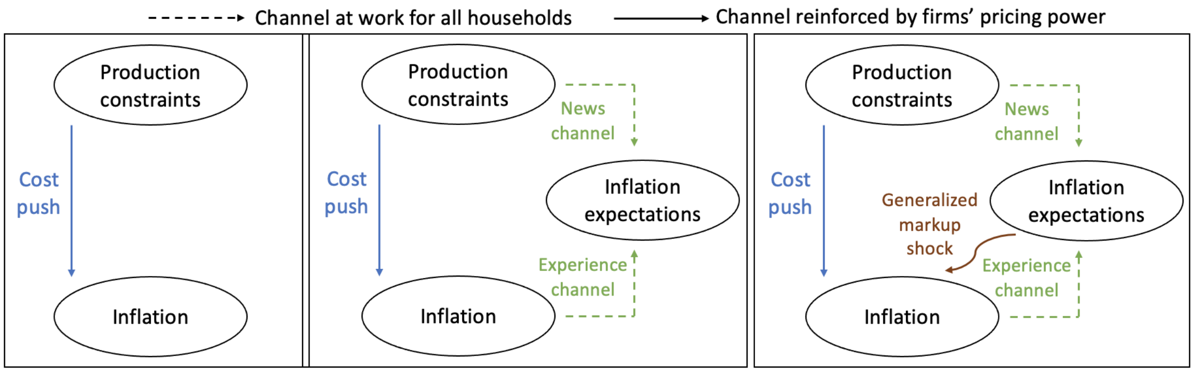


Figure 1: From supply chain constraints and *localized* inflation to high inflation expectations and *generalized* inflation. This figure shows the main channels at the core of our analysis. The left panel shows how production constraints might affect inflation through a cost-push channel. The middle panel shows how production constraints and inflation might increase inflation expectations. The right panel shows how inflation expectations might contribute to the rise in generalized inflation.

anticipating a rise in *aggregate prices*. Consequently, *generalized* inflation took hold, i.e., there was a pass-through of inflation to sectors hitherto unaffected by cost increases and particularly pronounced in sectors where firms have high pricing power. These firms (i) were more likely to maintain, or even increase, their markups when facing supply chain constraints and high demand, and (ii) were more likely to sustain relatively higher markups when inflation expectations became elevated and sticky, even after supply chain pressures eventually eased.[1]

To conduct our tests, we combine several data sets at various units of observations. At the industry-country-time level, we observe (i) firms' production constraints from the Joint Harmonised EU Programme of Business and Consumer Surveys (BCS), and (ii) energy consumption data from Eurostat. At the country-time and at the household-time level,

[1]In an environment characterized by heightened inflation expectations and aggregate cost and price uncertainty, households can become less informed about the *distribution of prices across firms and products*, lowering the price elasticity of demand—a phenomenon highlighted in theoretical research on the impact of cost shocks and inflation in imperfectly competitive search markets (e.g., Benabou and Gertner, 1993; Tommasi, 1994). Less precise household price information across firms can result in higher acceptance prices and, in turn, an upward shift in the demand curve faced by individual producers. Consequently, producers can sustain, or even increase, their markups without risking a significant sales decline.

we observe inflation expectations from the BCS and the European Central Bank (ECB) Consumer Expectations Survey (CES), respectively. At the product-country-time level, we observe Consumer Price Index (CPI) data from Eurostat. Finally, at the firm-time level, we observe financial data from Compustat Global, which we use to estimate firm markups.

The analysis is structured in five parts. First, we document the pass-through of supply chain constraints to price levels, consistent with a cost-push channel. For consumer prices, we show that product-country pairs characterized by increasing supply constraints are positively associated with CPI growth in the post-pandemic period. An instrumental variable (IV) estimation supports a causal interpretation of this finding. Specifically, we instrument a market's degree of supply chain disruptions with its firms' pre-COVID reliance on imports from China paired with Chinese province-time level data on lockdown stringency.[2] We employ granular energy consumption and price data to isolate—and confirm robustness of—the impact of supply chain frictions on inflation from the impact of the contemporaneous surge in energy costs.

Second, we show that supply chain constraints generalize into broad-based inflation expectations. Specifically, we find a positive association between the prevalence of supply chain constraints in a country with both (i) the share of households with heightened inflation expectations in that country as well as (ii) individual short-term and long-term household inflation expectations. We further substantiate the causal link between supply chain disruptions and rising household inflation expectations by employing again the IV estimation approach that capitalizes on the trade shock induced by China's lockdowns. The household-time level estimation also shows that households more aware of realized inflation during the

[2]We use data for the top-5 Chinese exporting provinces from the Oxford COVID-19 Government Response Tracker project and track the time-series evolution of nine types of COVID responses, including workplace closures and travel banks. See Figure OA.4.3 in the Appendix for the evolution of this aggregate stringency index.

initial cost-push phase expect CPI growth to increase more when reported supply chain constraints tighten—and this relationship is particularly pronounced in countries with greater exposure to salient information about supply chain disruptions. These findings support both the experience and the news channel of household expectation formations.

Third, we find evidence consistent with a generalization of inflation for markets that were initially not exposed to supply chain constraints, notably in service sectors. In particular, we document that in countries with elevated household inflation expectations, products with a high contribution from service sectors—thus less impacted by supply constraints—exhibit higher relative CPI growth in 2022 compared to similar products in countries where inflation expectations were less pronounced. To ensure this effect is not driven by demand factors, we employ several controls: (i) we account for potential pent-up demand by controlling for country-level energy costs and the intensity of lockdown measures during the COVID-19 pandemic; (ii) we include product-country-time fixed effects at the 1-digit COICOP level to absorb the impact of broader demand shocks on product categories; and (iii) we control for demand shifts across different product categories using data on final consumption expenditure of households at the product-country-time level.

Moreover, we show that the generalization of inflation (i) is driven by industry-country pairs where firms possess significant market power and (ii) is present in both countries with a high and low share of employees covered by a collective bargaining agreement. The latter finding suggests that the generalization into broad-based inflation is not driven by firms anticipating a rise in labor costs. Finally, the generalization effect is robust to controlling for a potential delay in supply shock transmission along the supply chain, i.e., allowing for the supply chain constraint affecting, for each product, upstream firms.

Fourth, we document an important role played by firms' pricing power. Firms with higher pricing power in industry-country pairs that experienced large supply chain pressures were able to raise their markups more than firms with ex-ante lower pricing power—a result driven by markets with sufficiently high demand. Conversely, firms with higher pricing power in industry-country pairs that did not experience large supply chain pressures were less able to maintain their markups compared to firms with lower pricing power.

Fifth, we show that subsequently firms with pricing power were more likely to maintain, or even increase, their markups in an environment with elevated inflation expectations, irrespective of whether they were affected by supply-side constraints (e.g., in services sector) and even after these constraints eventually subsided (in manufacturing sector). We provide direct evidence of this channel by using a Large Language Model (LLM) on company earnings call transcripts (presentations section). We document that firms' ability to sustain higher markups and profit margins is associated with lower price elasticity of demand, as reflected in greater references in the transcripts to higher pricing power and resilient consumer demand, importantly only in countries with elevated household inflation expectations.

Overall, the combination of households anticipating a rise in aggregate price levels, coupled with less precise information about the distribution of price across firms and products, can lead to supply-side shocks generalizing into broad-based inflation via an interaction of household expectations and firm pricing power. Our results therefore highlight the importance of a nuanced understanding and approach in policy formulation to mitigate the risk of supply-side inflation impulses becoming broad-based. As inflation began to rise in 2021, central banks initially tolerated the elevated inflation levels under the assumption that the supply shocks were transitory in nature. The conventional monetary policy response to a transitory supply shock involves permitting inflation to surpass target levels, ensuring that actual output remains near the efficient level of output, even if it exceeds potential output.

Related literature. The literature on supply-side factors and their connection to inflation and inflation expectations covers several interconnected areas of research, including (i) the effect of supply shocks on prices, (ii) the formation of inflation expectations, as well as (iii) the relationship between inflation and inflation expectations.

A variety of studies has investigated the impact of supply-side frictions on prices and price expectations. In the theoretical literature, Alessandria et al. (2022) and Kalemli-Ozcan et al.

(2022) model the aggregate effects of supply chain shocks during the COVID-19 pandemic. Bilbiie and Känzig (2023) investigates the interplay of corporate profits and income distribution in shaping inflation and aggregate demand. In the empirical literature, Carriere-Swallow et al. (2022) and Jiménez-Rodríguez and Morales-Zumaquero (2022) examine the effects of global shipping costs and commodity prices, respectively, on domestic prices and inflation expectations. Benigno et al. (2022) and Bai et al. (2024) propose new indices to capture global supply chain pressures and their impact on inflation. There is also a growing body of country-specific research on the effects of supply-side factors on inflation (Isaacson and Rubinton, 2022; Amiti et al., 2022; Ball et al., 2022; Bernanke and Blanchard, 2023; Comin et al., 2023; Finck and Tillmann, 2022; Celasun et al., 2022; Binici et al., 2022).

More closely related to our paper, Franzoni et al. (2023) focuses on the role of market power in the propagation of the initial cost-push shock. The authors provide evidence that supply chain constraints can help explain about 19% of the U.S. inflation in industries with more asymmetric firm size distribution, where supply chain shortages are more likely to benefit large firms at the expense of smaller firms. Similarly, Bräuning et al. (2022) investigates the effect of market concentration on the pass-through of cost shocks into prices in the U.S., suggesting that increased industry concentration may amplify inflationary pressures. Our main contribution to this literature is showing that supply-side shocks can *interact* with household inflation expectations and firm pricing power, leading to broad-based inflation.

More generally, our paper is also related to the literature on the formation of inflation expectations and their link to household behavior, firm behavior, and inflation. Candia et al. (forthcoming) and Weber et al. (2022) review the literature on firms' inflation expectations, highlighting systematic upward bias, large disagreements, high forecast uncertainty, deviations from professional forecasters, joint short-long term adjustments (suggesting potential "unanchoring"), inattention in stable economies, and varied expectations across countries.

With respect to how inflation expectations affect firms' decisions, empirical evidence is significantly more limited. Coibion et al. (2018) surveys firms in New Zealand, revealing managers consistently overestimate inflation, perceptions and forecasts are correlated, informed firms forecast closer to true values, and firms' attentiveness is tied to competition and their price-change intent. Coibion et al. (2020) and Savignac et al. (2021) find that Italian and French firms, respectively, with higher inflation expectations raise their prices relative to firms with lower inflation expectations. Coibion et al. (2021) finds that French firms have less biased inflation expectations than households and see only a weak link between price and wage inflation. Finally Anayi et al. (2022) analyzes firm price-setting post-COVID using UK survey data, finding that energy prices and supply factors drove inflation since 2021.[3]

Outline. The remainder of the paper is structured as follows. Section 2 introduces our data, documents a few stylized facts, and presents our theoretical framework. Section 3 shows that supply chain disruptions led to localized inflation and to increasing household inflation expectations. Section 4 documents that this initial inflationary impulse, mostly localized in specific sectors hit by supply chain bottlenecks, then generalized into broad-based inflation. Section 5 shows that household inflation expectations led to a lower price elasticity of consumer demand that enabled firms with pricing power to sustain relatively higher markups even when operating in a market not initially affected by supply chain constraints. Section 6 presents possible mechanisms driving this generalization of inflation via inflation expectations. Section 7 concludes.

[3]Moreover, there is a large body of work on how inflation expectations affect households' economic decisions, showing that higher inflation expectations are associated with higher desired consumption (Crump et al., 2022; Dräger and Nghiem, 2021; D'Acunto et al., 2022; Ichiue and Nishiguchi, 2015; Duca-Radu et al., 2021; Armantier et al., 2015; Malmendier and Nagel, 2016; Coibion et al., 2023).

2 Data and stylized facts

In this section, we outline our data sources (Section 2.1) and highlight key stylized facts that characterize the inflationary environment in the euro area (Section 2.2).

2.1 Data sources

Our analysis is based on several data sets for the euro area from 2019:Q1 to 2022:Q4. We use data about (i) firms' production constraints; (ii) household and firm inflation expectations; (iii) CPI growth; and, (iv) firm financials. In Section OA.1 in the Appendix, we provide a detailed explanation of our data sources and explain how we process and transform the data. Below, we summarize the key datasets used.

Joint Harmonised EU Programme of Business and Consumer Surveys (BCS). We obtain information about firms' production constraints at the industry-country-time level and household inflation expectations at the country-time level from the BCS conducted by the European Commission's Directorate-General for Economic and Financial Affairs (DG ECFIN). These surveys are conducted on a monthly and quarterly basis, covering 37,990 corporations across the manufacturing, services, retail trade, and construction industries, as well as 31,810 households from the 27 EU member countries.

Employing survey data to gauge constraints to firms' production stemming from supply chain disturbances offers two key advantages: (i) Survey data offers more immediate and direct evidence regarding firms' production constraints in comparison to raw supply chain data, which may not fully capture their full extent due to firms' ability to adapt, either through sourcing alternative material inputs or adjusting their supply chains; (ii) Survey data about constraints to production can serve as a leading indicator for increases in supply-side costs since firms are often able to anticipate the impact of supply shocks, such as a container ship congestion, before they translate into a tangible material shortage.

ECB Consumer Expectations Survey (CES). Furthermore, we use newly available anonymized household-time level inflation expectations microdata from the CES launched in 2020. Its sample covers six key euro area countries: Belgium, France, Germany, Italy, Spain, and the Netherlands, and it is representative of the euro area population (Bańkowska et al., 2021). A total of 18,492 distinct respondents participated in the 12 CES waves and households appear repeatedly in the survey, allowing us to compare responses of the same household over time.

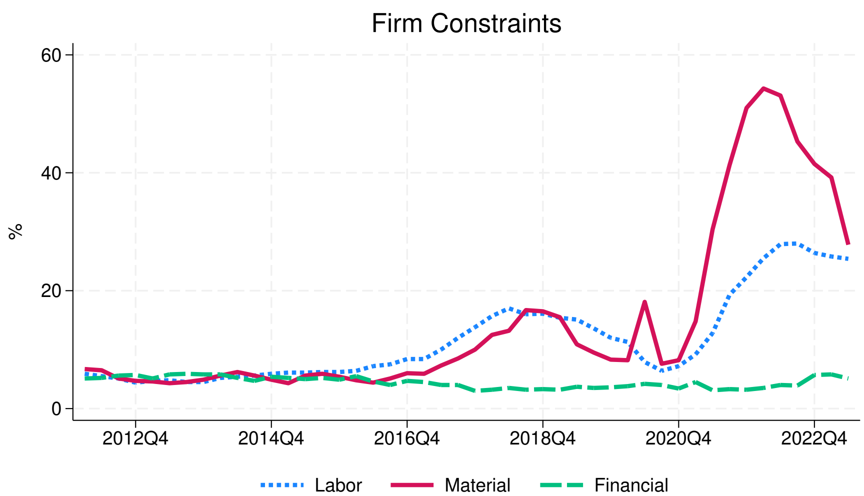
Other data sources. We obtain monthly data on consumer prices at the product-country-time level, data about industry-country-time level energy input use, and energy prices at the country-time level from Eurostat. Finally, we use firm-time level financial data from Compustat Global to estimate firm markups following De Loecker et al. (2020).

2.2 From localized to generalized inflation

The COVID-19 pandemic triggered a contemporaneous surge in supply chain disruptions, inflation and inflation expectations across the euro area. The top panel in Figure 2 shows that firms began reporting significant shortages of material inputs in 2021:Q1, followed by less pronounced labor shortages from 2021:Q2 onward. Both production constraints began easing by 2022:Q1 and 2022:Q3, respectively.

Supply chain shocks often prompt producers to raise prices to protect profit margins in response to challenges in sourcing materials and elevated input costs. Consistent with this, the CPI began to rise in 2021:Q1, peaking in October 2022 (see Figure OA.4.1 in the Appendix). Although price increases may propagate through firm-to-firm linkages, the initial *cost-push* inflationary impulse remains primarily confined to products directly affected by the supply-side shock.

While their immediate cost-push effect is localized, supply-side constraints can increase general inflation expectations when households experience higher prices and observe news



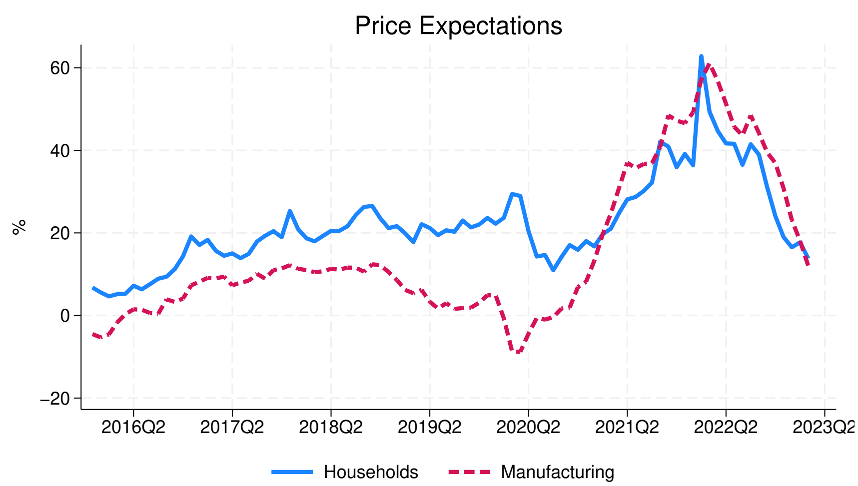


Figure 2: Production constraints and rising inflation expectations. The top panel shows the share of firms answering the following survey question: *"What main factors are currently limiting your production?"* as follows: (i) shortage of labor, (ii) shortage of material/equipment, (iii) financial constraints. The monthly data runs at a monthly frequency from January 2016 to April 2023 and is obtained from BCS firm survey for 27 EU countries, where the unit of observation is industry-country. The bottom panel shows the evolution of households' and manufacturing firms' inflation expectations over time. These expectations are measured as the share of households/firms expecting prices to increase more rapidly minus share of households/firms expecting inflation to fall over 12 months (for households) and 3 months (for manufacturing firms). The data source is the monthly survey on euro area households' and firms' inflation expectations.

coverage about the supply shocks (e.g., D'Acunto et al., 2021; Larsen et al., 2021). Indeed, as supply chain disruptions intensified, both households and firms began to expect higher inflation (see the bottom panel of Figure 2).[4]

Starting in the second half of 2021, localized inflation in supply-sensitive sectors gave way to a more widespread inflationary environment, with even sectors not directly affected by supply chain disruptions, such as services, experiencing high inflation rates (see top panel of Figure 3). While by late 2021, CPI year-over-year growth was 5%, with 27% of products experiencing inflation above 4% and 50% below 2%, by the end of 2022, CPI had risen to 9%, with 70% of products exceeding 4% inflation.

The bottom panel of Figure 3 confirms this transition to generalized inflation, displaying the survey-based measure of supply chain constraints alongside an "inflation diffusion" index, which assigns values of 0, 50, and 100 to product-quarters with annual inflation below 2%, between 2% and 4%, and above 4%, respectively. Despite easing supply chain bottlenecks in 2022, the index continued to rise as inflation became more broad-based.

This generalization can plausibly be explained by an interplay between supply-side disruptions, household inflation expectations and purchasing behavior, and firm pricing power. Households face a difficult signal extraction problem in response to supply shocks: they must assess whether producers are individually or generally affected to make optimal decisions about the effort invested in understanding price distributions across firms and products, which shapes their subsequent consumption choices. Search theory (Benabou and Gertner, 1993; Fishman, 1996; Gaballo and Paciello, 2022) suggests that when consumers perceive a supply-side shock as widespread (i.e., a common shock affecting many suppliers), a perception aligned with generalized inflation expectations (Dietrich, 2024), they reduce their

[4]These expectations are measured as the share of households or firms expecting prices to increase more rapidly minus the share of households or firms expecting inflation to fall over the next 12 months for households and 3 months for firms (see Weber et al., 2022; D'Acunto and Weber, 2024).

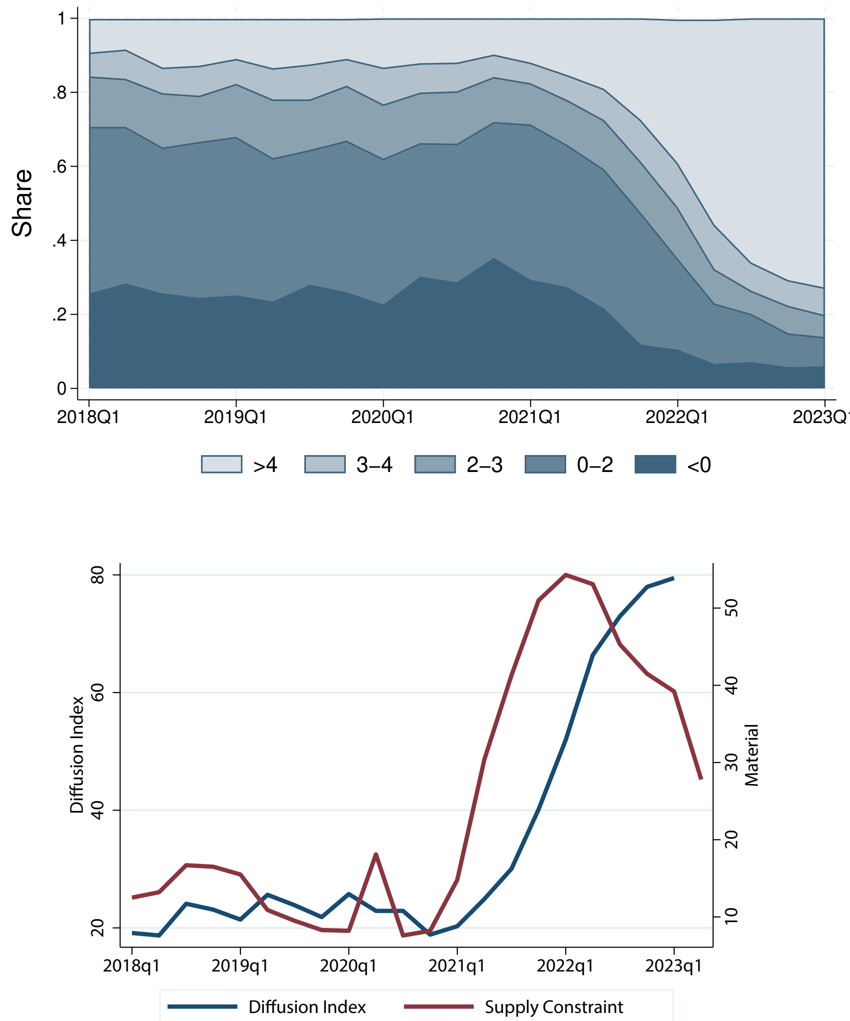


Figure 3: Localized inflation in 2021 becomes broad-based in 2022. The top panel provides a visual representation of inflation trends at the product-country-time level in the euro area. Each shaded area shows the share of product-country pairs that, in each quarter, have a specific CPI year-over-year growth as outline in the legend. The bottom panel of this figure shows the time-series evolution of an inflation diffusion index (blue line) and the time-series evolution of the supply chain constraint (red line). The diffusion index is defined by assigning a value of 0 to product-quarters that have an annual inflation of less than 2%, a value of 50 to product-quarters with an annual inflation between 2% and 4%, and a value of 100 to product-quarters with an annual inflation of more than 4%.

effort to seek better deals elsewhere when confronted with high prices. This translates into higher reservation (acceptance) prices and a lower price elasticity of demand; that is, households become less choosy and tend to enter into less adequate transactions. Consequently, *all* firms, even those not affected by the initial supply chain disruptions, can "hide" behind aggregate cost and inflationary noise to maintain, or even increase, their markups without risking a considerable decline in sales.

Our empirical analysis provides evidence supporting this transition from localized to generalized broad-based inflation via household expectations and firms' pricing power. Section 3 shows that supply-chain bottlenecks led to localized cost-push inflation and raised household inflation expectations. Section 4 documents the transition from localized to broad-based inflation, and links this generalization to elevated household inflation expectations. Section 5 shows that firms with pricing power maintained, or even increased, their markups when facing supply chain constraints and in an environment with elevated inflation expectations.

3 Pass-through of supply chain constraints

In this section, we present evidence consistent with a post-COVID pass-through of supply chain disruptions to price levels through a cost-push channel (Section 3.1) and to household inflation expectations (Section 3.2).

3.1 Pass-through to localized inflation

We begin by documenting the initial *localized* cost-push inflationary impulse, leveraging cross-sectional variation in supply chain disruptions at the product-country level. We then (i) document how this correlation varies during 2020–22, (ii) show that supply chain constraints propagate through firm-to-firm linkages, and (iii) present an IV estimation approach based on firms' reliance on imports from China paired with Chinese province-level data on lockdowns.

Baseline analysis. We test the effect of increasing supply chain pressures (as perceived by firms) on CPI growth by estimating the following specification at the product-country-quarter level:

$$CPI\ Growth_{pct+1} = \beta_1 Material_{pct} + \beta_2 Material_{pct} \times Covid_t + \nu_{ct} + \mu_{pc} + \epsilon_{pct}, \quad (1)$$

where p is a product, c is a country, and t is a quarter. $Material_{pct}$ measures the share of firms producing product p for the market in country c indicating that their production is constrained by supply chain bottlenecks. The sample period spans 2019:Q1 to 2022:Q4 at a quarterly frequency. We use 2019 as our "base year". The $Covid_t$ dummy is equal to one for the period after the start of the COVID-19 pandemic (i.e., after and including 2020:Q2) and zero otherwise. We measure the CPI growth in quarter t as the yearly CPI growth from quarter $t-3$ to quarter $t+1$. This approach allows us to gauge the effect of our independent variable of interest (i.e., $Material_{pct}$) in quarter t on the one-quarter ahead dependent variable of interest ($CPI\ Growth_{pct+1}$), while accounting for seasonality by taking the same quarter in the previous year as base year for the growth calculation.

By including country-quarter and product-country fixed effects, we isolate the effect of firms' perceived supply constraints holding constant the time-varying demand at the country level. Specifically, the country-quarter fixed effects absorb all shocks at the national level that might affect price levels (e.g., country-level demand shocks, energy shocks, government support packages, changes in tax legislation and national regulations). The product-country fixed effects control for time-invariant product-country characteristics.

Our analysis includes both manufacturing firms and services. For manufacturing firms, we observe supply chain constraints ($Material_{pct}$) in addition to the other supply factors ($Labor_{pct}$, $Financial_{pct}$, and $Other_{pct}$). These variables represent the share of firms that report being constrained by each respective factor. For services, the supply chain constraint is defined differently ($Equipment_{pct}$; capturing equipment shortages), while all other supply factors are defined as for manufacturing. We conservatively measure supply chain constraints

Dependent variable: CPI Growth$_{pct+1}$	(1)	(2)	(3)	(4)	(5)	(6)
Material$_{pct}$ × Covid$_t$	0.087***	0.086***				
	(0.023)	(0.022)				
Material$_{pct}$ × 2020$_t$			0.126***	0.126***	0.127***	0.095**
			(0.025)	(0.027)	(0.028)	(0.034)
Material$_{pct}$ × 2021$_t$			0.076**	0.074**	0.074**	0.064**
			(0.027)	(0.027)	(0.026)	(0.027)
Material$_{pct}$ × 2022$_t$			0.074**	0.071**	0.070**	0.060**
			(0.027)	(0.027)	(0.026)	(0.027)
Energy Use$_{pc}$ × Energy Inflation$_{ct}$		1.448***		1.454***	1.471***	1.515***
		(0.481)		(0.482)	(0.481)	(0.478)
Observations	9,187	9,187	9,187	9,187	9,187	9,187
R-squared	0.537	0.545	0.537	0.546	0.546	0.550
Other constraints					✓	✓
Other constraints interacted						✓
Country-time FE	✓	✓	✓	✓	✓	✓
Product-country FE	✓	✓	✓	✓	✓	✓

Table 1: Supply chain constraint pass-through to CPI. This table presents estimation results from Specification (1) in Column (1)–(2). Columns (3)–(6) present estimation results based on the same specification with yearly time dummies. The subscript notation is defined as follows: p is a product, c is a country, and t is a quarter. The dependent variable is the one-quarter ahead annual CPI growth at the product-country-time level. *Covid* is a dummy equal to one for the period after the start of the COVID-19 pandemic (i.e., after and including 2020:Q2) and zero otherwise. *Material*, *Labor*, *Financial*, and *Other* measure the share of firms that indicate that their production is constrained by the respective constraint. All constraints are transformed from the industry-country-time level to the product-country-time level using an input-output table and the share of consumption that each industry contributes to the final household consumption of a particular product. Non-reported controls include the other perceived constraints to production (*Labor*, *Financial*, and *Other*) uninteracted in Columns (5)–(6) and, in addition, these other constraints interacted with the three year dummies in Column (6). *Energy Inflation* is the country-time level CPI index for energy. *Energy Use* is a product-country pair's energy input before the COVID-19 pandemic, measured in 2019 and scaled by the country's total energy use. We exclude the product "Energy" from the regression. Standard errors are double-clustered at the country-product and quarterly level and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

solely using the *Material* variable.[5]

The first column of Table 1 shows that reported supply chain constraints are positively associated with CPI growth in the post-pandemic period (i.e., after 2020:Q2) relative to 2019. Specifically, a one standard deviation higher supply chain constraint is associated with a 1.3pp higher annual CPI growth in the COVID-19 pandemic period, which suggests

[5] Observing supply chain constraints ($Material_{pct}$) only for manufacturing firms attenuates the estimated magnitude of an eventual supply chain constraint pass-through in the full sample.

a pass-through of supply-side frictions to consumer prices.

In Column (2), we further control for the contemporaneous energy cost shock by including the interaction term $\textit{Energy Use}_{pc} \times \textit{Energy Inflation}_{ct}$, which allows us to disentangle the effect of supply chain frictions on inflation from the impact of rising energy costs. $\textit{Energy Inflation}_{ct}$ is the time-varying country-level CPI index for energy, capturing the evolution of a country's overall energy costs over time. $\textit{Energy Use}_{pc}$ is an industry-country pair's energy input before the COVID-19 pandemic, measured in 2019 and scaled by the country's total energy use.[6] The year 2019 provides a pre-COVID baseline for energy usage, reflecting "normal" economic conditions without pandemic-related distortions. Column (2) shows that accounting for energy costs does not significantly alter the coefficient capturing the impact of supply chain frictions, which suggests that, in terms of pass-through to CPI growth, the shocks from supply chain disruptions are largely orthogonal to those from energy costs.

Time variation of pass-through. Having established a correlation between supply chain disruptions and consumer prices for the COVID-19 pandemic period, we now examine its potential time variation throughout this period. To this end, we split the $\textit{Covid}_t$ dummy in three yearly dummies equal to one in 2020, 2021, and 2022, respectively—where the year dummy for 2020 equals one for Q2–Q4 only (i.e., only after the COVID-19 outbreak).

Columns (3)–(6) of Table 1 indicate that the link between supply chain constraints and CPI growth exists for all years. These columns estimate progressively more stringent specifications. Column (3) only includes the supply chain constraint. In Column (4), we again additionally control for energy cost shocks. Column (5) further incorporates other production constraints ($\textit{Labor}_{pct}$, $\textit{Financial}_{pct}$, and $\textit{Other}_{pct}$), which are omitted from the table for brevity. Finally, Column (6) interacts each of these constraint variables with three year dummies (also omitted for brevity). The estimated coefficients for the supply chain constraint

[6] Our results are robust to employing the nonscaled energy input level.

remain stable across all specifications. Note that, while the coefficient estimate for 2020 is the largest, CPI growth had not yet risen significantly in that year.

Cost-push along the supply chain. Next, we confirm that supply chain disruptions contribute to localized inflation by focusing on bottlenecks among *upstream suppliers*. Using the Figaro input-output table from Eurostat, we quantify the share of firms reporting production constraints due to specific supply factors ($\textit{Material}_{pct}$, $\textit{Labor}_{pct}$, $\textit{Financial}_{pct}$, or $\textit{Other}_{pct}$) in quarter t among suppliers providing input goods to firms that produce final consumption goods p in country c in year t:

$$\begin{aligned}&\textit{Material Supply}_{pct} = \\ &\sum_{\overline{j},\overline{c}} \left[\textit{COICOP Share}_{pc\overline{j}} \times \textit{Consumption Share}_{c\overline{j}\overline{c}} \times \left(\sum_{\underline{j},\underline{c}} \textit{Supply Share}_{\overline{j}\overline{c}\underline{j}\underline{c}} \times \textit{Constraint}_{\underline{j}\underline{c}t} \right) \right]\end{aligned} \tag{2}$$

The variable $\textit{Supply Share}_{\overline{j}\overline{c}\underline{j}\underline{c}}$ represents the contribution of supplier industry $\underline{j}$ in country $\underline{c}$ to customer industry $\overline{j}$ in country c. $\textit{Constraint}_{\underline{j}\underline{c}t}$ captures the share of firms in industry $\underline{j}$ in $\underline{c}$ reporting that their production is restricted by a specific supply factor. The variable $\textit{COICOP Share}_{pc\overline{j}}$ captures the relative weights of industry $\overline{j}$'s (CPA classification) contribution to the production of product p (COICOP classification) in country c, while $\textit{Consumption Share}_{c\overline{j}\overline{c}}$ captures the contribution of industry $\overline{j}$ in country $\overline{c}$ to final household consumption in country c.

We then estimate Specification (1), but this time substituting the immediate production constraints of industries that produce and sell goods for final household consumption with the weighted constraints reported by their upstream suppliers ($\textit{Material Supply}_{pct}$). Table 2 provides robust evidence that frictions reported by upstream suppliers propagate through the supply chain, ultimately leading to localized inflation. Column (6) shows that only material frictions (not the other constraints) travel downstream, which highlights a unique connection between material constraints, the supply chain dynamics of firms, and their contribution to localized inflation.

Dependent variable: CPI Growth$_{pct+1}$	(1)	(2)	(3)	(4)	(5)	(6)
Material Supply$_{pct}$ × Covid$_t$	0.277***	0.272***				
	(0.072)	(0.069)				
Material Supply$_{pct}$ × 2020$_t$			0.266***	0.270***	0.270***	0.248***
			(0.065)	(0.065)	(0.066)	(0.078)
Material Supply$_{pct}$ × 2021$_t$			0.282***	0.276***	0.276***	0.286***
			(0.083)	(0.081)	(0.081)	(0.083)
Material Supply$_{pct}$ × 2022$_t$			0.284***	0.270***	0.270***	0.277***
			(0.084)	(0.081)	(0.081)	(0.084)
Financial Supply$_{pct}$ × 2020$_t$						−0.036
						(0.063)
Financial Supply$_{pct}$ × 2021$_t$						0.022
						(0.055)
Financial Supply$_{pct}$ × 2022$_t$						−0.138
						(0.095)
Labor Supply$_{pct}$ × 2020$_t$						0.052
						(0.078)
Labor Supply$_{pct}$ × 2021$_t$						−0.055
						(0.036)
Labor Supply$_{pct}$ × 2022$_t$						−0.054
						(0.057)
Other Supply$_{pct}$ × 2020$_t$						0.013
						(0.030)
Other Supply$_{pct}$ × 2021$_t$						−0.006
						(0.032)
Other Supply$_{pct}$ × 2022$_t$						0.045
						(0.041)
Energy Use$_{pc}$ × Energy CPI$_{ct}$		1.420**		1.422**	1.423***	1.429***
		(0.485)		(0.485)	(0.479)	(0.481)
Observations	9,187	9,187	9,187	9,187	9,187	9,187
R-squared	0.537	0.545	0.537	0.545	0.545	0.546
Other constraints					✓	✓
Country-time FE	✓	✓	✓	✓	✓	✓
Product-country FE	✓	✓	✓	✓	✓	✓

Table 2: Supply chain constraint pass-through to CPI. This table presents estimation results from Specification (1) in Column (1)–(2) and the same specification with yearly time dummies in Columns (3)–(6). The subscript notation is defined as follows: p is a product, c is a country, and t is a quarter. The dependent variable is the one-quarter ahead annual CPI growth at the product-country-time level. *Covid* is a dummy equal to one for the period after the start of the COVID-19 pandemic (i.e., after and including 2020:Q2) and zero otherwise. *Material Supply*, *Labor Supply*, *Financial Supply*, and *Other Supply* measure the share of firms that indicate that their production is constrained by the respective input constraint in year t among the suppliers that provide input goods to firms that sell product p in country c in year t. All constraints are transformed from the industry-country-time level to the product-country-time level using an input-output table and the share of consumption that each industry contributes to the final household consumption of a particular product. Non-reported controls include the other perceived constraints to production (*Labor*, *Financial*, and *Other*) in Columns (5) and (6). *Energy Inflation* is the country-time level CPI index for energy. *Energy Use* is a product-country pair's energy input before the COVID-19 pandemic, measured in 2019 and scaled by the country's total energy use. We exclude the product "Energy" from the regression. Standard errors are double-clustered at the country-product and quarterly level and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

IV estimation. Next, we conduct an IV regression approach. This analysis serves two purposes: first, to further validate our survey data; and second, to pinpoint exogenous variations in supply chain frictions. Most importantly, it ensures that the reported material constraints are truly a result of supply chain disruptions, rather than capturing rising consumer demand paired with a lack of scalability in material inputs.

We instrument a market's degree of supply chain disruptions with its pre-pandemic reliance on imports from China and their resulting susceptibility to the disruptions caused by COVID-19 lockdowns in China:

$$\widetilde{B}_{pct} = \text{China Dependence}_{pc,2019} \times \text{Lockdown Stringency}_t,$$

where *China Dependence*$_{pc,2019}$ represents the share of material inputs that the respective firms imported from China in 2019 to produce and sell product p in country c (using data from Eurostat Figaro), while *Lockdown Stringency*$_t$ measures the severity of lockdown measures implemented in the top-5 exporting provinces of China (Guangdong, Jiangsu, Shandong, Shanghai, and Zhejiang) using data from the Oxford COVID-19 Government Response Tracker project (OxCGRT).[7] Our instrument thus gets all of the cross-sectional variation in the exposure of a product's supply chain to material imports sourced from China, and all of its time-series variation from the lockdown-induced disruptions.

[7]OxCGRT provides the COVID-19 Stringency Index, a composite measure based on nine response indicators including school closures, workplace closures, and travel bans, rescaled to a value from 0 to 100 (100 = strictest). We focus on lockdowns in the five leading Chinese provinces in export contributions to more precisely capture supply chain disruptions. Specifically, export volumes do not significantly correlate with the severity of COVID-19-related government policies at the provincial level. For instance, Guangdong, despite being a top exporter, experienced relatively moderate COVID-19 restrictions. Conversely, Xinjiang, with some of the most stringent lockdown measures, ranks low in export volumes. To create the consolidated top-5 export COVID-19 stringency index, we take the average of the province-time level index for the top-5 export provinces, collectively representing 67% of the national export total. See Figure OA.4.3 in the Appendix for the time-series evolution of this aggregate lockdown stringency index.

	(1) CPI Growth$_{pct}$	(2) Material$_{pct}$
$\widehat{Material}_{pct}$	0.081***	
	(0.017)	
China Dependence$_{pc,2019}$ $\times$ Lockdown Stringency$_t$		6.973***
		(0.339)
F-Test		423.17
Observations	9,187	9,187
R-squared		0.782
Controls	✓	✓
Product-country FE	✓	✓
Country-time FE	✓	✓

Table 3: Supply chain constraint pass-through to CPI: IV estimation. This table presents the estimation results from the IV specification. The subscript notation is defined as follows: p is a product, c is a country, and t is a quarter. The first stage results are shown in Column (2). The second stage results in Column (1). The dependent variables are the one-quarter ahead annual CPI growth at the product-country-time level in Column (1). *Material*, *Labor*, *Financial*, and *Other* measure the share of firms that indicate that their production is constrained by the respective constraint. All constraints are transformed from the industry-country-time level to the product-country-time level using input-output tables and the share of consumption that each industry contributes to the final household consumption of a particular product. *China Dependence* represents the share of inputs to produce product p in country c that are imported from China in 2019. *Lockdown Stringency* measures the severity of lockdown measures implemented in China's top-5 exporting provinces. Non-reported controls include the other perceived constraints to production (*Labor*, *Financial*, and *Other*) and, in addition, the interaction of *Energy Inflation* and *Energy Use*. *Energy Inflation* is the country-time level CPI index for energy. *Energy Use* is a product-country pair's energy input before the COVID-19 pandemic, measured in 2019 and scaled by the country's total energy use. We exclude the product "Energy" from the regression. Standard errors are double-clustered at the country-product and quarterly level. We report standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3 presents the results for the IV estimation. The first stage is in Column (2) and the second stage is in Column (1). The instrument has a positive and significant effect on the reported material frictions of European firms ($Material_{pct}$), with an F-statistic of 423 and a p-value below 0.01, confirming the *relevance* and the strength of the instrument. In the second-stage estimation, we replace the $Material_{pct}$ frictions with the predicted $\widehat{Material}_{pct}$ frictions from the first stage. The dependent variable is again the one-quarter ahead annual CPI growth at the product-country-time level. The IV estimated coefficients confirm the positive effect of an increase in the reported material frictions on CPI growth, suggesting a causal impact of supply chain disruptions on CPI growth.

These results on the pass-through of supply chain constraints on price levels are consistent with the evidence from research examining the recent supply-side disruptions in Europe

(Finck and Tillmann, 2022; Binici et al., 2022; Celasun et al., 2022).

3.2 Pass-through to higher inflation expectations

Despite their localized direct impact, supply-side constraints can generalize into broad-based inflation expectations.[8] This transmission works through two channels: the *experience* channel and the *news* channel. The experience channel operates through the observable effect of supply-side shocks on prices. Agents experiencing price increases tend to revise their inflation expectations, anticipating similar price movements in the future (Cavallo et al., 2017; D'Acunto et al., 2021). The news channel influences inflation expectations through information about economic developments that are perceived to have an impact on prices (Carroll, 2003; Dräger and Lamla, 2017; Larsen et al., 2021; Mazumder, 2021; Andre et al., 2024). For example, following reports about shipping container backlogs at Chinese ports, consumers may anticipate rising production costs and adjust their inflation expectations even before any observable price changes.

To provide evidence of a pass-through of supply chain constraints to household inflation expectations, we run three sets of empirical tests: (i) an analysis at the country-quarter level using BCS consumer survey data, (ii) an analysis at the household-quarter level using data from the ECB's CES, and (iii) expanding on the second, an analysis adding measures of households' awareness of past inflation and households' attention to supply chain disruptions.

Country-quarter level analysis. In the first set of tests, we examine the pass-through

[8] Figure OA.4.1 in the Appendix shows three snapshots of the distribution of one-year-ahead households' inflation expectations. Inflation expectations by households and firms shift to the right and become more fat-tailed in 2021 and especially 2022—mirroring past episodes where inflation expectations became unanchored (Reis, 2022b). Using a representative sample of the U.S. population, Andre et al. (2024) demonstrates that even in the U.S.—a country less exposed to supply-side shocks than Europe—households overwhelmingly identified supply-side factors as key drivers of the inflation surge in late 2021 and 2022.

Dependent variable: $\hat{\pi}^e_{ct}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\text{Material}_{ct} \times \text{Covid}_t$	1.187***							
	(0.175)							
$\text{Material}_{ct} \times 2020_t$		2.298***	2.416***	2.679***	2.766***	2.158***	1.804***	1.933***
		(0.374)	(0.373)	(0.400)	(0.395)	(0.386)	(0.562)	(0.534)
$\text{Material}_{ct} \times 2021_t$		0.900***	1.179***	1.105***	1.052***	0.889***	0.410*	0.556**
		(0.166)	(0.201)	(0.200)	(0.214)	(0.211)	(0.232)	(0.224)
$\text{Material}_{ct} \times 2022_t$		1.062***	1.147***	1.039***	0.963***	0.851***	0.507*	0.624**
		(0.164)	(0.153)	(0.171)	(0.181)	(0.182)	(0.280)	(0.242)
$\text{Food Inflation}_{ct}$			0.497***	0.343*	−0.057	−0.135	−0.126	
			(0.152)	(0.168)	(0.236)	(0.239)	(0.275)	
$\text{Energy Inflation}_{ct}$				0.142**	0.134**	0.125**	0.121***	
				(0.057)	(0.052)	(0.046)	(0.042)	
$\text{Core Inflation}_{ct}$					1.016*	1.159**	0.835	
					(0.504)	(0.483)	(0.535)	
$\text{High Perception}_{ct}$								0.154***
								(0.042)
Observations	305	305	305	305	305	305	305	305
R-squared	0.535	0.571	0.603	0.622	0.629	0.653	0.679	0.679
Other constraints						✓	✓	✓
Other constraints interacted							✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

Table 4: Supply chain constraint pass-through to household inflation expectations: Country-level evidence. This table presents estimation results from Specification (3) in Column (1) and the same specification with yearly time dummies in Columns (2)–(8). The subscript notation is defined as follows: c is a country and t is a quarter. The dependent variable is the share of households that believe consumer prices will increase more rapidly at the country-time level. *Covid* is a dummy equal to one for the period after the start of the COVID-19 pandemic (i.e., after and including 2020:Q2) and zero otherwise. *Material*, *Labor*, *Financial*, and *Other* measure the share of firms that indicate that their production is constrained by the respective constraint. All constraints are transformed from the industry-country-time level to the country-time level using the share of consumption that each industry contributes to the final household consumption. Non-reported controls include the other perceived constraints to production (*Labor*, *Financial*, and *Other*) uninteracted in Columns (6)–(8) and, in addition, these other constraints interacted with the three year dummies in Column (7) and (8). *Food Inflation*, *Energy Inflation*, and *Core Inflation* are the country-time level CPI indices for food, energy, and core, respectively. *High Perception* is the share of households at the country-time level that believe prices have risen a lot over the last 12 months. Standard errors are double-clustered at the country and quarterly level and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

of supply chain constraints to household inflation expectations at the *country-quarter level* using the following specification:

$$\hat{\pi}^e_{ct} = \beta_1 Material_{ct} + \beta_2 Material_{ct} \times Covid_t + \beta_3 Food\ Inflation_{ct} + \beta_4 Energy\ Inflation_{ct} \\ + \beta_5 Core\ Inflation_{ct} + \beta_6 High\ Perception_{ct} + Other\ Constraints_{ct} + \nu_c + \epsilon_{ct}. \tag{3}$$

The dependent variable is the share of households in country c that believe consumer prices will increase more rapidly. We control for realized inflation, and alternatively directly for households' perceptions of past inflation (*High Perception*$_{ct}$), since the literature has identified households' beliefs about the inflation over the recent past as strong predictor of their inflation forecast (Ranyard et al., 2008). Furthermore, we decompose realized inflation into core, energy, and food inflation, given that the latter two have been highlighted by the literature as particularly strong drivers of household inflation expectations (Coibion and Gorodnichenko, 2015; D'Acunto et al., 2019; Cavallo et al., 2017; D'Acunto et al., 2021; Wong, 2015). In our most stringent specification, we additionally include year interactions for all our controls.

Table 4 presents the estimation results for this test, where in the different specifications we incorporate an increasingly rigorous set of controls. The regression results for the specification without controls (Column (1)) suggest a strong effect of supply chain disruptions on household inflation expectations. Even after including controls for the experience channel—namely realized inflation and households' perception about past inflation (the latter being the most precise control for the experience channel)—the correlation between material input constraints and household inflation expectations remains. However, its magnitude declines by approximately 40-50% for 2021 and 2022 in the more stringent specifications (Columns (7)–(8)), providing evidence that the experience channel plays an important role in shaping household inflation expectations. Importantly, a positive correlation remains even after controlling for the experience channel, which suggests that the news channel also contributes to shaping household inflation expectations.

Overall, these results show that supply chain disruptions are positively associated with household inflation expectations. Based on the estimates in Column (8), a one standard deviation higher supply chain constraint in 2021 increases the share of households who believe that prices will increase more rapidly by 4pp, which is sizable given that the average share of households who think that prices will increase more rapidly is 23% in 2021.

To further substantiate the causal link between supply chain disruptions and rising household inflation expectations, we again run an IV estimation following our approach from

	(1) $\hat{\pi}^e_{ct}$	(2) Material$_{pct}$
$\widehat{Material}_{pct}$	2.371***	
	(0.496)	
China Dependence$_{pc}$ × Lockdown Stringency$_t$		2.973***
		(0.612)
F-Test		23.6
Observations	305	305
R-squared		0.738
Controls	✓	✓
Country FE	✓	✓

Table 5: Supply chain constraint pass-through to household inflation expectations: IV estimation. This table presents the estimation results from the IV specification. The subscript notation is defined as follows: p is a product, c is a country, and t is a quarter. The first stage result is shown in Column (2). The second stage results in Column (1). The dependent variable is the share of households that believe consumer prices will increase more rapidly at the country-time level in Column (1). *Material*, *Labor*, *Financial*, and *Other* measure the share of firms that indicate that their production is constrained by the respective constraint. All constraints are transformed from the industry-country-time level to the product-country-time level using input-output tables and the share of consumption that each industry contributes to the final household consumption of a particular product. *China Dependence* represents the share of inputs to produce product p in country c that are imported from China in 2019. *Lockdown Stringency* measures the severity of lockdown measures implemented in China's top-5 exporting provinces. Non-reported controls include the other perceived constraints to production (*Labor*, *Financial*, and *Other*) and, in addition, the interaction of *Energy Inflation* and *Energy Use*. *Energy Inflation* is the country-time level CPI index for energy. *Energy Use* is a product-country pair's energy input before the COVID-19 pandemic, measured in 2019 and scaled by the country's total energy use. Standard errors are double-clustered at the country and quarterly level. We report standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Section 3.1. As before, we use the interaction between a market's *China Dependence*$_{pc}$ and *Lockdown Stringency*$_t$ as our instrumental variable. The dependent variable here is the share of households that believe consumer prices will increase more rapidly. Table 5 presents the results. The IV estimated coefficients confirm the positive, plausibly causal, effect of an increase in the prevalence of reported supply chain frictions on inflation expectations.

Household-quarter level analysis. The second set of tests is based on the *household-quarter level* data from ECB's CES, which allows us to observe households' short-term (one-year ahead) and longer term (three-year ahead) inflation expectations. Consequently, we employ the following two dependent variables. First, a dummy variable set to one if household h anticipates a significant price increase over the next 12 months. Second, a dummy variable set to one if household h expects a substantial price rise during the 12-month period starting two years from now and ending three years from now.

Figure OA.4.4 in the Appendix shows that while the rise in inflation expectations is more pronounced for short-term expectations, there is also a notable increase in long-term expectations—suggesting that households' perceptions of inflation is not only a transient concern but a more entrenched expectation. To formally gauge the impact of supply chain disruptions on inflation expectations at the household-quarter level, we estimate the following specification:

$$\begin{aligned}\hat{\pi}^{e}_{hct} =& \beta_1 Material_{ct} + \beta_2 Food\ Inflation_{ct} + \beta_3 Energy\ Inflation_{ct} + \beta_4 Core\ Inflation_{ct} \\ &+ \beta_5 High\ Perception_{hct} + Other\ Constraints_{ct} + \mu_{hc} + \epsilon_{hct},\end{aligned} \tag{4}$$

where h is a household, c is a country, and t is a quarter. As in the previous tests, we control for realized inflation and alternatively for households' perception about inflation in the last 12 months (now at the household-time level).

The estimation results in Table 6 confirm the positive association between supply chain constraints and households' inflation expectations, both for their short-term (Panel A) and long-term (Panel B) expectations. For instance, the results in Column (5) of Panel A suggest that increasing the share of firms reporting material frictions from the 10th to the 90th percentile during the COVID-19 period leads to a 9.5pp higher probability for a household to believe prices will increase lot in the following year. This corresponds to 31% of the average share of households thinking inflation will increase a lot. Similarly, the results in Column (6) suggest a 4pp higher probability for a household to believe prices will increase lot in the following year, corresponding to 14% of the average share of households thinking inflation will increase a lot.

Moreover, we observe a similar pattern as in the country-level analysis: controlling for the experience channel—through realized and perceived inflation—reduces the effect size, indicating that the experience channel plays an important role. However, a correlation persists even in the most stringent specifications, again suggesting that the news channel

Panel A: Short-Term Expectations ($\hat{\pi}^{e,ST}_{hct}$)	(1)	(2)	(3)	(4)	(5)	(6)
Material$_{ct}$	0.951***	0.593***	0.296***	0.261***	0.281***	0.110**
	(0.037)	(0.034)	(0.041)	(0.041)	(0.059)	(0.050)
Food Inflation$_{ct}$		1.715***	1.359***	0.949***	1.032***	
		(0.050)	(0.050)	(0.067)	(0.088)	
Energy Inflation$_{ct}$			0.192***	0.175***	0.158***	
			(0.011)	(0.011)	(0.013)	
Core Inflation$_{ct}$				1.468***	1.731***	
				(0.201)	(0.207)	
Perceived (realized) Inflation$_{hct}$						1.178***
						(0.030)
Observations	126,080	126,080	126,080	126,080	126,080	126,080
R-squared	0.512	0.526	0.530	0.530	0.531	0.539

Panel B: Long-Term Expectations ($\hat{\pi}^{e,LT}_{hct}$)	(1)	(2)	(3)	(4)	(5)	(6)
Material$_{ct}$	0.242***	0.157***	0.097***	0.082***	0.110***	0.100***
	(0.019)	(0.020)	(0.023)	(0.024)	(0.038)	(0.034)
Food Inflation$_{ct}$		0.410***	0.338***	0.160***	0.212***	
		(0.037)	(0.040)	(0.061)	(0.071)	
Energy Inflation$_{ct}$			0.039***	0.031***	0.025***	
			(0.009)	(0.009)	(0.010)	
Core Inflation$_{ct}$				0.636***	0.747***	
				(0.162)	(0.173)	
Perceived (realized) Inflation$_{hct}$						0.518***
						(0.023)
Observations	126,080	126,080	126,080	126,080	126,080	126,080
R-squared	0.498	0.499	0.499	0.500	0.500	0.504
Other constraints					✓	✓
Household FE	✓	✓	✓	✓	✓	✓

Table 6: Supply chain constraint pass-through to household inflation expectations: Household-level evidence. This table presents estimation results from Specification (4). The subscript notation is defined as follows: h is a household, c is a country, and t is a quarter. The dependent variables are a household-time level dummy equal to one if household h believes prices will increase a lot over the next 12 month in Panel A and equal to one if household h believes prices will increase a lot over the 12-month period between current year+2 and current year+3 in Panel B. *Material*, *Labor*, *Financial*, and *Other* measure the share of firms that indicate that their production is constrained by the respective constraint. All constraints are transformed from the industry-country-time level to the country-time level using the share of consumption that each industry contributes to the final household consumption. Non-reported controls include the other perceived constraints to production (*Labor*, *Financial*, and *Other*) in Columns (5)–(6). *Food Inflation*, *Energy Inflation*, and *Core Inflation* are the country-time level CPI indices for food, energy, and core, respectively. *Perceived (realized) Inflation* is household h's perception about the inflation over the last 12 months. Standard errors are clustered at the country-demographics level and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

also contributes to shaping household inflation expectations.

The results in Panel B for long-term household inflation expectations show a qualitatively similar but a quantitatively smaller effect to that for short-term expectations in Panel A. However, when controlling for realized inflation and households' perceptions of past inflation, the effect sizes become more comparable. This suggests that the experience channel exerts a stronger influence on short-term expectations, while the effect of the news channel seems to be more uniform across short-term and long-term expectations. This finding suggests an important role of the news channel in the unanchoring of household inflation expectations, which we explore next.

Household-quarter level analysis with interactions. In the third set of tests, we extend our analysis at the *household-quarter level* to explore the mechanisms through which the COVID-induced supply shocks shaped households' inflation expectations. Specifically, we augment Specification (4) with two additional explanatory variables that serve as proxies for (i) households' awareness of realized inflation during the initial cost-push phase and (ii) households' exposure to salient information about supply chain disruptions, conveyed through news media, peer discussions, interactions with employers, and similar channels.

Households with greater awareness of inflationary pressures caused by supply-side frictions are more likely to incorporate these perceptions into their inflation expectations (Link et al., 2024). To capture this awareness, we calculate the *within-household* correlation between households' reported point estimates of headline inflation over the previous 12 months and actual inflation rates for the period 2020:Q2–2022:Q4. Using this metric, we construct a binary variable, $Awareness_{hc}$, which equals one for households whose correlation exceeds the sample median.

The news channel suggests that households' exposure to salient information about supply chain shocks influences their inflation expectations. To assess this exposure, we leverage Google Trends data—a widely used proxy for information acquisition in the social sciences

(Choi and Varian, 2012; Korenok et al., 2022; Link et al., 2024; Fetzer et al., 2021).[9] Specifically, we construct the variable $Google_{ct}$, which measures the intensity of Google searches for "delays in shipping" at the country-level, serving as a proxy for households' exposure to and engagement with salient information about supply-side shocks.[10] For this analysis, we focus on Germany, Italy, France, and Spain—the European countries with a sufficient volume of relevant searches.[11]

The coefficient for $Material_{ct} \times Awareness_{hc}$ in Columns (1) of Table 7 show that households more aware of realized inflation during the initial cost-push phase of the COVID-19 supply shock expect a more significant increase in CPI growth in response to escalating supply chain constraints. Column (2) confirms this result for a specification in which we additionally control for country-quarter fixed effects, which account for other country-specific factors influencing household inflation expectations, including realized inflation. Column (3) highlights a stronger correlation between reported supply chain disruptions and household inflation expectations in countries with greater exposure to salient information about supply chain disruptions as reflected in the significant coefficient on $Material_{ct} \times Google_{ct}$.

Finally, Columns (4) and (5) report results for specifications including interaction terms of $Material_{ct}$ jointly with both $Awareness_{hc}$ and $Google_{ct}$, which show that the relationship between households' awareness of realized inflation during the initial cost-push phase and supply chain shocks is stronger in countries with greater exposure to salient information about supply chain disruptions. These results suggest that the positive association between

[9] Google Trends quantifies the search intensity for specific terms as a relative measure of search interest, where a value of 100 represents the peak popularity of the term for the specified region and time.

[10] This variable reflects heightened awareness and concern that drive the demand for additional information. Unlike metrics based on news article counts, it captures a wider range of information channels, including informal interactions with coworkers, peers, and social networks.

[11] We search for "Lieferschwierigkeiten" and "Lieferengpasse" for Germany, "tempi consegna" for Italy, "tiempo entrega" for Spain, and "delai de livraison" for France. These words maximize the number of searches available.

Dependent variable: $\hat{\pi}^e_{hct}$	(1)	(2)	(3)	(4)	(5)
Material$_{ct}$	−0.461***		0.067	−0.260**	
	(0.052)		(0.081)	(0.110)	
Material$_{ct}$ × Awareness$_{hc}$	1.547***	1.209***		0.694***	0.503***
	(0.048)	(0.047)		(0.152)	(0.120)
Material$_{ct}$ × Awareness$_{hc}$ × Google$_{ct}$				1.408***	1.308***
				(0.275)	(0.220)
Google$_{ct}$			−0.254***	−0.230***	
			(0.033)	(0.035)	
Material$_{ct}$ × Google$_{ct}$			0.882***	0.099	
			(0.138)	(0.177)	
Awareness$_{hc}$ × Google$_{ct}$				−0.089	−0.172***
				(0.057)	(0.042)
Food Inflation$_{ct}$	1.020***		1.205***	1.156***	
	(0.084)		(0.097)	(0.093)	
Energy Inflation$_{ct}$	0.139***		0.095***	0.090***	
	(0.013)		(0.018)	(0.017)	
Core Inflation$_{ct}$	2.027***		2.476***	2.695***	
	(0.202)		(0.282)	(0.268)	
Perceived (realized) Inflation$_{hct}$		0.849***			0.841***
		(0.028)			(0.026)
Observations	122,096	122,096	106,144	102,551	103,088
R-squared	0.534	0.554	0.536	0.539	0.556
Other constraints	✓		✓	✓	
Country-time		✓			✓
Household	✓	✓	✓	✓	✓

Table 7: Supply chain constraint pass-through to household inflation expectations: Interactions with household characteristics. This table presents estimation results from Specification (4). The subscript notation is defined as follows: h is a household, c is a country, and t is a quarter. The dependent variable is a household-time level dummy equal to one if household h believes prices will increase a lot over the next 12 month. *Material*, *Labor*, *Financial*, and *Other* measure the share of firms that indicate that their production is constrained by the respective constraint. All constraints are transformed from the industry-country-time level to the country-time level using the share of consumption that each industry contributes to the final household consumption. *Awareness* is a dummy equal to one for households with an above median within household correlation between realized inflation over the last 12 months and the household's inflation estimate for the last 12 months. *Google* is a country-time level variable measuring the intensity of Google searches for "delays in shipping" (in the respective country's language). Non-reported controls include the other perceived constraints to production (*Labor*, *Financial*, and *Other*) in Columns (1), (3), and (4). *Food Inflation*, *Energy Inflation*, and *Core Inflation* are the country-time level CPI indices for food, energy, and core, respectively. *Perceived (realized) Inflation* is household h's perception about the inflation over the last 12 months. Standard errors are clustered at the country-demographics level and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

supply chain constraints and household inflation expectations is driven by households that are more aware of inflation trends and are more exposed to salient information about supply chain disruptions. This evidence is consistent with other recent research showing an increase in the degree of attention and awareness about the aggregate price level for higher levels of inflation (Cavallo et al., 2017; Bracha and Tang, 2022; Korenok et al., 2022; Pfäuti, 2022; Weber et al., 2023). Table OA.3.1 in the Appendix shows that the results from Table 7 are robust to including interaction terms between the variable *Awareness* and the different inflation categories—namely, food, energy, and core inflation—as well as perceived inflation.

In sum, the findings in this section indicate that the supply chain pressures in the period after the outbreak of the COVID-19 pandemic influenced household inflation expectations through *both* the experience and the news channel.

4 Generalization into broad-based inflation

As discussed in Section 2.2, higher household inflation expectations may be associated with a lower price elasticity of demand as firms can hide behind the aggregate costs and price uncertainty to sustain higher markups without risking a considerable decline in sales. This dynamic provides even firms not affected by supply-side constraints the leeway to raise prices, potentially contributing to a broader generalization of inflation.

Baseline spillover analysis. To isolate and test this mechanism, we next compare the CPI growth in product-country pairs (hereafter termed "markets") not materially affected by supply chain disruptions, across countries with varying degrees of aggregate (country-time level) growth in inflation expectations. Specifically, we focus on the CPI growth of service-based products, which were largely unaffected by supply chain constraints during the pandemic, across countries that exhibit varying increases in inflation expectations. To this end, we estimate the following "spillover specification":

$$
\begin{aligned}
\mathit{CPI\ Growth}_{pct+1} = {} & \beta_1 \mathit{Service}_{pc} \times \mathit{High\ Infl\ Exp}_c + \sum_{\tau=20,21,22} \beta_{2\tau} \mathit{Service}_{pc} \times \mathit{Year}_\tau \\
& + \sum_{\tau=20,21,22} \beta_{3\tau} \mathit{Service}_{pc} \times \mathit{High\ Infl\ Exp}_c \times \mathit{Year}_\tau \\
& + \mathit{Controls} + \nu_{ct} + \theta_{pc} + \epsilon_{cpt}, \qquad (5)
\end{aligned}
$$

where p is a product, c is a country, and t is a quarter. The dependent variable is the one-quarter ahead annual CPI growth for a product-country pair and *Year* is a set of year dummy variables. $Service_{pc}$ is the time-invariant contribution of service sectors to the consumption of product p in country c.[12] $High\ Infl\ Exp_c$ is an indicator equal to one if the increase in the share of households expecting prices to rise more rapidly is above the median in a country between 2021:Q1 and 2022:Q1.

We also include country-time and product-country fixed effects, as well as the following set of control variables: the constraints to production other than the material constraint mostly relevant for manufacturing firms ($Labor_{ct}$, $Financial_{ct}$, and $Other_{ct}$) interacted with the three year dummies, and $Energy\ Inflation_{ct}$ interacted with the $Service_{pc}$ variable and the three year dummies. Finally, we exclude the product "Energy" from the sample. Controlling for the $Energy\ Inflation_{ct}$ interactions and excluding the product "Energy" alleviates concerns about bias coming from the rise in energy inflation during our sample period—due to manifestation of pent-up demand in 2021 and notably after the Russian invasion of Ukraine in March 2022, which severely affected energy supply to several European countries.

The estimation results in Table 8 present evidence consistent with a generalization of inflation going from markets affected by supply-side constraints to more service-oriented markets, which are less affected, or not affected at all, by these constraints. In line with supply chain constraints being passed through to higher consumer prices in the manufacturing sector, the first three rows of Column (1) show that more service-oriented markets have a lower CPI growth than more manufacturing-based markets in the same country. However, the coefficient for the interaction of $Service_{pc} \times High\ Infl\ Exp_c$ with the year 2022 confirms that the CPI growth of service-oriented markets tends to be higher in 2022 when inflation

[12] We use the BCS classification to identify service sectors and obtain the service sector contribution to consumption from the COICOP-CPA matrix from Cai and Vandyck (2020).

Dependent variable: CPI Growth$_{pct+1}$	(1)	(2)	(3)	(4)
Specification	Full Sample Baseline	Demand 1-Digit	Lockdown Intensity	Household Expenditure
Service$_{pc}$ × 2020$_t$	−0.246	−0.454	0.121	0.047
	(0.669)	(0.517)	(0.704)	(0.616)
Service$_{pc}$ × 2021$_t$	−2.219***	−3.230***	−2.379***	−1.871**
	(0.675)	(0.783)	(0.805)	(0.709)
Service$_{pc}$ × 2022$_t$	−4.709***	−3.874***	−4.933***	−4.789***
	(0.903)	(0.884)	(0.990)	(0.983)
Service$_{pc}$ × High Infl Exp$_c$ × 2020$_t$	−1.256	−1.627*	−1.212*	−1.315*
	(0.787)	(0.835)	(0.691)	(0.671)
Service$_{pc}$ × High Infl Exp$_c$ × 2021$_t$	0.106	−0.286	0.131	0.394
	(0.734)	(0.976)	(0.732)	(0.725)
Service$_{pc}$ × High Infl Exp$_c$ × 2022$_t$	2.675**	2.806**	2.755**	2.779**
	(1.073)	(1.241)	(1.083)	(1.068)
Service$_{pc}$ × Energy Inflation$_{ct}$ × 2020$_t$	0.065	0.093	0.049	0.073
	(0.063)	(0.058)	(0.049)	(0.050)
Service$_{pc}$ × Energy Inflation$_{ct}$ × 2021$_t$	0.001	0.065	0.004	0.006
	(0.038)	(0.039)	(0.036)	(0.037)
Service$_{pc}$ × Energy Inflation$_{ct}$ × 2022$_t$	−0.047	−0.001	−0.041	−0.034
	(0.036)	(0.028)	(0.034)	(0.033)
Service$_{pc}$ × Energy Inflation$_{ct}$	0.042	0.004	0.036	0.036
	(0.034)	(0.030)	(0.031)	(0.031)
Energy Use$_{pc}$ × Energy Inflation$_{ct}$	1.467***	1.298***	1.480**	1.476***
	(0.268)	(0.252)	(0.505)	(0.480)
Observations	8,099	7,262	8,051	8,051
R-squared	0.580	0.776	0.579	0.533
Other constraints	✓	✓	✓	✓
Other constraints interacted	✓	✓	✓	✓
Lockdown intensity control			✓	
Household expenditure control				✓
Country-time FE	✓	✓	✓	✓
Product-country FE	✓	✓	✓	✓
1-digit product-country-time FE		✓		

Table 8: Pass-through of supply chain constraints to generalized inflation. This table presents estimation results from Specification (5). The subscript notation is defined as follows: p is a product, c is a country, and t is a quarter. The dependent variable is the one-quarter ahead annual CPI growth at the product-country level. *Material*, *Labor*, *Financial*, and *Other* measure the share of firms that indicate that their production is constrained by the respective constraint. All constraints are transformed from the industry-country-time level to the country-time level using the share of consumption that each industry contributes to the final household consumption. *Service* is the time-invariant contribution of service sectors to the consumption of product p in country c. *High Infl Exp* is an indicator equal to one if the increase in the share of households expecting that prices will rise more rapidly is above the median in a country between 2021:Q1 and 2022:Q1. In Column (2), we additionally include product-country-time fixed effects, using the 1-digit COICOP level as product category. Non-reported controls include the other perceived constraints to production (*Labor*, *Financial*, and *Other*) uninteracted and, in addition, these other constraints interacted with the three year dummies. In Column (3), we additionally control for the country-level severity of lockdown measures in 2021, as well as for its double and triple interactions with *Service* and the different year dummies. In Column (4), we additionally control for the final consumption expenditure of households at the product-country-time level. *Energy Inflation* is the country-time level CPI index for energy. *Energy Use* is an industry-country pair's energy input before the COVID-19 pandemic, measured in 2019 and scaled by the country's total energy use. We exclude the product "Energy" from the regression. Standard errors are double-clustered at the country-product and quarterly level and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

expectations significantly increased in the respective country, relative to similar markets in countries that experienced a less pronounced increase in inflation expectations. Moreover, the coefficients for $Service_{pc}$ × $Energy\ Inflation_{ct}$ interacted with the three post-COVID years in Column (1) of Table 8 indicate that energy prices do not seem to substantially affect the differential CPI growth rates between service- and manufacturing-oriented markets. This observation implies that energy prices are unlikely to be the driver of the spillover and generalization of inflation that we are documenting.

In Columns (2)–(4), we conduct three tests to rule out that the generalization of inflation is not merely a result of demand shocks. In Column (2), we additionally incorporate product-country-time fixed effects, using the 1-digit COICOP as product category. These fixed effects control for the impact of demand shocks affecting broad product categories. In Column (3), we further control for the country-level severity of lockdown measures in 2021 (using OxCGRT's COVID-19 Stringency Index) as a proxy for pent-up demand for services. Finally, in Column (4), we control for the final consumption expenditure of households at the product-country-time level, employing data from Eurostat at the 2-digit COICOP level. This variable helps control for shifts in demand across different product categories.

Influence of market power. Columns (1) and (2) of Table 9 show estimation results in the subsamples of *High Market Power* and *Low Market Power* markets, which consist of industry-country pairs with an above and below median average markup in 2018, respectively.[13] The results show that the generalization into broad-based inflation is driven by markets with high market power, consistent with service firms with pricing power enabling inflation to generalize as they extract higher markups in an environment of heightened household inflation expectations.

[13] We obtain average markups at the industry-country level from the 9th vintage of the CompNet database.

Dependent variable: CPI Growth$_{pct+1}$	(1)	(2)	(3)	(4)
Sample	High Mkt Power Markets	Low Mkt Power Markets	High Bargaining Countries	Low Bargaining Countries
Service$_{pc}$ × 2020$_t$	−0.728	0.460	−0.581	−0.669
	(1.203)	(0.928)	(0.821)	(1.127)
Service$_{pc}$ × 2021$_t$	−3.156***	−1.389	−1.528**	−2.657**
	(1.173)	(1.149)	(0.747)	(1.082)
Service$_{pc}$ × 2022$_t$	−5.406***	−4.885***	−4.615***	−4.788***
	(1.310)	(1.852)	(1.209)	(1.404)
Service$_{pc}$ × High Infl Exp$_c$ × 2020$_t$	0.550	−1.634	−0.221	−2.399
	(1.006)	(1.532)	(0.789)	(2.039)
Service$_{pc}$ × High Infl Exp$_c$ × 2021$_t$	1.503	−1.921	−0.568	−0.079
	(1.242)	(1.358)	(0.842)	(1.659)
Service$_{pc}$ × High Infl Exp$_c$ × 2022$_t$	4.445**	0.029	2.111*	3.336*
	(1.788)	(1.995)	(1.245)	(2.012)
Service$_{pc}$ × Energy Inflation$_{ct}$ × 2020$_t$	0.041	−0.054	0.003	0.236
	(0.103)	(0.108)	(0.077)	(0.320)
Service$_{pc}$ × Energy Inflation$_{ct}$ × 2021$_t$	0.020	−0.088	−0.011	0.037
	(0.068)	(0.060)	(0.036)	(0.166)
Service$_{pc}$ × Energy Inflation$_{ct}$ × 2022$_t$	−0.065	−0.083	−0.035	−0.012
	(0.067)	(0.057)	(0.034)	(0.165)
Service$_{pc}$ × Energy Inflation$_{ct}$	0.061	0.085	0.027	0.028
	(0.061)	(0.054)	(0.031)	(0.162)
Energy Use$_{pc}$ × Energy Inflation$_{ct}$	1.077***	1.437***	1.213***	2.580***
	(0.385)	(0.343)	(0.282)	(0.879)
Observations	3,645	3,430	5,062	3,037
R-squared	0.604	0.630	0.513	0.630
Other constraints	✓	✓	✓	✓
Other constraints interacted	✓	✓	✓	✓
Country-time FE	✓	✓	✓	✓
Product-country FE	✓	✓	✓	✓

Table 9: Pass-through of supply chain constraints to generalized inflation. This table presents estimation results from Specification (5). The subscript notation is defined as follows: p is a product, c is a country, and t is a quarter. The dependent variable is the one-quarter ahead annual CPI growth at the product-country level. *Material*, *Labor*, *Financial*, and *Other* measure the share of firms that indicate that their production is constrained by the respective constraint. All constraints are transformed from the industry-country-time level to the country-time level using the share of consumption that each industry contributes to the final household consumption. *Service* is the time-invariant contribution of service sectors to the consumption of product p in country c. *High Infl Exp* is an indicator equal to one if the increase in the share of households expecting that prices will rise more rapidly is above the median in a country between 2021:Q1 and 2022:Q1. *High Market Power* markets are defined as industry-country pairs with an above median average markup. *High Collective Bargaining* countries are countries with a share of employees covered by a collective agreement as a proportion of the number of eligible employees above 75%. Non-reported controls include the other perceived constraints to production (*Labor*, *Financial*, and *Other*) uninteracted and, in addition, these other constraints interacted with the three year dummies. *Energy Inflation* is the country-time level CPI index for energy. *Energy Use* is an industry-country pair's energy input before the COVID-19 pandemic, measured in 2019 and scaled by the country's total energy use. We exclude the product "Energy" from the regression. Standard errors are double-clustered at the country-product and quarterly level and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Testing for the influence of labor costs. Another potential concern is that the higher price levels in service-oriented markets in countries with rapidly rising inflation expectations might simply stem from firms anticipating a steeper rise in labor costs, driven by heightened household inflation expectations and subsequent wage hike demands (e.g., see Reis, 2023). To address this concern, we employ the OECD/AIAS ICTWSS database, which includes an adjusted collective bargaining coverage rate, defined as the number of employees covered by a collective agreement in force as a proportion of the total number of employees minus the number of employees legally excluded from the right to bargain.

We then re-estimate Specification (5) separately in the subsample of high collective bargaining countries (collective bargaining coverage rate above 75%) and low collective bargaining countries (collective bargaining coverage rate below 75%).[14] Columns (3) and (4) of Table 9 report the results for this sample split, showing that the estimated coefficients are similar across the two subsamples, suggesting that the generalization into broad-based inflation does not seem to be primarily driven by firms anticipating a rise in labor costs.

Controlling for spillovers along the supply chain. Another potential concern is that the observed generalization of inflation from markets directly affected by supply-side constraints to those less impacted is, at least partially, driven by spillover effects along the supply chain. Specifically, disruptions in production among upstream suppliers can cascade downstream, influencing the prices of final goods sold to consumers. This dynamic might bias our results if more service-oriented product-country pairs tend to be markets that are initially less impacted by supply-side shocks in the early post-COVID period, yet are indirectly affected later due to their reliance on upstream suppliers who experience these shocks.

To check whether our findings are affected by this dynamic, we expand the analysis from

[14]We have set the threshold for the sample split to 75% since the distribution of the collective bargaining coverage rate across countries is clustered into two distinct groups as shown in Figure OA.4.5 in the Appendix: countries that all have a coverage ratio below 57% and countries that all have a coverage ratio above 77%.

Dependent variable: CPI Growth$_{pct+1}$	(1)	(2)	(3)	(4)
Service$_{pc}$ × 2020$_t$	−0.330	−0.226	−0.529	−0.473
	(0.774)	(0.765)	(0.733)	(0.727)
Service$_{pc}$ × High Infl Exp$_c$ × 2020$_t$	−1.307*	−1.327*	−1.290	−1.307*
	(0.783)	(0.781)	(0.784)	(0.784)
Service$_{pc}$ × 2021$_t$	−0.996	−1.050	−1.254*	−1.279*
	(0.676)	(0.678)	(0.662)	(0.664)
Service$_{pc}$ × High Infl Exp$_c$ × 2021$_t$	−0.139	−0.122	−0.108	−0.121
	(0.721)	(0.720)	(0.720)	(0.722)
Service$_{pc}$ × 2022$_t$	−4.361***	−4.374***	−4.630***	−4.641***
	(1.097)	(1.099)	(1.100)	(1.102)
Service$_{pc}$ × High Infl Exp$_c$ × 2022$_t$	2.624**	2.610**	2.657**	2.695**
	(1.075)	(1.077)	(1.076)	(1.085)
Service$_{pc}$ × Energy Inflation$_{ct}$	0.035	0.033	0.034	0.031
	(0.033)	(0.033)	(0.033)	(0.034)
Service$_{pc}$ × Energy Inflation$_{ct}$ × 2020$_t$	0.062	0.133*	0.059	0.087
	(0.063)	(0.074)	(0.063)	(0.065)
Service$_{pc}$ × Energy Inflation$_{ct}$ × 2021$_t$	0.029	0.035	0.033	0.039
	(0.038)	(0.042)	(0.038)	(0.040)
Service$_{pc}$ × Energy Inflation$_{ct}$ × 2022$_t$	−0.038	−0.036	−0.037	−0.032
	(0.036)	(0.038)	(0.036)	(0.036)
Energy Use$_{pc}$ × Energy Inflation$_{ct}$	1.479***	1.293**	1.472***	1.275***
	(0.270)	(0.562)	(0.270)	(0.361)
Material Supply$_{pcx}$ × 2020$_t$	−0.001	0.013	−0.055	−0.043
	(0.070)	(0.070)	(0.058)	(0.058)
Material Supply$_{pcx}$ × 2021$_t$	0.127***	0.123***	0.140***	0.138***
	(0.025)	(0.025)	(0.027)	(0.027)
Material Supply$_{pcx}$ × 2022$_t$	0.030	0.029	0.011	0.009
	(0.036)	(0.037)	(0.035)	(0.035)
Energy Use Supply$_{pc}$ × Energy Inflation$_{cx}$ × 2020		8.181**		4.652
		(3.634)		(2.944)
Energy Use Supply$_{pc}$ × Energy Inflation$_{cx}$ × 2021		0.682		0.981
		(1.660)		(1.521)
Energy Use Supply$_{pc}$ × Energy Inflation$_{cx}$ × 2022		0.087		0.596
		(1.441)		(1.082)
Timing of supply constraint	$x = t$	$x = t$	$x = t - 1$	$x = t - 1$
Observations	8,099	8,099	8,099	8,099
R-squared	0.583	0.584	0.582	0.583
Other constraints	✓	✓	✓	✓
Other constraints interacted	✓	✓	✓	✓
Country-time FE	✓	✓	✓	✓
Product-country FE	✓	✓	✓	✓

Table 10: Pass-through of supply chain constraints to generalized inflation with controls for spillovers along the supply chain. This table extends the baseline analysis from Table 8 by incorporating controls for supply chain spillovers. Column (1) introduces interactions with *Material Supply*, which measures the share of firms that indicate that their production is constrained by material input constraints in year $x = t$ among the suppliers that provide input goods to firms that sell product p in country c in year t. Column (2) further includes controls for the energy cost exposure in year t of the suppliers that provide input goods to firms that sell product p in country c in year t. Columns (3) and (4) replicate the analysis of Columns (1) and (2), respectively, but with variables lagged by one year (i.e., $x = t - 1$). Standard errors are double-clustered at the country-product and quarterly level and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 8 by incorporating controls for such supply shock spillovers. To control for spillovers along the supply chain caused by material input disruptions, we add *Material Supply*, which measures the share of suppliers facing material shortages in year t, supplying to firms selling product p in country c in the same year. The results in Column (1) of Table 10 indicate that, while increased material input constraints among suppliers correlate with higher price growth in the products they supply, the generalization effect remains unchanged, as indicated by the coefficient of $Service_{pc} \times High\ Infl\ Exp_c \times 2022$.

Column (2) shows that the inflation generalization effect to the services sector is also robust to controlling for spillovers along the supply chain caused by energy shocks. To this end, we add the control $Energy\ Use\ Supply_{pc} \times Energy\ Inflation_{ct}$, which captures the impact of rising energy costs on the production of suppliers (we construct this variable as the product between the energy usage of suppliers and the growth in energy costs). In a last step, we incorporate again both supply chain spillover controls, but apply a one-quarter lag to accommodate a potential delay in the transmission of supply shocks through the supply chain. Columns (3) and (4) confirm that the generalization effect is robust to these lagged specifications.

Taken together, this evidence is consistent with inflation caused by supply-side shocks becoming more broad-based with time—shifting in particular from manufacturing to services—through the change in household inflation expectations and firms' pricing response to the resulting lower price elasticity of household demand.

5 The role of firms' pricing behavior

In this section, we employ two separate tests to examine the role of firms' pricing behavior in the generalization of inflationary pressures and how it is shaped by household inflation expectations, firms' pricing power, and their interaction. In Section 5.1, we use earnings call data and a Large Language Model (LLM) to link firms' ability to sustain higher markups and profit margins to lower price elasticity of demand, as reflected in references in company earnings call transcripts to higher pricing power and resilient demand, importantly only in countries with elevated household inflation expectations. In Section 5.2, we leverage firm-level financial data from Compustat Global to analyze how firms' pre-COVID pricing power influences their ability to raise markups in response to supply-side shocks and changes in household inflation expectations during the COVID-19 pandemic period.

5.1 Household inflation expectations and price elasticity

Company earnings calls are key events where executives provide insights into a firm's financial health, future outlook, and—most importantly for our analysis—strategic decisions, including pricing policies. Analyzing earnings calls allows us to assess how firms' pricing behavior is shaped by their exposure to supply-side disruptions, prevailing household inflation expectations, and resulting pricing power.

We obtain earnings call transcripts from the LSEG Workspace Transcripts & Briefs database. Our sample includes 27,163 transcripts from 2,414 firms, covering all quarters from 2019 to 2023. Each transcript consists of a presentation by company executives, followed by a Q&A session with analysts. To ensure consistency, we retain only the presentation portion, as it follows a standardized format across firms and focuses on comparable company-specific topics.[15] We further segment each transcript by speaker to reduce the LLM input length and analyze patterns within a call. The total number of speaker sections across all transcripts is 120,305, resulting in an average of 4.43 speaker sections per transcript.[16]

We employ an LLM to identify whether firms discuss price increases, when these increases

[15] In contrast, Q&A sessions introduce variability due to analyst-driven discussions.

[16] Note that each instance of a speaker's dialogue is treated as a separate section, even if the same speaker speaks multiple times.

occur, and the factors driving them, leveraging its capability of processing large volumes of textual data while preserving context and capturing relationships within the text (Vaswani et al., 2017).[17] Specifically, we use OpenAI's GPT-4o model and interact with it through the ChatCompletion API endpoint.[18] To ensure consistent formatting of the model's output, we specify a structured JavaScript Object Notation (JSON) output schema.[19] Each API request includes the following prompt, along with a speaker section of an earnings call transcript:

You are an economic analyst specializing in extracting nuanced insights from textual data. Your specialization is in understanding firms' ability to maintain or increase profit margins through time in an inflationary environment. You will be given a section of an earnings call transcript where the dialogue is segmented by speaker. Based only on the text provided, you must assign two scores: score one and score two.

score one *(single value):*

- *'1' if the company maintains or increases its overall profit margins (or overall profitability/markups).*
- *'0' if the company does not maintain or increase its profit margins (or overall profitability/markups).*
- *'na' if the company does not discuss its profit margins.*

score two *(one or more values):*

- *'1' if the company experiences or expects rising labor costs.*
- *'2' if the company experiences or expects rising input material costs.*

[17] Traditional text analysis techniques—such as keyword extraction, word counting, and rule-based sentiment analysis—often struggle to preserve context over long sequences and to capture complex relationships between words.

[18] We set the temperature to 0 to ensure deterministic behavior, meaning the model will always select the most probable next token in its output. This behavior is preferred for a classification task such as ours.

[19] The structured output feature enables users to define the expected format of the model's response.

- *'3' if the company experiences or expects rising energy costs.*
- *'4' if the company experiences or expects supply-chain disruptions.*
- *'5' if the company experiences or expects resilient demand.*
- *'6' if the company experiences or expects rising pricing power.*
- *'na' only if none of the other options are assigned.*

The values should only include the score and no additional text.

Based on these two scores, we construct two firm-time level indicator variables. First, to determine whether a firm was generally able to maintain or increase its markup in a given quarter, we define *High profit margin*$_{ijct}$ as an indicator variable equal to one for firm i in sector j in country c in quarter t if score one is equal to one for any of its earnings call sections in that quarter.

Second, to assess the extent to which a firm's ability to maintain or increase its markup is driven by its ability to sustain high prices (i.e., high pricing power) without significant losses in sales volume (i.e., resilient demand), we define *Low price elasticity*$_{ijct}$ as an indicator variable equal to one for firm i in quarter t if score one equals one and score two contains both values 5 (resilient demand) and 6 (high pricing power) but no other values. That is, the indicator equals one if a firm maintains or increases its markup solely due to resilient demand and pricing power, with no other contributing factors.

We verify that our LLM measures accurately capture firms' ability to sustain higher markups by regressing the estimated markup of firm i on its *High profit margin*$_{ijct}$ and *Low price elasticity*, while controlling for country-time and firm fixed effects. We estimate firm markups following De Loecker et al. (2020), which relies on the insight that the output elasticity of a variable production factor is only equal to its expenditure share in total revenue when price equals marginal cost of production. Under any form of imperfect competition, however, the relevant markup drives a wedge between the input's revenue share and its output elasticity. Table OA.3.2 in the Appendix shows a significant correlation between both indicator variables and firms' estimated markups, confirming that our LLM-based classifications align with actual firm pricing behavior.

Figure 4 plots the evolution of household inflation expectations alongside the share of companies with *Low price elasticity* equal to one over time. The top panel shows that the frequency with which firms report being able to maintain or increase profit margins due to pricing power and resilient demand begins to rise slightly ahead of household inflation expectations. Both measures peak in the first quarter of 2022, suggesting a potential link between firms' pricing power and household inflation expectations.

In the bottom panel, we plot the share of companies with *Low price elasticity* equal to one separately for firms in the service and manufacturing sectors. Interestingly, manufacturing firms increasingly report the ability to sustain higher profit margins due to high pricing power and resilient demand already beginning in late 2020, preceding the rise in household inflation expectations. In contrast, service sector firms only begin reporting higher profit margins due to lower price elasticity in parallel with rising household inflation expectations, consistent with inflation expectations reducing price sensitivity even in sectors unaffected by supply shocks, enabling these firms to raise markups.

Next, we parametrically analyze how firms in the service and manufacturing sectors differ over time in their ability to sustain higher profit margins due to a low price elasticity, depending on the evolution of household inflation expectations in their home country. To this end, we estimate the following regression at the industry-country-quarter level:

$$Low\ price\ sensitivity_{jct} = \sum_{\tau=20,21,22} \beta_{1\tau} Service_{pc} \times Year_{\tau} + \nu_{ct} + \theta_{jc} + \epsilon_{jct}, \tag{6}$$

where j is a sector, c is a country, and t is a quarter. *Low price sensitivity*$_{jct}$ is the average of firms' *Low price sensitivity*$_{ijct}$ across all firms within a given industry-country pair in quarter t. Table 11 presents the results. Columns (1) and (2) report estimates separately for firms in countries with high and low inflation expectations, respectively, where high inflation

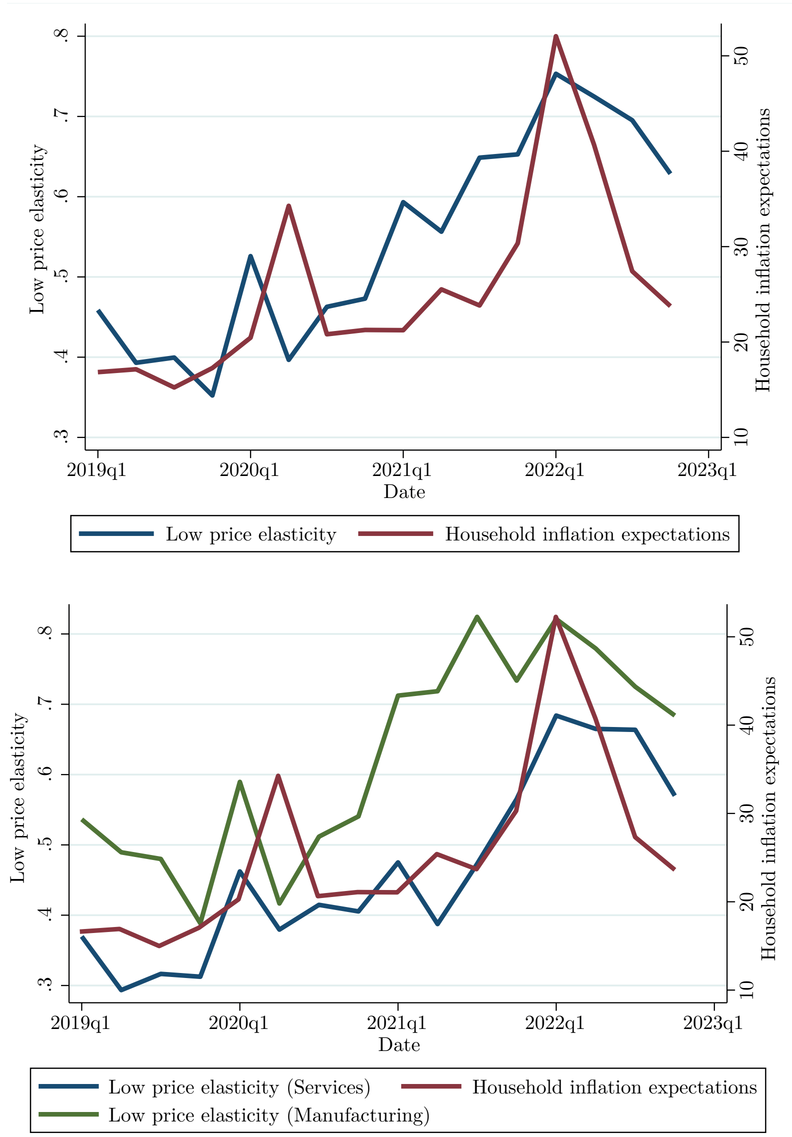


Figure 4: Price elasticity and household inflation expectations. The top panel shows the share of companies reporting that they are able to maintain or increase their overall profit margin solely due to high pricing power and resilient demand, which we label as *Low price elasticity* (blue line), alongside the share of households expecting prices to rise more rapidly over the next 12 months (red line). The bottom panel shows the share of companies stating to face low price elasticity separately for the service (blue line) and manufacturing sector (green line), again alongside the evolution of household inflation expectations (red line).

expectation countries are those where the increase in the share of households expecting prices to rise more rapidly between 2021:Q1 and 2022:Q1 is above the median. Column (3) presents the results for the full sample.

The findings are consistent with the evidence on the generalization of inflation in Section 4. In 2021, service firms in both high and low household inflation expectation countries were less able to sustain high profit margins due to low price elasticity compared to manufacturing firms. However, in 2022, service firms in high inflation expectation countries caught up, suggesting that rising inflation expectations strengthened their pricing power. In contrast, service firms in low-inflation expectation countries did not exhibit the same catch-up effect, reinforcing the role of inflation expectations in enabling firms to increase prices without experiencing significant declines in demand.

Overall, this evidence supports the notion that inflation expectations act as a transmission channel from localized to generalized inflationary pressures, lowering the price elasticity of consumer demand and enabling even firms not initially affected by supply-side shocks to sustain higher markups and prices.

5.2 Household inflation expectations and pricing power

Next, we leverage firm-level data from Compustat Global to further investigate how firms' pricing power and household inflation expectations contribute to the entrenchment and generalization of inflationary pressures. To evaluate whether firms' pricing power affects their markup policy in an environment of elevated household inflation expectations, we estimate

Dependent variable: Low price elasticity$_{jct}$	(1)	(2)	(3)
Sample	High Infl Exp	Low Infl Exp	Full
Service$_j$ x 2020	0.059	0.032	0.043
	(0.076)	(0.062)	(0.048)
Service$_j$ x 2021	-0.137*	-0.116**	-0.125***
	(0.070)	(0.052)	(0.042)
Service$_j$ x 2022	0.136**	0.017	0.065
	(0.069)	(0.062)	(0.046)
Observations	1,361	1,989	3,350
R-squared	0.403	0.383	0.392
Country-time FE	✓	✓	✓
Industry-country FE	✓	✓	✓

Table 11: Price elasticity and household inflation expectations. This table presents estimation results at industry-country-quarter level. The subscript notation is defined as follows: j is an industry, c is a country, and t is a quarter. The dependent variable *Low price sensitivity*$_{jct}$ is the average of firms' *Low price sensitivity*$_{ijct}$ across all firms within a given industry-country pair in quarter t. *Low price sensitivity*$_{ijct}$ is an indicator equal to one if a firm states it is able to maintain or increase its overall profit margin due to resilient demand and high pricing power, but not for other reasons such as rising labor costs, rising input material costs, rising energy costs, or supply-chain disruptions. Column (1) and (2) report the results for firms incorporated in high and low inflation expectation countries, respectively, while Column (3) reports the results for the full sample. *High Infl Exp* is an indicator equal to one if the increase in the share of households expecting that prices will rise more rapidly is above the median in a country between 2021:Q1 and 2022:Q1. Standard errors are clustered at the country-industry level and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

the following triple-interaction specification at the firm-quarter level:

$$\begin{aligned}
Markup_{ijct+1} = & \sum_{\tau=20,21,22} \beta_{1\tau} Markup^{2018}_{ijc} \times Constraint_{jct} \times Year_\tau \\
& + \sum_{\tau=20,21,22} \beta_{2\tau} Markup^{2018}_{ijc} \times High\ Infl\ Exp_{ct} \times Year_\tau \\
& + \beta_3 Markup^{2018}_{ijc} \times Constraint_{jct} + \beta_4 Markup^{2018}_{ijc} \times High\ Infl\ Exp_{ct} \\
& + \sum_{\tau=20,21,22} \beta_{5\tau} Markup^{2018}_{ijc} \times Year_\tau + \beta_6 Markup^{2018}_{ijc} + \xi_{jct} + \epsilon_{ijct},
\end{aligned} \tag{7}$$

where i is a firm, j is an industry, c is a country, and t is a quarter. $Markup^{2018}_{ijc}$ represents the firm-level markup measured at the end of 2018, which proxies for firm i's pre-pandemic pricing power. $Constraint_{jct}$ is a vector encompassing the two supply-side constraints, *Ma-*

$terial_{jct}$ and $Labor_{jct}$, both measured at the industry-country-time level. *Year* is a set of dummy variables for 2020 (from Q2 onwards), 2021, and 2022, with 2019 again being the base year. The interaction term $Markup_{ijc}^{2018} \times Constraint_{jct} \times Year_{\tau}$ captures the influence of pre-pandemic pricing power on the cost-push channel.

Moreover, we incorporate interactions with $High\ Infl\ Exp_{ct}$, a dummy variable that equals one if, in a given country-quarter, the share of households expecting consumer prices to rise more rapidly over the next 12 months exceeds the median level observed in that country between 2021:Q1 and 2022:Q1. The interaction term $Markup_{ijc}^{2018} \times High\ Infl\ Exp_{ct} \times Year_{\tau}$ captures the influence of pre-pandemic pricing power on the generalization of inflationary pressures through the rise in household inflation expectations.

Finally, to isolate the firm-level impact of pricing power on markup dynamics, we include industry-country-time fixed effects to absorb time-varying shocks that simultaneously impact all firms within a given industry and country, such as policy interventions or demand fluctuations. These fixed effects also account for sector-specific differences in markup levels, which arise due to variations in cost structures, particularly the balance between fixed and variable costs across industries.

Column (1) of Table 12 presents the estimation results for the full sample of firms. Column (2) reports results for the subsample of manufacturing firms, which were most affected by pandemic-induced supply chain disruptions. Column (3) presents results for firms in the service sector, which were relatively unaffected by supply chain constraints but more exposed to labor constraints. Accordingly, for this subsample, we replace the supply chain constraint variable (*Material*) with the labor constraint variable (*Labor*).

There are two key takeaways. First, the estimated coefficients for the interactions between $\text{Markup}_{ijc}^{2018}$ and the *Year* dummies indicate that in countries where household inflation expectations did not materially increase, firms with greater pricing power at the onset of the pandemic experienced a relatively larger decline in markups during the pandemic period.

Second, the estimated coefficients for the triple interactions between $High\ Infl\ Exp_{c}$,

Dependent variable: Markup_{ijct+1}	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Full	Manufacturing	Services	Full	Manufacturing	Services
$\text{Material}_{jct} \times \text{Markup}^{2018}_{ijc}$	−0.003***	−0.003***			−0.003**	
	(0.001)	(0.001)			(0.001)	
$\text{Markup}^{2018}_{ijc} \times 2020_t$	−0.141***	−0.126***	−0.107	−0.084***	−0.111***	−0.111
	(0.051)	(0.037)	(0.126)	(0.031)	(0.037)	(0.074)
$\text{Markup}^{2018}_{ijc} \times 2021_t$	−0.154	−0.170**	−0.154	−0.089*	−0.142**	−0.089
	(0.112)	(0.076)	(0.189)	(0.046)	(0.062)	(0.130)
$\text{Markup}^{2018}_{ijc} \times 2022_t$	−0.290**	−0.327***	−0.282*	−0.164***	−0.192**	−0.126
	(0.121)	(0.108)	(0.165)	(0.049)	(0.092)	(0.107)
$\text{Material}_{jct} \times \text{Markup}^{2018}_{ijc} \times 2020_t$	0.001	0.001			0.001	
	(0.001)	(0.001)			(0.001)	
$\text{Material}_{jct} \times \text{Markup}^{2018}_{ijc} \times 2021_t$	0.004***	0.004***			0.004**	
	(0.001)	(0.001)			(0.002)	
$\text{Material}_{jct} \times \text{Markup}^{2018}_{ijc} \times 2022_t$	0.005***	0.005***			0.003*	
	(0.001)	(0.001)			(0.002)	
$\text{Labor}_{jct} \times \text{Markup}^{2018}_{ijc}$	0.001		−0.003			−0.004**
	(0.001)		(0.002)			(0.002)
$\text{Labor}_{jct} \times \text{Markup}^{2018}_{ijc} \times 2020_t$	0.001		0.001			0.001
	(0.002)		(0.003)			(0.002)
$\text{Labor}_{jct} \times \text{Markup}^{2018}_{ijc} \times 2021_t$	−0.001		0.001			0.001
	(0.003)		(0.003)			(0.002)
$\text{Labor}_{jct} \times \text{Markup}_{ijc} \times 2022_t$	−0.001		0.004			0.002
	(0.002)		(0.003)			(0.002)
$\text{High Infl Exp}_c \times \text{Markup}^{2018}_{ijc}$	0.141***	0.129**	0.098	0.150***		
	(0.052)	(0.056)	(0.095)	(0.051)		
$\text{High Infl Exp}_c \times \text{Markup}^{2018}_{ijc} \times 2020_t$	0.070	0.056	0.004	0.017		
	(0.075)	(0.076)	(0.123)	(0.059)		
$\text{High Infl Exp}_c \times \text{Markup}^{2018}_{ijc} \times 2021_t$	0.068	0.074	0.135	0.066		
	(0.083)	(0.073)	(0.161)	(0.058)		
$\text{High Infl Exp}_c \times \text{Markup}^{2018}_{ijc} \times 2022_t$	0.161**	0.176**	0.207*	0.118**		
	(0.079)	(0.081)	(0.125)	(0.057)		
$\text{Markup}^{2018}_{ijc}$	0.827***	0.855***	0.883***	0.797***	0.902***	0.943***
	(0.034)	(0.029)	(0.109)	(0.033)	(0.033)	(0.069)
Observations	12,420	12,420	6,420	18,840	12,420	6,411
R-squared	0.801	0.800	0.621	0.765	0.797	0.619
Industry-country-time FE	✓	✓	✓	✓	✓	✓

Table 12: Supply-side constraints and firm markups. This table presents estimation results from Specifications (**??**) and (7). The subscript notation is defined as follows: i is a firm, j is an industry, c is a country, and t is a quarter. The dependent variable is a firm's markup, which we estimate following De Loecker et al. (2020). *Material* and *Labor* measure the share of firms that indicate that their production is constrained by supply chain problems and by labor shortages at the industry-country-time level, respectively. $Markup^{2018}$ measures a firm's markup in the fiscal year 2018. *High Infl Exp* is a dummy equal to one if the share of households in a country-quarter that believe consumer prices will increase more rapidly over the next 12 months has increased above the median level in a country between 2021:Q1 and 2022:Q1. Columns (3) and (6) are estimated in the full sample. Columns (1) and (4) are estimated in the sample of manufacturing firms. Columns (2) and (5) are estimated in the sample of firms operating in services. Standard errors are clustered at the industry-country level and reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

$\text{Markup}_{ijc}^{2018}$, and the *Year* dummies indicate that in countries where household inflation expectations rose more sharply, firms with greater pre-pandemic pricing power were able to sustain relatively higher markups in 2022.[20]

The interaction between high inflation expectations and firms' pricing power thus appears to contribute to the emergence of generalized inflation, spreading inflationary pressures across the broader economy. This conclusion is further supported by the finding that pricing power also allows firms in the service sector—where material-driven cost-push inflation is minimal—to sustain relatively higher markups in 2022 in countries with elevated household inflation expectations (see Column 3).

Moreover, the estimated coefficients for the triple interactions between $Material_{jct}$, $\text{Markup}_{ijc}^{2018}$, and the *Year* suggest that firms with greater pre-pandemic pricing power were also more effective at passing increased material input costs to prices during the initial cost-push phase. Importantly, in a context where material input costs are increasing, even simply maintaining the same markup suggests that these firms were able to enhance their gross margins in absolute terms—and consequently, their absolute profits—per unit sold.[21] The results in Column (3) provide no evidence that pricing power influences the cost-push pass-through of labor costs to inflation during the pandemic period in the services sector.

Finally, Column (4) replicates Column (1), focusing on the generalization of inflation through inflation expectations and therefore excluding the terms for $Material_{jct}$ and $Labor_{jct}$, which are associated with the cost-push channel. Meanwhile, Columns (5) and (6) isolate the cost-push channel by excluding terms related to the generalized markup shock driven

[20] These results align with Konczal et al. (2022), which finds that 2021 recorded the highest markups and the largest annual increase in the U.S. since 1955. Notably, firms with the highest pre-pandemic markups raised them the most during the pandemic period.

[21] Markups are defined as the ratio of price to marginal costs. Take, for instance, an initial markup of 1.5. If marginal costs rise from 1 to 2 due to supply-side shocks, the per-unit gross margin in absolute terms then grows from 0.5 ($= 1.5 \times 1 - 1$) to 1 ($= 1.5 \times 2 - 2$).

by elevated inflation expectations, analyzing manufacturing and service firms separately. These tests confirm that the interaction of pricing power and elevated inflation expectations broadly amplifies inflationary pressures, while in the cost-push phase pricing power solely influences markup adjustments within the manufacturing sector.

6 Mechanisms driving the generalization of inflation

Our key empirical finding is that localized supply-side inflation can generalize into broad-based markups and inflation. What are the potential driving mechanisms?

Building on the search model from Benabou and Gertner (1993), we show in Section OA.2 in the Appendix how the perception of a common cost shock, potentially associated with generalized inflation expectations, can drive higher markups and prices, particularly in sectors not directly impacted by the initial localized supply-side shock. In response to a supply shock, consumers must evaluate the extent to which individual firms are affected in order to make optimal decisions about their search efforts and subsequent consumption choices. If a supply shock is perceived as widespread—a common shock affecting many firms—consumers are less inclined to engage in costly search efforts for better deals because they anticipate uniformly higher prices across the market (see also Fishman, 1996 and Gaballo and Paciello, 2022). This shift translates into higher reservation (acceptance) prices, particularly in sectors that are not materially affected by the initial supply-side shocks. In effect, consumers become less selective and are more likely to enter into less adequate transactions. This dynamic reduces competitive pressure on firms, enhancing their pricing power.[22]

[22]In our model, we show that this effect can be amplified by fairness concerns in consumer behavior. Empirical evidence suggests that consumers tend to view price increases driven by rising costs as more acceptable than those driven by demand shocks (see Eyster et al., 2021 for a detailed discussion). The overestimation of a supply-side shock as a common shock driven by elevated generalized inflation expectations causes consumers to perceive firms' prices as more fair. This perception reduces their price elasticity of

The ability of supply-side shocks to generalize into broad-based inflation expectations, characterized by a perception of uniformly higher costs and prices, stems from how these expectations are formed. As explored in the diagnostic expectations literature (Bordalo et al., 2018, 2019, 2012, 2021), individuals tend to infer broader economic trends from specific, salient incidents, and often overweight recent events when predicting future outcomes. Consistent with this framework, Link et al. (2024) shows that consumers particularly attentive and informed about realized inflation rates have inflation expectations that deviate more significantly upward from professional forecasts compared to less attentive individuals. This finding suggests that consumers rely on their own—potentially misspecified—models when processing inflation-relevant information (see also Andrade et al., 2016; Andre et al., 2022; Laudenbach et al., 2024).

In the case of the experience channel, salient events include extreme price increases due to supply disruptions (de Bruin et al., 2011) and spikes in the cost of everyday goods such as food or gasoline (Cavallo et al., 2017; D'Acunto et al., 2021; Dietrich, 2024). These salient price increases lead consumers to place significant weight on them when forming their expectations about *overall* price trends. In the case of the news channel, salient events include reports about supply chain disruptions and their effects on costs and prices, especially when the media emphasizes potential economy-wide implications.[23]

Besides diagnostic expectations, rational inattention (Sims, 2003) and sparsity (Gabaix, 2014) can also lead to generalized inflation expectations. Due to cognitive limitations, indi-

demand, allowing firms—particularly those less directly affected by the initial supply-side shock—to charge higher markups and prices without significantly affecting demand.

[23]Since reports of supply-side constraints are often more salient and newsworthy, while their resolution receives little attention, this asymmetry can contribute to the persistence of elevated inflation expectations. Supporting this notion, Ascari et al. (2023) finds that increases in inflation expectations have a stronger impact than shocks that lower them, and Blanco et al. (2022) finds that inflation surges elevate long-term inflation expectations, which remain persistent throughout the disinflation process.

viduals face a trade-off between the benefits of acquiring additional information and the costs (time, effort, or cognitive resources) of processing it. Individuals thus tend to focus on the most relevant information while ignoring less critical details. In the context of inflation, individuals thus typically base their expectations on easily observable price signals (D'Acunto and Weber, 2024), such as rising prices of frequently purchased goods or news about increases in headline inflation, while selectively ignoring complex or technical information, such as disaggregated inflation data.[24] If these easily observable signals indicate higher inflation, individuals may generalize this perception to the broader economy. If a supply shock elevates generalized inflation expectations, it is likely perceived as widespread—a common cost shock affecting many firms.[25]

7 Conclusion

The post-pandemic era witnessed supply-side shocks that, combined with a swift economic recovery, resulted in a dramatic rise in inflation rates, levels which had not been observed in many decades. In this paper, we document complex interactions between supply chain pressures, firm pricing power, and household inflation expectations in contributing to the surge, generalization, and persistence of post-pandemic inflation in the euro area.

We find that in 2021, disruptions in the supply chain not only drove inflation upwards through a cost-push mechanism but also elevated household inflation expectations. The influence of market power exacerbated this cost-push effect as firms with pricing power

[24] Relatedly, the theory proposed by Mei and Wu (2024) suggests that longer causal chains exert diminishing influence on beliefs, resulting in an overreaction of inflation expectations to cost-push news shocks.

[25] Acharya et al. (2023) demonstrates that in a regime-switching model with parameter uncertainty, a *negative duration dependence* can take hold: if the economy remains in a regime for an extended period, even fully rational agents may begin to assign via learning a higher likelihood to the possibility of being in the regime with persistence, potentially indefinitely.

could sustain or even enhance their profit margins. In 2022, high-pricing power firms further increased their markups in response to heightened household inflation expectations, but this effect prevailed not just in the initially-affected manufacturing sectors but also in the services sectors. These mechanisms together generated a lagged and persistent transmission of initial localized shocks into broad-based consumer price inflation. Overall, our findings suggest that supply-side inflation impulses can generalize and spiral upwards, via an interaction of firms' pricing power and household expectations.

From a policy perspective, three main implications emerge. First, "see through the shock" policy approaches may need to take into account the possibility of persistent and intertwined inflationary pressures. Policymakers may need to be prepared to act decisively to adjust the monetary policy stance if inflation expectations show the first signs of becoming unanchored. Second, the ability of firms with substantial pricing power to capitalize on supply chain disruptions and elevated inflation expectations can be considered as an empirically tangible version of "greedflation". This implication provides support for measures that promote competition, thereby curbing the inflationary tendencies of dominant market players. Third, transparent communication about the nature (for instance, magnitude and longevity) of supply-side shocks by policymakers as well as their commitment to price stability can help prevent a self-fulfilling prophecy where unanchored expectations drive up actual inflation.

References

Acharya, V. V., T. Johnson, S. Sundaresan, and S. Zheng (2023): "Disasters with unobservable duration and frequency: Intensified responses and diminished preparedness," Tech. rep., National Bureau of Economic Research.

Alessandria, G., S. Khan, A. Khederlarian, C. Mix, and K. Ruhl (2022): "The Aggregate Effects of Global and Local Supply Chain Disruptions: 2020–2022," *Working Paper.*

Amiti, M., S. Heise, F. Karahan, and A. Şahin (2022): "Inflation Strikes Back: The Return of Wage to Price Pass-Through," *Working Paper.*

Anayi, L. S., N. Bloom, P. Bunn, P. Mizen, G. Thwaites, and I. Yotzov (2022): "Firming up price inflation," *Working Paper.*

Andrade, P., R. K. Crump, S. Eusepi, and E. Moench (2016): "Fundamental disagreement," *Journal of Monetary Economics*, 83, 106–128.

Andre, P., I. Haaland, C. Roth, M. Wiederholt, and J. Wohlfart (2024): "Narratives about the Macroeconomy," *Working Paper*.

Andre, P., C. Pizzinelli, C. Roth, and J. Wohlfart (2022): "Subjective models of the macroeconomy: Evidence from experts and representative samples," *The Review of Economic Studies*, 89, 2958–2991.

Armantier, O., W. Bruine de Bruin, G. Topa, W. Van Der Klaauw, and B. Zafar (2015): "Inflation expectations and behavior: Do survey respondents act on their beliefs?" *International Economic Review*, 56, 505–536.

Ascari, G., S. Fasani, J. Grazzini, and L. Rossi (2023): "Endogenous uncertainty and the macroeconomic impact of shocks to inflation expectations," *Journal of Monetary Economics*.

Bai, X., J. Fernández-Villaverde, Y. Li, and F. Zanetti (2024): "The causal effects of global supply chain disruptions on macroeconomic outcomes: evidence and theory," .

Ball, L. M., D. Leigh, and P. Mishra (2022): "Understanding US Inflation During the COVID Era," *Working Paper*.

Bańkowska, K., A. Borlescu, E. Charalambakis, A. Dias da Silva, D. Di Laurea, M. Dossche, D. Georgarakos, J. Honkkila, N. Kennedy, G. Kenny, et al. (2021): "ECB Consumer Expectations Survey: an overview and first evaluation," *ECB Occasional Paper*.

Benabou, R. and R. Gertner (1993): "Search with learning from prices: does increased inflationary uncertainty lead to higher markups?" *The Review of Economic Studies*, 60, 69–93.

Benigno, G., J. di Giovanni, J. J. Groen, and A. I. Noble (2022): "The GSCPI: A New Barometer of Global Supply Chain Pressures," *Working Paper*.

Bernanke, B. and O. Blanchard (2023): "What caused the US pandemic-era inflation?" *Hutchins Center Working Papers*.

Bilbiie, F. O. and D. R. Känzig (2023): "Greed? Profits, Inflation, and Aggregate Demand," *Working Paper*.

Binici, M., S. Centorrino, S. Cevik, and G. Gwon (2022): "Here Comes the Change: The Role of Global and Domestic Factors in Post-Pandemic Inflation in Europe," *Working Papers*.

Blanco, A., P. Ottonello, and T. Ranosova (2022): "The dynamics of large inflation surges," Tech. rep., National Bureau of Economic Research.

Blinder, A., E. R. Canetti, D. E. Lebow, and J. B. Rudd (1998): *Asking about prices: a new approach to understanding price stickiness*, Russell Sage Foundation.

Bordalo, P., N. Gennaioli, S. Y. Kwon, and A. Shleifer (2021): "Diagnostic bubbles," *Journal of Financial Economics*, 141, 1060–1077.

Bordalo, P., N. Gennaioli, R. L. Porta, and A. Shleifer (2019): "Diagnostic expectations and stock returns," *The Journal of Finance*, 74, 2839–2874.

Bordalo, P., N. Gennaioli, and A. Shleifer (2012): "Salience theory of choice under risk," *The Quarterly journal of economics*, 127, 1243–1285.

——— (2018): "Diagnostic expectations and credit cycles," *The Journal of Finance*, 73, 199–227.

Bracha, A. and J. Tang (2022): "Inflation levels and (in) attention," .

Bräuning, F., J. L. Fillat, and G. Joaquim (2022): "Cost-Price Relationships in a Concentrated Economy," *Working Paper*.

Cai, M. and T. Vandyck (2020): "Bridging between economy-wide activity and household-level consumption data: Matrices for European countries," *Data in brief*, 30, 105395.

Candia, B., O. Coibion, and Y. Gorodnichenko (forthcoming): "The Macroeconomic Expectations of Firms," *Handbook of Economic Expectations*.

Carriere-Swallow, Y., P. Deb, D. Furceri, D. Jimenez, and J. D. Ostry (2022): "Shipping Costs and Inflation," *Working Paper*.

Carroll, C. D. (2003): "Macroeconomic expectations of households and professional forecasters," *the Quarterly Journal of economics*, 118, 269–298.

Cavallo, A., G. Cruces, and R. Perez-Truglia (2017): "Inflation Expectations, Learning, and Supermarket Prices: Evidence from Survey Experiments," *American Economic Journal: Macroeconomics*, 9, 1–35.

Celasun, O., N.-J. Hansen, A. Mineshima, M. Spector, and J. Zhou (2022): "Supply Bottlenecks: Where, Why, How Much, and What Next?" *IMF Working Paper*.

Choi, H. and H. Varian (2012): "Predicting the present with Google Trends," *Economic record*, 88, 2–9.

Coibion, O., G. Erwan, Y. Gorodnichenko, and F. Savignac (2021): "Firms' Inflation Expectations: New Evidence from France," *Working Paper*.

Coibion, O., D. Georgarakos, Y. Gorodnichenko, and M. Van Rooij (2023): "How does consumption respond to news about inflation? Field evidence from a randomized control trial," *American Economic Journal: Macroeconomics*, 15, 109–152.

Coibion, O. and Y. Gorodnichenko (2015): "Is the Phillips curve alive and well after all? Inflation expectations and the missing disinflation," *American Economic Journal: Macroeconomics*, 7, 197–232.

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

——— (2020): "Inflation Expectations and Firm Decisions: New Causal Evidence," *The Quarterly Journal of Economics*, 135, 165–219.

Comin, D., R. C. Johnson, and C. Jones (2023): "Supply Chain Constraints and Inflation," *Working Paper*.

Crump, R. K., S. Eusepi, A. Tambalotti, and G. Topa (2022): "Subjective intertemporal substitution," *Journal of Monetary Economics*, 126, 118–133.

D'Acunto, F., U. Malmendier, J. Ospina, and M. Weber (2019): "Salient price changes, inflation expectations, and household behavior," *Working Paper*.

de Bruin, W. B., W. Van der Klaauw, and G. Topa (2011): "Expectations of inflation: The biasing effect of thoughts about specific prices," *Journal of Economic Psychology*, 32, 834–845.

De Loecker, J., J. Eeckout, and G. Unger (2020): "The Rise of Market Power and the Macroeconomic Implications," *Quarterly Journal of Economics*, 135, 561–644.

Dietrich, A. M. (2024): "Consumption categories, household attention, and inflation expectations: Implications for optimal monetary policy," *Journal of Monetary Economics*, 103594.

Dräger, L. and M. J. Lamla (2017): "Imperfect information and consumer inflation expectations: Evidence from microdata," *Oxford Bulletin of Economics and Statistics*, 79, 933–968.

Dräger, L. and G. Nghiem (2021): "Are consumers' spending decisions in line with a euler equation?" *Review of Economics and Statistics*, 103, 580–596.

Duca-Radu, I., G. Kenny, and A. Reuter (2021): "Inflation expectations, consumption and the lower bound: Micro evidence from a large multi-country survey," *Journal of Monetary Economics*, 118, 120–134.

D'Acunto, F., D. Hoang, and M. Weber (2022): "Managing households' expectations with unconventional policies," *The Review of Financial Studies*, 35, 1597–1642.

D'Acunto, F., U. Malmendier, J. Ospina, and M. Weber (2021): "Exposure to grocery prices and inflation expectations," *Journal of Political Economy*, 129, 1615–1639.

D'Acunto, F. and M. Weber (2024): "Why survey-based subjective expectations are meaningful and important," *Annual Review of Economics*, 16.

Eyster, E., K. Madarász, and P. Michaillat (2021): "Pricing under fairness concerns," *Journal of the European Economic Association*, 19, 1853–1898.

Fetzer, T., L. Hensel, J. Hermle, and C. Roth (2021): "Coronavirus perceptions and economic anxiety," *Review of Economics and Statistics*, 103, 968–978.

Finck, D. and P. Tillmann (2022): "The Macroeconomic Effects of Global Supply Chain Disruptions," *Working Paper*.

Fishman, A. (1996): "Search with learning and price adjustment dynamics," *The Quarterly Journal of Economics*, 111, 253–268.

Franzoni, F., M. Giannetti, and R. Tubaldi (2023): "Supply Chain Shortages, Large Firms' Market Power, and Inflation," *Working Paper*.

Frey, B. S. and W. W. Pommerehne (1993): "On the fairness of pricing—an empirical survey among the general population," *Journal of Economic Behavior & Organization*, 20, 295–307.

Gabaix, X. (2014): "A sparsity-based model of bounded rationality," *The Quarterly Journal of Economics*, 129, 1661–1710.

Gaballo, G. and L. Paciello (2022): "Spending allocation under nominal uncertainty: A model of effective price rigidity," *Working Paper*.

Gielissen, R., C. E. Dutilh, and J. J. Graafland (2008): "Perceptions of price fairness: An empirical research," *Business & Society*, 47, 370–389.

Ichiue, H. and S. Nishiguchi (2015): "Inflation expectations and consumer spending at the zero bound: Micro evidence," *Economic Inquiry*, 53, 1086–1107.

Isaacson, M. and H. Rubinton (2022): "Shipping Prices and Import Price Inflation," *Working Paper*.

Jiménez-Rodríguez, R. and A. Morales-Zumaquero (2022): "Commodity price pass-through along the pricing chain," *Review of World Economics*, 158, 109–125.

Kahneman, D., J. L. Knetsch, R. Thaler, et al. (1986): "Fairness as a constraint on profit seeking: Entitlements in the market," *American economic review*, 76, 728–741.

Kalemli-Ozcan, S., A. Silva, M. A. Yildirim, and J. di Giovanni (2022): "Global Supply Chain Pressures, International Trade, and Inflation," *Working Paper*.

Konczal, M., N. Lusiani, and R. Institute (2022): "Prices, Profits, and Power: An Analysis of 2021 Firm-Level Markups," *Working Paper*.

Korenok, O., D. Munro, and J. Chen (2022): "Inflation and attention thresholds," *Working Paper*.

Larsen, V. H., L. A. Thorsrud, and J. Zhulanova (2021): "News-driven inflation expectations and information rigidities," *Journal of Monetary Economics*, 117, 507–520.

Laudenbach, C., A. Weber, R. Weber, and J. Wohlfart (2024): "Beliefs About the Stock Market and Investment Choices: Evidence from a Survey and a Field Experiment," *The Review of Financial Studies*, hhae063.

Link, S., A. Peichl, C. Roth, and J. Wohlfart (2024): "Attention to the Macroeconomy," *Available at SSRN 4697814*.

Malmendier, U. and S. Nagel (2016): "Learning from inflation experiences," *The Quarterly Journal of Economics*, 131, 53–87.

Mazumder, S. (2021): "The reaction of inflation forecasts to news about the fed," *Economic Modelling*, 94, 256–264.

Mei, P. and L. Wu (2024): "Thinking about the Economy, Deep or Shallow?" *Working Paper*.

Pfäuti, O. (2022): "Inflation–who cares? Monetary Policy in Times of Low Attention," *Working Paper*.

Piron, R. and L. Fernandez (1995): "Are fairness constraints on profit-seeking important?" *Journal of Economic Psychology*, 16, 73–96.

Ranyard, R., F. Del Missier, N. Bonini, D. Duxbury, and B. Summers (2008): "Perceptions and expectations of price changes and inflation: A review and conceptual framework," *Journal of Economic Psychology*, 29, 378–400.

Reis, R. (2022a): "The Burst of High Inflation in 2021–22: How and Why Did We Get Here?" *Working Paper*.

——— (2022b): "Losing the inflation anchor," *Brookings Papers on Economic Activity*, 2021, 307–379.

——— (2023): "Four Mistakes in the Use of Measures of Expected Inflation," *AEA Papers and Proceedings*, 113, 47–51.

Rotemberg, J. J. (2008): "Behavioral aspects of price setting, and their policy implications," Tech. rep., National Bureau of Economic Research.

Savignac, F., E. Gautier, Y. Gorodnichenko, and O. Coibion (2021): "Firms' Inflation Expectations: New Evidence from France," *Working Paper*.

Shiller, R. J., M. Boycko, and V. Korobov (1991): "Popular attitudes toward free markets: the Soviet Union and the United States compared," *The American Economic Review*, 81, 385–400.

Sims, C. A. (2003): "Implications of rational inattention," *Journal of monetary Economics*, 50, 665–690.

Tommasi, M. (1994): "The consequences of price instability on search markets: Toward understanding the effects of inflation," *The American Economic Review*, 1385–1396.

Urbany, J. E., T. J. Madden, and P. R. Dickson (1989): "All's not fair in pricing: an initial look at the dual entitlement principle," *Marketing Letters*, 1, 17–25.

Vaswani, A., N. Shazeer, N. Parmar, J. Uszkoreit, L. Jones, A. N. Gomez, Ł. Kaiser, and I. Polosukhin (2017): "Attention is all you need," *Advances in neural information processing systems*, 30.

Weber, M., B. Candia, T. Ropele, R. Lluberas, S. Frache, B. Meyer, S. Kumar, Y. Gorodnichenko, D. Georgarakos, O. Coibion, et al. (2023): "Tell me something I don't already know: Learning in low-and high-inflation settings," *Working Paper*.

Weber, M., F. D'Acunto, Y. Gorodnichenko, and O. Coibion (2022): "The Subjective Inflation Expectations of Households and Firms: Measurement, Determinants, and Implications," *Journal of Economic Perspectives*, 36, 157–184.

Wong, B. (2015): "Do inflation expectations propagate the inflationary impact of real oil price shocks?: Evidence from the michigan survey," *Journal of Money, Credit and Banking*, 47, 1673–1689.

Online Appendix

OA.1 Detailed data description

Our analysis is based on various data sets for the euro area from 2019:Q1 to 2022:Q4. We use data about (i) firms' production constraints and price expectations, all at the *industry-country-time level*; (ii) household inflation expectations at the *country-time level* and *household-time level*; (iii) CPI growth at the *product-country-time level*; and, (iv) *firm-time level* financials.

Joint Harmonised EU Programme of Business and Consumer Surveys. We obtain information about firms' production constraints and household inflation expectations from the Joint Harmonised EU Programme of Business and Consumer Surveys (BCS) conducted by the European Commission's Directorate-General for Economic and Financial Affairs (DG ECFIN). These surveys (harmonized across countries) are administered to a total of 37,990 corporations from manufacturing, services, retail trade, and construction industries and 31,810 households across the 27 EU member countries, on a monthly and quarterly basis.

Manufacturing firms are asked about firm-specific factors, such as production capacity, competitive position, price expectations, and factors constraining production. Consumers are questioned on both objective variables (e.g., inflation and the country's general economic situation) and subjective assessments (e.g., major purchases and savings).

From the BCS firm survey, we use responses to the following two questions. First, we employ responses to the quarterly Question 8, which asks firms: *"What main factors are currently limiting your production?"* Firms can respond with (only) one of the following factors: (i) none, (ii) insufficient demand, (iii) shortage of labour force, (iv) shortage of material and/or equipment, (v) financial constraints, or (vi) other factors. The BCS then reports, at the industry-country-time level, the share of firms that respond that their production is constrained by the respective factor.

Second, we obtain inflation expectations at the country-time level from Question 6 that asks households: *"By comparison with the past 12 months, how do you expect that consumer prices will develop in the next 12 months?"* Respondents can reply: (i) increase more rapidly,

(ii) increase at the same rate, (iii) increase at a slower rate, (iv) stay about the same, or (v) fall. Following D'Acunto et al. (2022), we use the share of households expecting prices to increase more rapidly to measure high inflation expectations.

ECB Consumer Expectations Survey. Furthermore, we use newly available anonymized household-time level inflation expectations microdata from the ECB Consumer Expectations Survey (CES) launched in 2020. Its sample covers six key euro area countries: Belgium, France, Germany, Italy, Spain, and the Netherlands, and it is representative of the euro area population (Bańkowska et al., 2021). The CES comprises monthly *core*, *background*, and *recruitment* questionnaires, along with a quarterly questionnaire. The core questionnaire addresses households' expectations in areas such as macroeconomic conditions, housing markets, and their financial situation. The quarterly and background modules contain additional questions on household expenditures, savings, employment, borrowing, risk attitudes, financial knowledge, and income. A total of 18,492 distinct respondents participated in the 12 CES waves and households appear repeatedly in the survey, allowing us to compare responses of the same household over time.

To measure inflation expectations at the country-time and household-time level consistently across the two surveys (BCS and CES), we use the responses to CES' Question C1110 that asks households: *"Looking ahead to 12 months from now, what do you think will happen to prices in general?"* Similar to the BCS, households can answer: (i) prices will increase a lot, (ii) prices will decrease a lot, (iii) prices will increase a little, (iv) prices will decrease a little, or (v) prices will be exactly the same (that is 0% change). We again classify a household as having high inflation expectations if the household responds that prices will increase a lot.

Additionally, the CES provides insight into households' long-term inflation expectations. Specifically, Question C1210 asks: *"Please think further ahead to <survey month year+2 >. What do you think will happen to prices in general in the country you currently live in over the 12-month period between <survey month year+2 and survey month year+3 >?"* Again, we classify a household as having high inflation expectations if it indicates that prices will increase a lot.

Other data sources. We also use monthly data on consumer prices from Eurostat, which provides information for various producer and consumer price indices for all European countries. In this granular data, we observe prices at the product-country-time level. Products are grouped in COICOP categories.[26] From Eurostat, we also obtain an industry-country level input-output table as well as data about industry-country-time level energy input use and energy prices at the country-time level.

Finally, we use firm-time level financial data from Compustat Global to estimate firm markups following De Loecker et al. (2020).

Data transformations. We transform variables from the industry-country-quarter level to the product-country-quarter level in two steps. First, we use a EU inter-country input-output table (Eurostat Figaro) to capture industries from different countries contributing to the sales of a specific product in a specific country.[27] For example, cars sold in Germany are produced not only in Germany but also in Italy, Spain, etc.

Second, we use the inverse of the COICOP-CPA matrix from Cai and Vandyck (2020) to transform the production constraints from the industry-country-time level to the product-country-time level by calculating a weighted constraints measure of all CPA categories that are related to a COICOP category (two digits). Consider, for example, the product category "Food and non-alcoholic beverages" (COICOP 01). This product's COICOP is a weighted average of, among others, the following CPA categories: (i) products of agriculture, hunting, and related services, (ii) fish and fishing products, and (iii) food products.

Similarly, we transform variables from the industry-country-time level to the country-time level using the share of consumption that each industry contributes to the final household consumption (using the COICOP-CPA matrix from Cai and Vandyck, 2020) as weights.

OA.2 Theoretical framework

To examine how consumers' generalized inflation expectations influence firms' pricing behavior, we employ a duopolistic search market equilibrium model, drawing on the search

[26]The Classification of Individual Consumption According to Purpose (COICOP) is the international reference classification of household expenditure. It provides homogeneous categories of goods and services.

[27]The Figaro data is available at https://ec.europa.eu/eurostat/web/esa-supply-use-input-tables.

model from Benabou and Gertner (1993) and the fairness concern framework from Eyster et al. (2021).

OA.2.1 Setup

There are two firms with index $i \in \{1, 2\}$, which have constant marginal costs C_i:

$$C_i = e^{\bar{c}+\theta+\gamma_i}, \tag{OA.2.1}$$

where $\bar{c}$ is the lower bound of the marginal costs, $\theta \sim \mathcal{N}(0, \psi_\theta)$ is a common cost shock affecting both firms equally, while $\gamma_i \sim \mathcal{N}(Z_i, \psi_\gamma)$ are independent firm-specific shocks, with Z_i characterizing the extent of a firm-specific supply-side shock. The firms cannot price-discriminate, implying that each unit of their good sells at the same price, P_i.

Influence of generalized inflation expectations. Customers cannot directly observe firms' marginal production costs. Instead, they infer these costs based on the observed price and their understanding of the broader economic environment, which is shaped by their perceptions of supply-side cost shocks and the resulting inflation expectations.

To formalize this belief formation process (as outlined in Section 3) and examine its implications for firms' pricing strategies in response to supply-side shocks during the pandemic, we introduce a biased belief function $C_i^B(P_i)$. This function maps the price that a monopoly with marginal costs C_i would set to consumers' biased perception of these costs as follows:

$$C_i^B(P_i) = e^{\bar{c}+\widehat{\theta}+\widehat{\gamma}_i}, \tag{OA.2.2}$$

where $\widehat{\theta} \sim \mathcal{N}(b_Z, \psi_\theta)$, and $\widehat{\gamma}_i \sim \mathcal{N}(\max(0, Z_i - b_Z), \psi_\gamma)$ with $b_Z > 0$. This belief function captures that elevated generalized inflation expectations are associated with a tendency to misinterpret a supply-side shock affecting only certain firms as a broader shock impacting a wider range of firms. Consequently, the supply-side cost shock is at least partially attributed to a common shock, rather than being recognized as firm-specific.

OA.2.2 Effect of generalized inflation expectations on firm pricing through search

First, we explore the effect of generalized inflation expectations on firm pricing through its impact on consumers' perceived value of search. There is a continuum of identical consumers, with measure normalized to one, and their demand function in absence of search is given by:

$$Y_i^d(P_i) = P_i^{-\eta}. \tag{OA.2.3}$$

Hence, the profit function of a monopolist with cost C_i is $(P_i - C_i)Y_i^d(P_i)$, and its maximum value is given by

$$P_i^m(C_i) = \frac{\eta}{\eta - 1} \cdot C_i. \tag{OA.2.4}$$

To study the effect of search on firm pricing, we assume that, initially, half the consumers observe firm 1's price, and the other half observe firm 2's price, at no cost. Given the observed price, each consumer decides whether to purchase at that price or search further to learn the price from the other firm. Searching entails a cost $\sigma > 0$, but it allows consumers to buy at the lower of the two prices.

Without loss of generality, let us consider consumers who first observe the price P_1. Upon observing P_1, they infer firm 1's underlying marginal cost structure. Using this information, they then form a posterior belief about the distribution of firm 2's price, denoted $G(P_2 \mid P_1)$ with density $g(P_2 \mid P_1)$. Based on these beliefs, the consumers then decide whether it is worthwhile to search and discover P_2. Specifically, upon observing P_1, consumers map this price to the biased marginal cost C_1^B and form a biased Bayesian posterior for C_2^B. This posterior is subsequently mapped to the monopoly price P_2^m that a firm with costs C_2^B would charge. For convenience, we define $c \equiv \log C$ and $p_i^m(c) \equiv \log(P_i^m(C))$.

The conditional distribution of c_2^B, given $c_1^B = c$, is normal with mean,

$$E[c_2^B|c] = \rho c + (1 - \rho)\left(\bar{c} + \max(b_Z, Z_2)\right),$$

where

$$\rho = \frac{\psi_\theta}{\psi_\theta + \psi_\gamma}, \tag{OA.2.5}$$

and variance:

$$\mathrm{Var}(c_2^B|c) = (1-\rho^2)(\psi_\theta + \psi_\gamma).$$

The unconditional distribution of p_2^m is normal, with mean

$$\bar{p} \equiv \bar{c} + (\bar{c} + \max(b_Z, Z_2)) + \log\left(\frac{\eta}{\eta-1}\right). \tag{OA.2.6}$$

Moreover, the conditional distribution of $p_2^m(c_2^B)$, given $c_1^B = c$, is normal with mean,

$$\mu(p) \equiv \rho p + (1-\rho)\bar{p},$$

and variance:

$$s^2 \equiv (1-\rho^2)(\psi_\theta + \psi_\gamma).$$

The expected gain from search. Let $S(p) \equiv \int_p^\infty Y_i^d(r)\,dr$ be the surplus that consumers derive from buying at price p; thus:

$$S(p) = \frac{1}{\eta-1} e^{(1-\eta)p}. \tag{OA.2.7}$$

Therefore, after observing p_1, consumers' expected gain from search is given by:

$$\begin{aligned} W(p_1) &= \int_{-\infty}^{p_1} [S(p_2) - S(p_1)]\, g(p_2 \mid p_1)\, dp_2 \\ &= \frac{1}{\eta-1} \int_{-\infty}^{p_1} \frac{1}{\sqrt{2\pi s}} \left\{\exp\left[(1-\eta)p_2\right] - \exp\left[(1-\eta)p_1\right]\right\} \exp\left[-\frac{(p_2-\mu(p_1))^2}{2s^2}\right] dp_2. \end{aligned}$$

If $W(p_1) > \sigma$, a consumer chooses to search; otherwise, the consumer buys immediately at price p_1. Moreover, define consumers' reservation price p_1^* as the smallest solution to:

$$W(p_1^*) = \sigma.$$

Accordingly, consumers are thus indifferent between searching and purchasing from firm 1 when it charges p_1^*. Let c_1^* denote the cost level such that $p_1^m(c_1^*) = p_1^*$. Consequently, if firm 1's cost level is $c_1 > c_1^*$ and it charges its monopoly price, it will induce search. Rather than incur the first-order loss in customers (who may search and potentially find a lower price), the firm opts to charge p_1^*, avoiding customer loss and experiencing only a second-order effect on profits per customer.

Rewriting the consumers' expected gain from search, $W(p_1)$, in terms of the distribution Φ of a standard normal gives:

$$\begin{aligned} W(p_1) =& \frac{1}{\eta-1} \exp\left[-\frac{(\eta-1)}{2}\left[2\bar{p}+2\rho(p_1-\bar{p})-s^2(\eta-1)\right]\right] \\ & \cdot \Phi\left[\frac{(1-\rho)(p_1-\bar{p})+s^2(\eta-1)}{s}\right] \\ & -\frac{1}{\eta-1}\exp\left[-(\eta-1)p_1\right]\cdot\Phi\left[\frac{(1-\rho)(p_1-\bar{p})}{s}\right]. \end{aligned} \tag{OA.2.8}$$

Generalized inflation expectations and the perceived search value. Taking the derivative of $W(p_1)$ with respect to the extent of common shock bias b_Z yields:

$$\frac{\partial W(p_1)}{\partial b_Z} = \begin{cases} -(1-\rho)\exp\left(-\frac{(\eta-1)}{2}\left[2\bar{p}+2\rho(p_1-\bar{p})-s^2(\eta-1)\right]\right) & \\ \quad \cdot\Phi\left(\frac{(1-\rho)(p_1-\bar{p})+s^2(\eta-1)}{s}\right)<0 & \text{if } b_Z > Z_2, \\ 0 & \text{if } b_Z \leq Z_2. \end{cases}$$

Hence, the effect of an increase in b_Z on the search value of consumers depends on the sector and its exposure to supply-side shocks.

For less affected sectors—where $b_Z > Z_2$ (e.g., service sectors)—an increase in the mean of the conditional distribution of $p_2^m(c_2^B)$ conditional on $p_1 = p$, driven by a higher b_Z (i.e., attributing the supply-side cost shock to a common shock across both firms), reduces the perceived option value of search. This effect arises because consumers in these sectors are effectively overestimating the average price level in the market. This dynamic reduces competitive pressure on firm 1, raising its market power. As a result, the reservation price p_1^* shifts upward, allowing firm 1 to charge higher prices without inducing consumers to search for alternatives. Correspondingly, the threshold cost level c_1^* increases, extending the range of cost levels over which firm 1 can charge monopoly markups.

In contrast, in sectors more directly impacted by the supply-side shock—where $b_Z \leq Z_2$ (e.g., manufacturing)—this effect does not arise. The greater actual commonality in costs across firms means that consumers' attribution of elevated costs to a shared shock is accurate. As a result, their posterior beliefs about firm 2's prices reflect the true cost structure, leaving the reservation price p_1^* unchanged. Consequently, there is no distortion in market power, and firm 1's pricing behavior remains unaffected by the attribution of the shock.

While we study a single product market, our findings are also applicable to multiple product markets where the consumption of different products is interconnected through a positive cross-elasticity of demand. A lower perceived option value of search the cross-price elasticity of demand. This reduction, in turn, causes an upward shift in the demand curve for individual firms.

OA.2.3 Effect of generalized inflation expectations on firm pricing through fairness concerns

Next, we explore how the overestimation of the magnitude of the common shock (i.e., bias $b_Z > 0$) impacts firm pricing through consumers' fairness concerns. To study this effect, we consider a case without search, and where customers assess transactional fairness by evaluating the perceived markup charged by firms.

Consumers' fairness concerns. There is microevidence supporting the idea that consumers care about fairness (see Eyster et al., 2021 for a detailed discussion). Customers typically perceive price hikes driven by increased demand as unfair, whereas those resulting from rising costs are viewed more acceptably (e.g., Kahneman et al., 1986; Frey and Pommerehne, 1993; Gielissen et al., 2008; and Shiller et al., 1991). Perceived unfair pricing can reduce customers' willingness to pay (e.g., Piron and Fernandez, 1995; Rotemberg, 2008; and Urbany et al., 1989). Firms also recognize that customers respond negatively to markups perceived as unfair (e.g., Blinder et al., 1998 and Eyster et al., 2021).

To capture consumers' fairness concerns, we assume that the perceived markup (over perceived costs) determines a transaction's perceived fairness, represented by a twice differentiable fairness function $F(M^B)$, which is positive, strictly decreasing, and weakly concave over $[0, M^h]$, where $F(M^h) = 0$ and $M^h > \eta/(\eta - 1)$. The decreasing nature of F reflects customers' aversion to higher markups, while its weak concavity implies that increases in perceived markup lead to a utility loss at least as large as the utility gain from an equal-sized decrease in the perceived markup.

Generalized inflation expectations are associated with consumers' overestimation of the magnitude of the common shock, which influences their fairness assessments. Specifically, consumers form biased beliefs about firms' marginal costs and infer the firms' markup accordingly. Given these biased perceptions, consumers infer that the markup is as follows:

$$M^B(P_i) = \frac{P_i}{E\left[C^B(P_i)\right]}. \tag{OA.2.9}$$

A customer who purchases quantity Y_i of the good at price P_i thus experiences the following fairness-adjusted consumption:

$$A = F(M^B(P_i)) \cdot Y_i.$$

Customers also face a budget constraint:

$$P_i \cdot Y_i + B = I,$$

where $I > 0$ represents initial wealth, and B denotes remaining money balances. Fairness-adjusted consumption and money balances are incorporated into a quasilinear utility function:

$$\frac{\eta}{\eta - 1} \cdot A^{(\eta-1)/\eta} + B,$$

where the parameter $\eta > 1$ governs the concavity of the utility function. Given the fairness factor F and price P_i, customers choose their purchases Y_i and money balances B to maximize utility, subject to the budget constraint:

$$\frac{\eta}{\eta - 1} \left(F \cdot Y_i\right)^{(\eta-1)/\eta} + I - P_i \cdot Y_i.$$

The maximum of the customers' utility function is determined by the following first-order condition (FOC):

$$F^{(\eta-1)/\eta} \cdot Y_i^{-1/\eta} = P_i,$$

which yields the following demand function:

$$Y_i^d(P_i) = P_i^{-\eta} \cdot F(M^B(P_i))^{\eta-1}. \tag{OA.2.10}$$

The price affects demand through two channels: the typical substitution effect, represented by $P_i^{-\eta}$, and the fairness channel, captured by $F(M^B(P_i))^{\eta-1}$. The fairness channel arises because the price influences the perceived markup, and thus the perceived fairness of the transaction; this, in turn, impacts the marginal utility of consumption and, consequently, demand.

Firm pricing under fairness concerns. When firms set prices under fairness concerns, they need to account for how the perceived fairness of their markups influences customers' willingness to pay. Consequently, firms must balance the direct impact of the price on profit margins with the indirect effect of perceived fairness on the demand elasticity.

Specifically, in the absence of search, the two firms set price P_i and output Y_i to maximize profits $(P_i - C_i) \cdot Y_i^d(P_i)$, subject to customers' demand for their good. The resulting FOC is:

$$Y_i^d(P_i) + (P_i - C_i)\frac{dY_i^d}{dP_i} = 0. \tag{OA.2.11}$$

We introduce the price elasticity of demand, normalized to be positive:

$$E_i = -\frac{d\ln(Y_i^d)}{d\ln(P_i)} = -\frac{P_i}{Y_i^d} \cdot \frac{dY_i^d}{dP_i},$$

which implies together with the FOC from Eq. (OA.2.11) for the monopoly price that

$$P_i^m(C_i) = \frac{E_i}{E_i - 1} \cdot C_i. \tag{OA.2.12}$$

From Eq. (OA.2.10), we find the elasticity E:

$$E_i = \eta + (\eta - 1) \cdot \phi(M^B) > \eta, \tag{OA.2.13}$$

where

$$\phi(M^B) = -\frac{d\ln(F)}{d\ln(M^B)}$$

is the elasticity of the fairness function with respect to the perceived markup. The properties of the fairness function F imply the following lemma (for the proof, please refer to Online Appendix A of Eyster et al., 2021).

Lemma 1. *The elasticity of the fairness function $\phi(M^B)$ is strictly positive and strictly increasing on $(0, M^h)$, with $\lim_{M^B \to 0} \phi(M^B) = 0$ and $\lim_{M^B \to M^h} \phi(M^B) = +\infty$. As an* *implication, the superelasticity of the fairness function*

$$\kappa = \frac{d\ln(\phi)}{d\ln(M^B)}$$

is strictly positive on $(0, M^h)$.

The second term in Eq. (OA.2.13), $(\eta - 1) \cdot \phi$, represents the fairness channel, which implies that higher perceived marginal costs and a lower price reduce the perceived markup, thereby increasing the perceived fairness and lowering the price elasticity of demand.

From Eq. (OA.2.12) and Eq. (OA.2.13) it follows that the firms' monopoly price is given by

$$P_i^m = \left(\frac{\eta + (\eta - 1)\phi}{(\eta - 1)(1 + \phi)}\right) \cdot C_i. \tag{OA.2.14}$$

Generalized inflation expectations and price elasticity of demand. Next, we investigate the effect of consumers' overestimation of the common cost shock, b_Z, on optimal firm pricing. To this end, we calculate the derivative of P_i^m with respect to b_Z using the chain rule, as ϕ depends on the perceived markup M^B, which in turn is influenced by b_Z:

$$\frac{dP_i^m}{db_Z} = \frac{dP_i^m}{d\phi} \cdot \frac{d\phi}{db_Z}, \tag{OA.2.15}$$

where the derivative of P_i^m with respect to ϕ is given by:

$$\frac{dP_i^m}{d\phi} = -\frac{C_i}{(\eta - 1)(1 + \phi)^2} < 0. \tag{OA.2.16}$$

Plugging Eq. (OA.2.16) into Eq. (OA.2.15) yields:

$$\frac{dP_i^m}{db_Z} = -\frac{C_i}{(\eta - 1)(1 + \phi)^2} \cdot \frac{d\phi}{db_Z}. \tag{OA.2.17}$$

Hence, to determine the sign of dP_i^m/db_Z, we next need to establish the sign of $d\phi/db_Z$. Since ϕ depends on b_Z via the perceived markup given in Eq. (OA.2.9), we have:

$$\frac{d\phi}{db_Z} = \frac{d\phi}{dM^B(P_i)} \cdot \frac{dM^B(P_i)}{db_Z}, \tag{OA.2.18}$$

for which we know that $d\phi/dM^B(P_i) > 0$ from Lemma 1. To determine $dM^B(P_i)/db_Z$, we first substitute the actual and perceived marginal costs into Eq. (OA.2.9), which, after simplification, yields:

$$M^B(P_i) = \left(\frac{\eta + (\eta - 1)\phi}{(\eta - 1)(1 + \phi)}\right) \cdot e^{-b_Z}. \tag{OA.2.19}$$

The derivative of $M^B(P_i)$ with respect to b_Z is given by:

$$\frac{dM^B(P_i)}{db_Z} = \begin{cases} = -\left(\frac{1}{(\eta-1)(1+\phi)^2} \cdot \frac{d\phi}{db_Z} + \frac{\eta+(\eta-1)\phi}{(\eta-1)(1+\phi)}\right) \cdot e^{-b_Z} & \text{if } b_Z > Z_1, \\ 0 & \text{if } b_Z \leq Z_1. \end{cases} \tag{OA.2.20}$$

Substituting Eq. (OA.2.18) into Eq. (OA.2.20) and solving for $dM^B(P_i)/db_Z$ yields

$$\frac{dM^B(P_i)}{db_Z} = \begin{cases} = -\frac{\left(\frac{\eta+(\eta-1)\phi}{(\eta-1)(1+\phi)}\right) \cdot e^{-b_Z}}{1+\frac{e^{-b_Z}}{(\eta-1)(1+\phi)^2} \cdot \frac{d\phi}{dM^B(P_i)}} < 0 & \text{if } b_Z > Z_1, \\ 0 & \text{if } b_Z \leq Z_1. \end{cases} \tag{OA.2.21}$$

Eq. (OA.2.21) together with Eq. (OA.2.18) imply that $d\phi/db_Z < 0$ if $b_Z > Z_1$, which in turn implies that $dE/db_Z < 0$ (see Eq. OA.2.13) and that $dP_i^m/db_Z > 0$ (see Eq. OA.2.17). Therefore, the overestimation of the common cost shock magnitude, b_Z, reduces the price elasticity of demand E whenever $b_Z > Z_1$ due to consumers' fairness concerns, prompting firms to set higher prices.

Finally, we determine the derivative of the actual markup with respect to b_z. Plugging the price P_i^m from Eq. (OA.2.14) into the actual markup (P_i/C_i) yields:

$$M_i = \frac{P_i}{C_i} = \left(\frac{\eta + (\eta - 1)\phi}{(\eta - 1)(1 + \phi)}\right); \tag{OA.2.22}$$

thus, the derivative of M_i with respect to b_Z is given by:

$$\frac{dM_i}{db_Z} = \frac{dM_i}{d\phi} \cdot \frac{d\phi}{db_Z},$$

since ϕ again depends on the perceived markup, which depends on b_Z. Taking the derivative of M_i with respect to ϕ yields:

$$\frac{dM_i}{d\phi} = -\frac{1}{(\eta - 1)(1 + \phi)^2} < 0. \tag{OA.2.23}$$

Hence, the derivative of M_i with respect to b_Z is:

$$\frac{dM_i}{db_Z} = \begin{cases} = -\frac{1}{(\eta-1)(1+\phi)^2} \cdot \frac{d\phi}{db_Z} > 0 & \text{if } b_Z > Z_1, \\ 0 & \text{if } b_Z \leq Z_1. \end{cases} \tag{OA.2.24}$$

Therefore, the overestimation of the size of the common cost shock, b_Z, also increases the actual markup charged by firms in the absence of search if $b_Z > Z_1$.

In summary, when consumers have elevated generalized inflation expectations, they attribute higher prices to broader market-wide cost increases, which reduces their perception of unfairness in pricing. This shift lowers the price elasticity of demand, as consumers become less responsive to price hikes. Firms capitalize on this reduced elasticity by increasing their markups and prices. These effects are again more pronounced in sectors less affected by supply-side shocks.

OA.3 Additional Tables

Dependent variable: $\hat{\pi}^e_{ht}$	(1)	(2)	(3)	(4)
Awareness$_h$ × Google$_{ct}$ × Material$_{ct}$	1.341***	1.308***	2.227***	1.493***
	(0.225)	(0.220)	(0.295)	(0.222)
Material$_{ct}$ × Awareness$_h$	0.140	0.514***	−0.497***	0.368***
	(0.119)	(0.120)	(0.173)	(0.121)
Awareness$_h$ × Google$_{ct}$	−0.293***	−0.163***	−0.089*	−0.147***
	(0.047)	(0.042)	(0.054)	(0.044)
Awareness$_h$ × Food Inflation$_{ct}$	0.542***		1.963***	
	(0.115)		(0.673)	
Awareness$_h$ × Food Inflation$_{ct}$ × Google$_{ct}$			−2.096*	
			(1.191)	
Awareness$_h$ × Energy Inflation$_{ct}$	0.186***		0.262**	
	(0.022)		(0.133)	
Awareness$_h$ × Energy Inflation$_{ct}$ × Google$_{ct}$			−0.085	
			(0.228)	
Awareness$_h$ × Core Inflation$_{ct}$	2.560***		8.960***	
	(0.365)		(1.752)	
Awareness$_h$ × Core Inflation$_{ct}$ × Google$_{ct}$			−11.845***	
			(3.156)	
Perceived (realized) inflation$_{ht}$		0.900***		1.555***
		(0.035)		(0.151)
Awareness$_h$ × Perceived (realized) inflation$_{ht}$		−0.126**		0.516**
		(0.052)		(0.250)
Perceived (realized) inflation$_{ht}$ × Google$_{ct}$				−1.179***
				(0.262)
Awareness$_h$ × Perceived (realized) inflation$_{ht}$ × Google$_{ct}$				−0.957**
				(0.415)
Observations	103,088	103,088	103,088	103,088
R-squared	0.549	0.556	0.549	0.556
Other constraints	✓		✓	✓
Country-time FE		✓		
Household FE	✓	✓	✓	✓

Table OA.3.1: Supply chain constraint pass-through to household inflation expectations: Interactions with household characteristics. This table presents estimation results from an adjusted version of Specification (4). The subscript notation is defined as follows: h is a household, c is a country, and t is a quarter. The dependent variable is a household-time level dummy equal to one if household h believes prices will increase a lot over the next 12 month. *Material*, *Labor*, *Financial*, and *Other* measure the share of firms that indicate that their production is constrained by the respective constraint. All constraints are transformed from the industry-country-time level to the country-time level using the share of consumption that each industry contributes to the final household consumption. *Awareness* is a dummy equal to one for households with an above median within household correlation between realized inflation over the last 12 months and the household's inflation estimate for the last 12 months. *Google* is a country-time level variable measuring the intensity of Google searches for "delays in shipping" (in the respective country's language). Non-reported controls include the other perceived constraints to production (*Labor*, *Financial*, and *Other*) in Columns (1), (3), and (4). *Food Inflation*, *Energy Inflation*, and *Core Inflation* are the country-time level CPI indices for food, energy, and core, respectively. *Perceived (realized) Inflation* is household h's perception about the inflation over the last 12 months. Standard errors are clustered at the country-demographics level and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Dependent variable: Markup$_{ijct}$	(1)	(2)
High profit margin$_{ijct}$	0.033**	
	(0.014)	
Low price elasticity$_{ijct}$		0.016*
		(0.009)
Observations	6,773	6,545
R-squared	0.884	0.879
Country-time FE	✓	✓
Firm FE	✓	✓

Table OA.3.2: Relationship between earnings call measures and estimated markups. This table presents results from regressing *Markup* on *High profit margin* (Column 1) and *Low price elasticity* (Column 2), respectively. The subscript notation is defined as follows: i is a firm, j is an industry, c is a country, and t is a quarter. The dependent variable is a firm's markup, which we estimate following De Loecker et al. (2020). *High profit margin* is an indicator variable equal to one if a firm states in their earnings call in a given quarter that it is maintaining or increasing its overall profit margins. *Low price elasticity* is an indicator equal to one if a firm states it is able to maintain or increase its overall profit margin due to resilient demand and high pricing power, but not for other reasons such as rising labor costs, rising input material costs, rising energy costs, or supply-chain disruptions. Standard errors are clustered at the country-industry-level and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

OA.4 Additional Figures

Figure OA.4.1: Inflation in Euro Area. This figure shows the CPI growth in the euro area at a monthly frequency from January 2016 to April 2023.

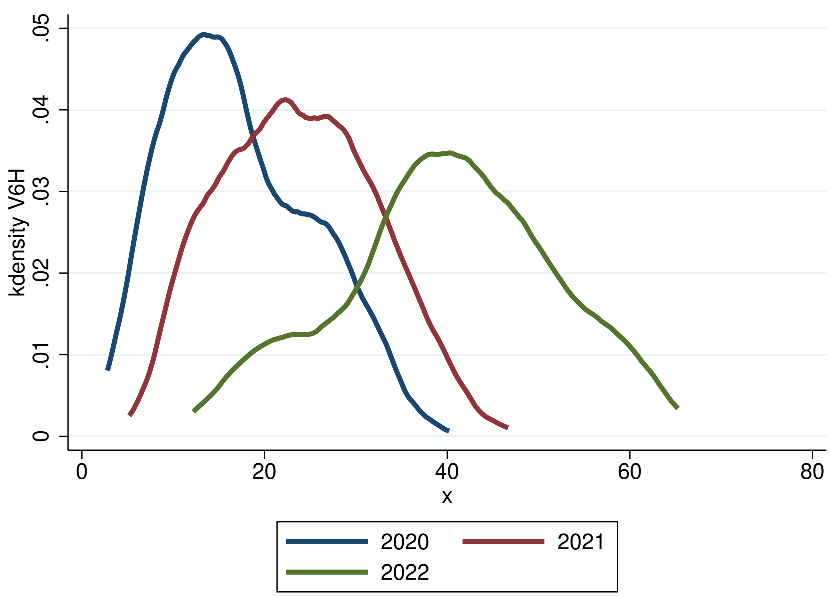


Figure OA.4.2: Distribution of inflation expectations over time. The figure shows three snapshots of the distribution of one-year ahead household inflation expectations.

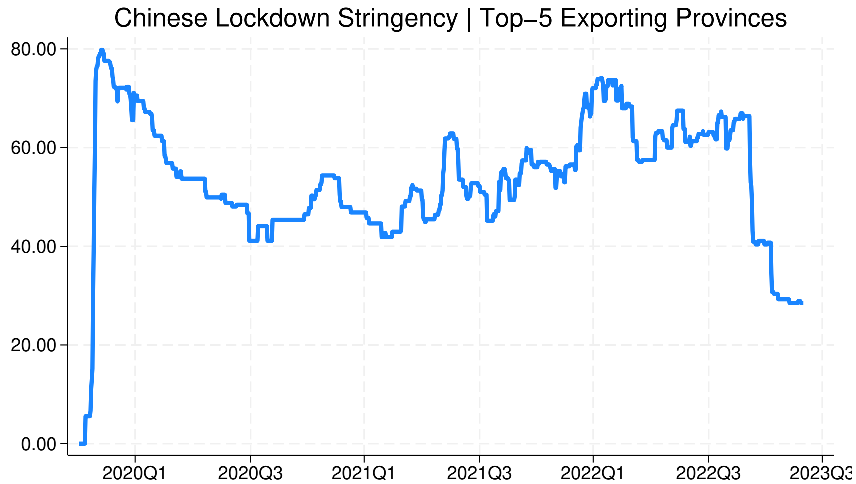


Figure OA.4.3: Chinese lockdown stringency index. This figure shows the time-series evolution of the aggregate stringency index of the top-5 exporting provinces in China.

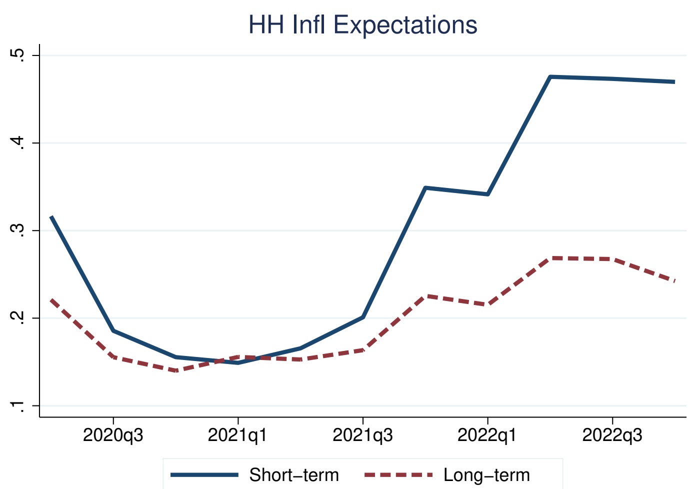


Figure OA.4.4: Short-term and long-term household inflation expectations. The figure plots the averages of household-time level dummies equal to one if household h believes prices will increase a lot over the next 12 month (short-term expectations; blue line) and equal to one if household h believes prices will increase a lot over the 12-month period between current year+2 and current year+3 (long-term expectations; dotted red line).

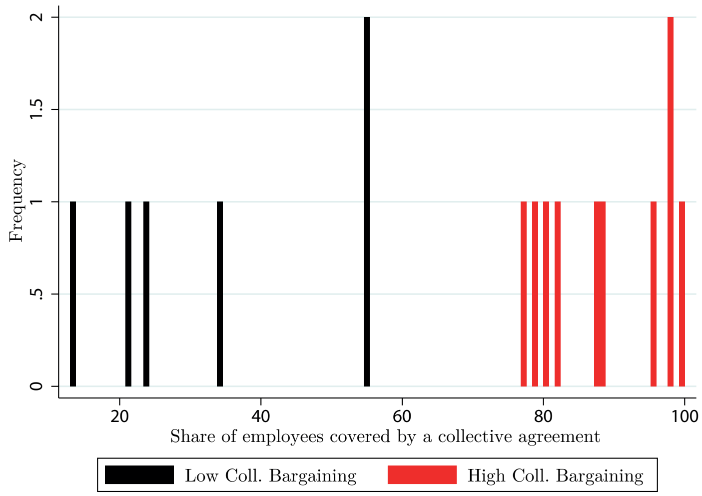


Figure OA.4.5: Share of employees covered by a collective agreement. This figure shows the distribution of the adjusted collective bargaining coverage rate from the OECD/AIAS ICTWSS database for our sample countries. This coverage rate is defined as the number of employees covered by a collective agreement in force as a proportion of the number of eligible employees equipped (i.e., the total number of employees minus the number of employees legally excluded from the right to bargain).