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Philip Bunn,[(1)] Nicholas Bloom,[(2)] Craig Menzies,[(3)] Paul Mizen,[(4)] Gregory Thwaites[(5)] and Ivan Yotzov[(6)]

Abstract

We present new evidence on how firms set prices using direct questions from a large economy-wide survey of UK firms. Since 2023, 54% of firms report setting prices in a state-dependent manner, as opposed to changing prices at fixed intervals. In contrast, 44% of firms used state-dependent pricing in 2019. Smaller firms, those with a higher share of non-labour costs, and those reporting higher subjective uncertainty around sales and prices are more likely to be state-dependent. We then analyse the implications of price-setting behaviour for inflation dynamics. State-dependent firms experienced a sharper increase in price growth over 2022–23, and also a faster subsequent decline. Using evidence from a randomised survey experiment, firm-level forecast errors and local projections, we show that prices of state-dependent firms respond more strongly to cost shocks. The difference between state-dependent and time-dependent firms is furthermore larger for bigger shocks, consistent with theoretical predictions.

Key words: Inflation, price-setting, survey data, firms.

JEL classification: C83, D22, D84, E31.

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1 Introduction

How do firms set prices? A key assumption in modern macroeconomics is that firm prices adjust with a lag. In other words, prices are 'sticky' or exhibit 'nominal rigidities'. This has important implications in macroeconomic models – for example, price stickiness allows monetary policy to have (short-run) impacts on real activity (Woodford, 2003). In practice, there are two main approaches to modelling price-setting behaviour which exhibit such nominal rigidities. In the first class of models, firms are able to change their prices in each period with a fixed probability (Calvo, 1983), or they are able to change prices at fixed intervals (Taylor, 1979). This is known as 'time-dependent' pricing. Alternatively, in the second class of 'state-dependent' models (Ball and Mankiw, 1994, 1995), firms are able to change prices every period, but have to pay a cost to do so. In other words, firms will only change prices when the benefit of doing so exceeds the cost. If shocks are small, firms will not adjust prices instantaneously, which again generates stickiness.[1]

The two modelling approaches offer some distinct theoretical predictions around how firms' prices should respond to shocks. On the extensive margin, the frequency of price changes should be constant for time-dependent firms (by construction), whereas it should increase with the magnitude of the shock for state-dependent firms. As a result, the pass-through of shocks is faster for state-dependent firms, particularly when faced with large shocks. Crucially, the two approaches give similar predictions when economic conditions are stable, but diverge in times of high inflation or when the economy is faced with large shocks (Alvarez et al., 2017; Auclert et al., 2024). These differences concern near-term inflation dynamics; over longer time horizons, pass-through should be roughly equal for both types of price-setting behaviour.

In this paper, we use new survey questions from the Decision Maker Panel (DMP) that directly ask firms how they set prices. We study which types of firms set prices in different ways and how the prices of these different groups respond to shocks. The DMP is a large, economy-wide monthly survey of UK firms established in late 2016. It regularly asks firms about their realisations and year-ahead expectations

[1]Other models of price-setting have also been introduced in the literature. For example, see Rotemberg, 1982; Mankiw and Reis, 2002; Reis, 2006; Ravn et al., 2006; Maćkowiak and Wiederholt, 2009; Ilut et al., 2020; Rebelo et al., 2025.

for output prices, sales, employment, and investment. We combine these regular series with a newly introduced question on how firms set prices. This question asks firms whether they normally set prices at regular intervals ('time-dependent') or in response to events ('state-dependent'). These questions have been asked multiple times since 2023, with observations from over 4,200 unique firms as of 2025. In addition, questions on the frequency of price changes have also been asked in the survey.

In the first half of the paper, we document recent trends in price-setting behaviour, and explore sectoral and firm-level heterogeneities. We find that both time-dependent and state-dependent price-setting is common across UK firms. On average between 2023 and 2025, 54% of firms report setting prices in response to events, whereas 46% set prices at fixed intervals. The share of state-dependent firms was the highest in 2023, at close to 60%. By the beginning of 2025, this share gradually fell to 50%, before increasing again over August-October 2025 to 54%. By comparison, around 44% of firms report setting prices in response to events in 2019.

Beyond the aggregates, we find evidence of significant heterogeneity in price-setting behaviour, across both sectors and at the firm level. Firms that produce or sell goods (e.g. manufacturing, wholesale & retail sectors) and firms with higher non-labour cost shares are more likely to be state-dependent. This could be the result of such firms facing more volatile input costs, particularly over the last three years. Conversely, service firms, whose costs may be more stable or change less frequently (e.g. annual wage contracts), are more likely to be time-dependent price-setters. Smaller firms are also more likely to be state-dependent in their price setting. Finally, we use data on firm-level uncertainty around future prices, sales, and unit costs and show that higher uncertainty is strongly correlated with a higher likelihood of state-dependent pricing.

In the second half of the paper, we study the implications of price setting behaviour for recent inflation dynamics and the pass-through of cost shocks. State-dependent firms experienced a much larger increase in price growth over 2022/2023 (and also a sharper decline over 2024-2025) than time-dependent firms. This is consistent with theory, where large shocks pass through faster to prices in state-dependent models (Cavallo et al., 2024). We also find that relative to 2019, state-dependent firms experienced a greater increase in the frequency of price changes. This is again in line with the theory, which suggests that the frequency of price changes for time-dependent firms should remain relatively stable.

To analyse the differences between state- and time-dependent firms for the pass-through of costs to prices, we use three complementary approaches. First, we use a randomised survey experiment. Over August-October 2024, firms in the DMP were asked how their prices would respond to a series of hypothetical unit cost shocks. We find that pass-through over a one-year horizon is significantly stronger for state-dependent firms, and the difference between state- and time-dependent price responses is only present for larger shocks. Second, we construct price growth and unit cost growth forecast errors, leveraging the strong panel dimension of the survey. Using unit cost growth forecast errors as plausibly exogenous cost shocks, we again find a faster response of prices for state-dependent firms, and especially for larger unit cost forecast errors. For smaller forecast errors, the differences between state- and time-dependent firms is not statistically significant. Finally, we use data on oil supply news shocks from Känzig (2021) and gas supply shocks from Alessandri and Gazzani (2025) to study the impact on firms' prices using local projections. For both oil supply and gas supply shocks, price growth of state-dependent firms reacts faster; time-dependent firms catch up after around six quarters. We also show that the difference between state- and time-dependent pricing increases more than proportionately for larger shocks, re-affirming the findings of non-linearities from the previous two approaches.

The results have several implications for modelling price-setting behaviour. First, they emphasise that state and time-dependent price-setting have very different implications for short-term inflation dynamics, particularly when firms are hit by large shocks. We estimate that firms' use of state-dependent pricing contributed an additional 1pp to aggregate output price inflation at peak near the end of 2021, relative to assuming all firms were time-dependent. In these settings, using models which do not incorporate state-dependent pricing would underestimate the speed of the inflation response and lead to potentially large forecast errors. Second, we show substantial evidence of heterogeneity in price-setting behaviour across sectors, with firms in the goods sector being much more likely to be state-dependent. Thus, the pass-through of sectoral shocks should also take into account whether these shocks fall on more state- or time-dependent sectors.

Related Literature This project relates to two main strands of the literature. First, it relates to papers which use price microdata to infer whether state-dependent (SD) or time-dependent (TD) pricing models are more well-suited for understanding inflation dynamics. A classic paper is Bils and Klenow (2004), who use US CPI price quota data from the Bureau of Labor Statistics over the period 1995-1997 to study the frequency of price adjustment across product categories. The authors conclude that the evidence is not consistent with time-dependent pricing models. Klenow and Kryvtsov (2008) provide detailed information on price adjustment frequencies, durations, and magnitudes in the US using the CPI Research Database. They argue that neither purely SD nor TD models perfectly fit the stylised facts, and models which incorporate features of both can more closely match the microdata. Nakamura and Steinsson (2008) use the US CPI Research Database and PPI Research Database and provide a detailed analysis of price adjustment frequencies, asymmetries in price adjustment, seasonality effects, and the role of sales and product substitutions. They conclude that some, but not all, of the findings are consistent with a standard menu cost pricing model. Dixon and Grimme (2022) use data from the ifo Business Cycle Survey and find that firm pricing decisions feature both SD and TD characteristics. In the UK, (Bunn and Ellis, 2012a,b) study PPI and CPI micro-data as well as supermarket prices, and find evidence of significant heterogeneity in pricing behaviour across sectors and product groups. These two papers conclude that conventional price-setting models are not able to fully capture the heterogeneity of price-setting observed in the data. Petrella et al. (2025) also use UK CPI microdata, and highlight the key role of price flexibility (specifically the extensive margin of price changes) for the pass-through of inflation shocks. Ascari and Haber (2022) use aggregate US data and find evidence that the transmission of monetary policy shocks exhibits both non-linearities and state-dependence, both of which are consistent with SD pricing models.[2]

[2]More recently, Montag and Villar (2023) use US CPI micro data and show that the recent inflation period was driven by a higher frequency of price changes (specifically price increases), whereas the absolute value of changes remained stable. In the euro area, Morris and de Vincent-Humphreys (2019) use a survey of euro area firms to study the frequency of price reviews and price changes. Dedola et al. (2023, 2024) use micro-data from the Price-setting Microdata Analysis Network (PRISMA) to study

A second set of studies in this literature uses evidence from the microdata to calibrate pricing models. Cavallo et al. (2024) argue that state-dependent models are better able to capture pass-through of large shocks, because they generate increases in the *frequency* of price changes. Likewise, Alvarez et al. (2017) show that for small shocks, the difference between SD and TD pricing is minimal, as long as they are appropriately calibrated. Furthermore, Auclert et al. (2024) show that the cost-price pass-through in menu cost SD models can be closely approximated by appropriately calibrated TD models. We contribute to this literature with direct evidence on firm price-setting behaviour from the DMP, an economy-wide firm survey which shows that both SD and TD pricing are common across firms. We also find that the pass-through of cost shocks to firm prices differs depending on price-setting behaviour, with quicker pass-through for SD firms.

Second, we contribute to recent research on cost-price pass-through using micro-data. Gopinath and Itskhoki (2010) show that firms with a higher frequency of price adjustment have stronger pass-through of exchange rate shocks to prices. Amiti et al. (2019) use data from the Belgian manufacturing sector and find evidence that firm prices respond to both own-costs and competitors' prices, consistent with evidence of strategic complementarities. Gagliardone et al. (2024, 2025) use similar Belgian manufacturing data to study cost-price pass-through, and emphasise implications for the estimation of the Phillips curve and aggregate inflation dynamics. Godl-Hanisch and Menkhoff (2024) use survey data from German firms and survey experiments to study cost pass-through dynamics. They find evidence of both micro real rigidities and nominal rigidities in price-setting. Gautier et al. (2023) find that the pass-through of wholesale gasoline prices to daily retail gasoline prices is consistent with a broad range of sticky price models. In the UK, Bunn et al. (2024a) use data from the Decision Maker Panel and show evidence of significant non-linearities in the pass-through of cost shocks to firm prices. We contribute to this literature by studying the differences in pass-through of costs to prices for state-dependent and time-dependent firms, using a hypothetical survey experiment, firm-level forecast errors, and local projections with exogenous oil supply news shocks (Känzig, 2021) and gas supply

price-setting dynamics and their implications for the Phillips curve and transmission of monetary policy.

shocks (Alessandri and Gazzani, 2025).[3]

The rest of the paper is structured as follows. Section 2 describes the Decision Maker Panel survey used for the empirical analysis. Section 3 provides descriptive statistics on state- versus time-dependent price setting. Section 4 examines the implications of different price-setting behaviour for inflation dynamics. Section 5 concludes.

2 Data

We use data from the Decision Maker Panel (DMP) survey.[4] The DMP is a monthly online survey of businesses in the UK. It was launched in late 2016 and is organised by the Bank of England, in collaboration with the University of Nottingham and King's College London. On average, it receives responses from around 2,500 firms each month (Figure A1), who account for around 4% of UK employment. The response rate of active panel members is around 50%. The survey is representative with good coverage across industries (see Bunn et al., 2024b for further details on survey representativeness).[5]

In the DMP, firms are regularly asked about their realised firm performance along a number of dimensions, including sales growth, own output price growth, employment, and capital expenditure. The question of output prices asks firms about changes in the average price that they charge rather than collecting data on the prices of individual goods or services. In addition, firms are asked about their year-ahead expectations for these variables. In particular, they are asked to provide a five-point distribution for their expectations and assign probabilities to each of the five scenarios. Figure A3 shows the template for the own-price expectations question. This format allows us to analyse not only the mean expected price growth (as the weighted

[3]A related literature has recently considered how differences in price-setting behaviour affect the pass-through of expected shocks. Using survey data from Swiss firms, Abberger et al. (2024) also find that around 60% can be classified as state-dependent. They furthermore show that state-dependent price-setting implies *lower* pass-through of inflation expectations to prices. Similarly, Ghassibe et al. (2025) use data from the DMP and show that the pass-through of expected future cost shocks to firms' optimal reset prices is lower for state-dependent firms.

[4]Monthly aggregated statistics on realisations and expectations of outcomes are available on the DMP website: https://decisionmakerpanel.co.uk/

[5]Figure A2 compares the coverage of the DMP survey across industries and by region with data for the universe of UK businesses from the Business Register. Panel A shows that the DMP broadly matches industry shares in the UK. It also matches the regional distribution (Panel B), but with a larger concentration for London.

average of the scenarios), but also construct firm-level measures of uncertainty and skewness over expected future price growth (see Yotzov et al. (2023), for example, who analyse firm-level inflation uncertainty using data from the DMP). Finally, since the DMP is a panel, we can compare firm expectations with their realisations *a year later*. Figure A15, Panel B presents this comparison for own-price growth, and shows that there is a very strong positive correlation between own-price expectations and realisations a year later. In other words, expectations are generally a very good guide to how firms' prices will actually evolve.

Figure 1 compares the trends in firm annual own-price growth from the DMP with annual Consumer Price Index (CPI) inflation excluding energy for the UK. The latter series is taken from the Office for National Statistics. The two series are highly correlated over the full sample period, including during the inflation surge in 2022. We exclude the contribution of energy from CPI, since energy costs have a much larger weight in the household CPI basket compared with firms, and have been particularly affected by the recent energy price shock. To highlight this, Figure A8 shows the trends in firm output price growth and headline CPI inflation instead.[6] The two series remain highly correlated in this figure as well, although headline CPI inflation has been more volatile in recent years.

New questions on state vs. time-dependent pricing In February 2023, new questions were introduced to the DMP survey, which asked firms how they usually set prices. Businesses could choose from two options: 'Mostly change prices in response to specific events (e.g. changes in costs or demand)' or 'Mostly change prices at fixed intervals (e.g. once a year or once a quarter, etc.)'. Figure A4 is a screenshot of the question in the survey platform. We interpret the first option as corresponding to state-dependent pricing behaviour, and the second option as time-dependent pricing behaviour in our analysis. These questions have been asked in four blocks since 2023: February-April 2023, February-April 2024, August-October 2024, February-April 2025.[7] In August-October 2025, a version of this question was asked. In ad-

[6]This is not the only difference between the DMP series and CPI inflation. The DMP is a sample of firms across the whole economy, whereas CPI inflation covers only consumer-facing firms. Furthermore, the CPI is constructed by weighting price changes by their shares in a representative consumer basket. In contrast, price growth in the DMP is weighted by industry and employment shares.

[7]The survey has a rotating panel structure, and these questions are included in one panel. Over three months, all firms in the panel are able to answer the question.

dition to how they set prices in 2025, firms were also asked to retrospectively report how they set prices in 2023 and 2019.[8] Figure A5 shows a screenshot of this question. Overall, by October 2025, the survey has received over 9,500 responses to these questions, from over 4,200 unique firms.

New questions on frequency of price change In addition to the questions on how firms set prices, questions have also been included since 2023 asking firms about the typical frequency of their price changes. These ask firms about their current frequency, as well as retrospectively about their frequencies in the past. Figure A6 presents a screenshot of this question in the survey platform, as asked in February 2025. In this vintage, firms are able to select one of six options – 'Daily'; 'Weekly'; 'Monthly', 'Quarterly'; 'Half-yearly'; 'Annually' – for 2019, 2024, and 2025. Over the past three years, we have collected data on the frequency of price changes in 2019 as well as for each year over 2022-2025.

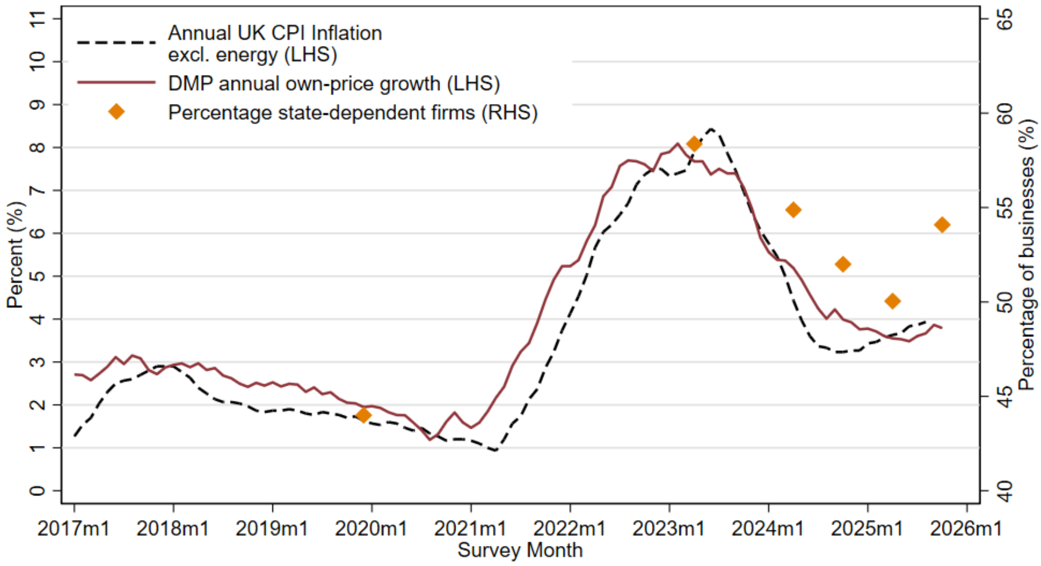
In the empirical analysis, we convert these responses to the approximate percentage of price changes in each month. For firms which select annual price changes, this corresponds to approximately 1/12th of prices changing each month; for half-yearly, it is 1/6th; and so on. This approach allows for more straightforward analysis of how the frequency of price changes has evolved over time and for different cross-sections of firms.

3 Characteristics of state- vs. time-dependent pricing

In this section, we analyse the characteristics of state- and time-dependent firms, based on survey answers over the past three years. Alongside the trends in firm price growth and CPI inflation ex-energy, Figure 1 shows the average proportion of state-dependent firms in each of the five periods when these questions were asked, and additionally plots the retrospective proportions for 2019. On average, since 2023 54% of firms report setting prices in a state-dependent manner. By comparison, the percentage of state-dependent firms in 2019 was 44%. State-dependency was higher in February-April 2023, at 58%. During these months, firm price growth was near its peak rate, at 7.7% on average. Subsequently, the state-dependent share declined, and

[8] 761 firms responded to the question in 2023 and the retrospective question about 2023. Of these, 75% of firms gave the same answer, suggesting a high degree of recall.

Figure 1: Firm annual price growth, annual CPI inflation (excl. energy), and share of state-dependent firms

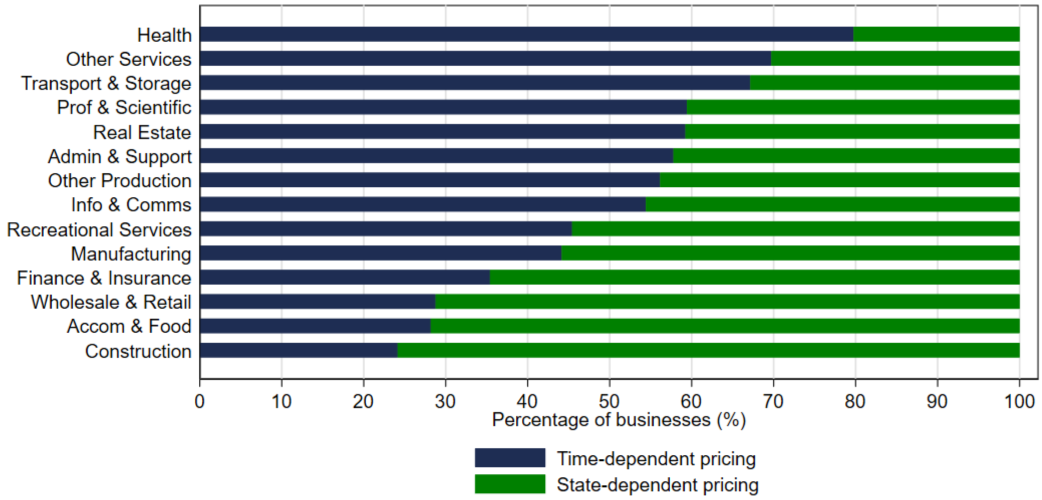


Notes: The data on annual own-price growth are based on data from the Decision Maker Panel. The data on annual CPI inflation (excl. energy) is taken from the Office for National Statistics. The series are three-month moving averages. The percentage of state-dependent firms is based on responses to the question: 'Which of the following best describes how your business usually sets prices?'. Respondents were asked to choose one of the following options: (i) Mostly change prices in response to specific events (eg changes in costs or demand), (ii) Mostly change prices at fixed intervals (eg once a year or once a quarter, etc).

by February-April 2025 it was 50%. Output price inflation also fell over this period. In 2025, firm output price growth and CPI inflation have again increased. This was also reflected in an increase in the share of state-dependent firms over August-October 2025 to 54%. Overall, the proportion of state-dependent firms has increased in recent years compared to pre-pandemic averages, and appears to be sensitive to the broader inflation environment as well.

The changing share of state-dependent firms in Figure 1 reflects both new firms answering the question and some firms changing their responses over time. Across all responses, we find that around 80% have always responded in the same way, and around 20% have changed from either state- to time-dependent pricing, or vice versa. Table A1 shows that regardless of the number of times firms had responded to the price-setting question, firms that never switched price-setting behaviour remained the largest group, typically accounting for over 60% of each subsample. Among those that do switch, most do so only once, while multiple switches are relatively rare.

Figure 2: State- vs. time-dependent price setting by industry



Notes: This figure compares the use of state- and time-dependent pricing across industries. The average is based on data collected over five response periods: Feb-Apr 2023, Feb-Apr 2024, Aug-Oct 2024, Feb-Apr 2025, and Aug-Oct 2025.

Beyond the aggregate shares, we find substantial differences in price-setting behaviour across sectors and industries of the economy. Existing research has documented significant heterogeneity in the frequency of price changes across sectors (e.g. Bunn and Ellis, 2012a,b; Davies, 2021), but not on state- versus time-dependent behaviour. State-dependent pricing is more common among firms in the goods sector (65% of firms) than in the services sector (46% of firms), where firms are more likely to be time-dependent.[9] Within services, consumer-facing firms are more likely to be state-dependent (51% of firms) than business-facing firms (43%). Figure 2 shows the split by price-setting behaviour for broad industry groups. State-dependent pricing was reported to be most common in the construction industry, with 76% of firms setting prices in response to events, followed closely by 72% of firms in accommodation and food and 71% of firms in wholesale and retail. The industries with the highest share of time-dependent firms were health (80%), other services (70%), and transport and storage (67%). Overall, no industry is fully time-dependent or fully state-dependent, highlighting the heterogeneities in price-setting both across sectors and within them. We next analyse how price-setting behaviour varies across a number of firm-level characteristics.

[9]Figure A7 illustrates the distribution of price-setting behaviour across the goods and services sectors. In the goods sector, 65% of firms report setting prices in a state-dependent manner, compared with 46% in the services sector.

In Table 1, we analyse the determinants firm price-setting behaviour. The dependent variable pools all the individual survey responses from firms over time and is a dummy equal to 100 for firms which reported setting prices in response to events and zero for firms that reported setting prices at fixed intervals. First, in Column 1 we show that there is a positive and significant relationship between CPI inflation and the probability of state-dependent price setting, even conditional on industry fixed effects. This confirms the trends shown in Figure A8. In the remaining specifications, we control for SIC2 industry fixed effects and time fixed effects. Column 2 shows that smaller firms are more likely to use state-dependent pricing. In Column 3 we look at the correlation with firm non-labour cost shares. These are calculated as the share of non-labour costs as a percentage of total costs using firm accounts data. The coefficient shows that firms for whom non-labour costs are more important are more likely to be state-dependent price-setters. Conversely, firms that have relatively higher labour costs are more likely to be time-dependent. Labour costs are likely to be less volatile and more predictable than non-labour costs and may therefore be more suitable for a time-dependent pricing strategy. This finding is also consistent with the industrial breakdowns, as goods producers have higher non-labour cost shares on average and higher shares of state-dependent firms.

One reason why firms may set prices in response to events is that economic conditions are more uncertain. In this case, firms may need to be more responsive to changing circumstances. We can measure firm-level uncertainty as the standard deviation of expectations for own-price growth, sales growth, and unit cost growth, using the five-point distributions firms are asked to provide. Columns 4-6 of Table 1 examine the relationships between price-setting behaviour and firm-level uncertainty. Across all three columns, we find a strong positive relationship, suggesting that higher uncertainty is associated with a higher likelihood of state-dependent pricing. Higher uncertainty could also be one reason why smaller firms are more likely to be state-dependent: as shown in Yotzov et al. (2023), smaller firms have higher firm-level inflation uncertainty on average. However, the causality of this relationship between subjective uncertainty and how firms set prices is not clear-cut. Firms that only set prices at fixed intervals, and particularly on an annual basis, may be less uncertain about their future prices because they choose to set prices in this way.

Table 1: Determinants of state- vs. time-dependent price setting

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable:	State-Dependent Price Setting (scaled by 100)						
Sample period:	2023-2025						
Estimation:	OLS						
CPI Inflation	0.851***						
	(0.317)						
ln(Employment)		-3.090***					-1.643***
		(0.499)					(0.587)
% of non-labour costs in total costs			0.284***				0.248***
			(0.050)				(0.050)
ln(Subjective Price Uncertainty)				13.996***			12.582***
				(1.214)			(1.370)
ln(Subjective Sales Uncertainty)					5.289***		-0.603
					(1.084)		(1.192)
ln(Subjective Cost Uncertainty)						9.661***	3.028
						(2.377)	(2.438)
SIC2 industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.095	0.109	0.111	0.128	0.106	0.105	0.138
Observations	4,172	4,172	4,172	4,172	4,172	4,172	4,172

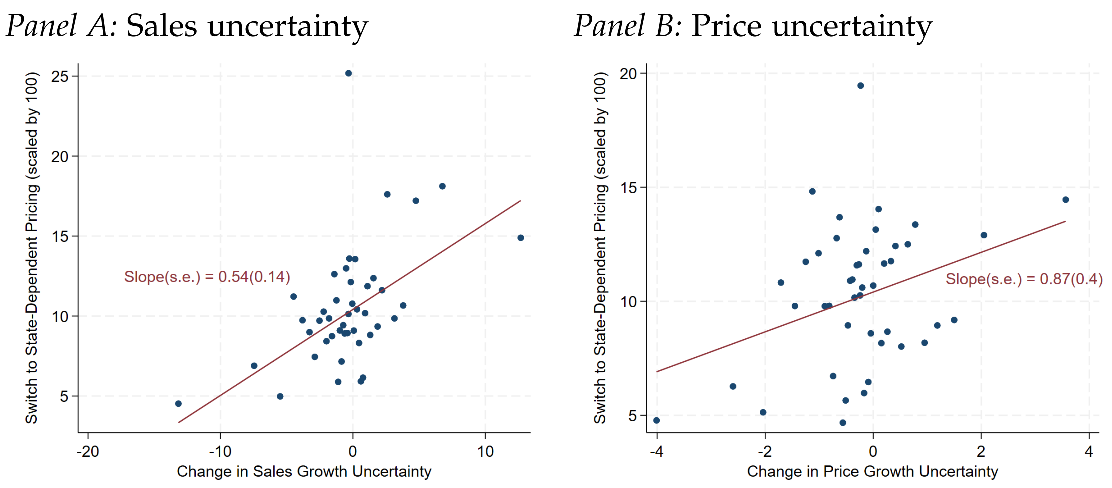
Notes: The dependent variable is a dummy for whether a firm uses state-dependent pricing, rescaled by 100 for presentational purposes. For firms which have responded to the question multiple times, the latest response is used in the regression. A constant has also been estimated, but not reported in the table. Where data are missing for a particular variable a dummy variable is included to account for that (results not reported). Standard errors are clustered at the firm level and reported in parentheses, stars indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Finally, Column 7 shows that once all variables are included together, the most significant correlates of price-setting behaviour are firm size, non-labour cost share, and inflation uncertainty.[10]

Finally, although around 80% of firms have not changed their price-setting behaviour in our sample, it is important to analyse what factors may predict these changes across firms. To study this, we consider firms which have answered the questions on price-setting behaviour more than once, and compare how changes in their subjective uncertainty correlate with changes in their responses. Figure 3 presents binned scatter plots of the change in sales growth uncertainty (Panel A) and the change in price growth uncertainty (Panel B) on an indicator for firms switching from time-dependent to state-dependent pricing. Firms which have not changed price-setting or have switched from state- to time-dependent pricing are treated as the reference category. The positive relationship in both panels suggests that increases in uncertainty *within* firms are indeed correlated with a higher likelihood of becoming state-dependent. Thus, it is not only that higher subjective uncertainty is correlated with state-dependent pricing, but *changes* in subjective uncertainty are also correlated

[10]Figure A9 presents binned scatter plots of the relationships between firm price-setting behaviour and each of the firm characteristics in Table 1.

Figure 3: Subjective uncertainty and changes in price-setting behaviour



Notes: This figure presents binned scatter plots of the change in subjective sales uncertainty (Panel A) and subjective price uncertainty (Panel B) and the likelihood of switching between time-dependent and state-dependent pricing at the firm level. The y-axis is a dummy for whether a firm switched from time- to state-dependent pricing, scaled by 100 for presentational purposes. The coefficient estimates and standard errors are taken from Columns 1 and 2 in Table A2.

with changing price-setting behaviour.[11]

3.1 Frequency of price changes

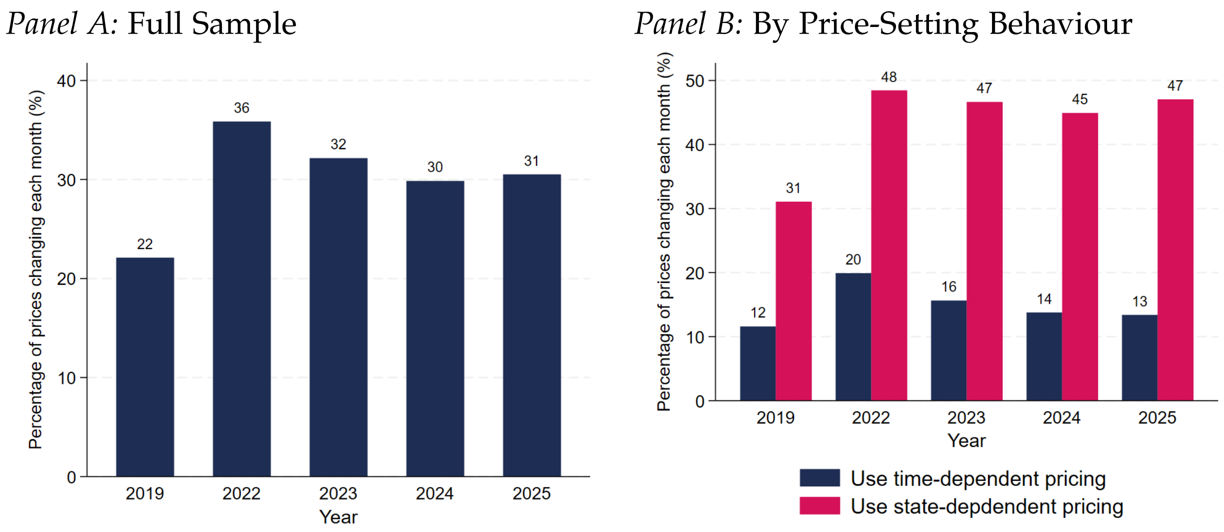
In addition to the questions on how firms usually set prices, firms in the DMP have also been asked about the frequency of their price changes. These data are available for 2019 as well as over 2022-2025. As described in Section 2, we convert the categorical responses to the approximate percentage of prices which change each month for the empirical analysis.

Figure 4, Panel A presents the results over the full sample. In 2019, we estimate that 22% of prices change every month. This increases sharply to 36% in 2022, when inflation rates in the UK were rising rapidly. Over 2023-2025, the frequency has declined from this peak, but remains above the 2019 levels. In 2025, approximately 31% of prices change each month.

Panel B of Figure 4 shows that there is a significant difference in the frequency of price changes across state-dependent and time-dependent firms. State-dependent firms have a higher average frequency across all years. State-dependent firms also

[11]Table A2 shows the determinants of changing to state-dependent pricing behaviour. Both changes in sales growth and price growth uncertainty are individually statistically significant correlates (Column 1-2). When both are included in the same specification, changes in sales growth uncertainty remain significant, whereas changes in price growth uncertainty become significant only at around 12% significance level.

Figure 4: Frequency of price change over time



Notes: The data on frequency of price change is based on responses to the following question: "Approximately, how often did you change/do you expect to change your prices in each of the following periods?" Firms could select from: Daily; Weekly; Monthly; Quarterly; Half-yearly; Annually; Prices did not change. These responses are then used to estimate the percentage of prices which change in a given month. The data on state-dependent and time-dependent pricing is described in the notes of Figure 1.

saw a much larger increase in the frequency at which they changed prices after 2019, consistent with the predictions of theory. There was still some increase in the frequency of price changes for time-dependent firms, indicating that the horizon at which firms update prices can still change in exceptional circumstances. However, this share quickly returned back towards normal, whereas the frequency of price changes for state-dependent firms remained well above 2019 levels. Thus, the higher aggregate frequency of price changes in 2025 from Panel A is almost entirely driven by state-dependent firms.

Overall, this section documents that firm price-setting behaviour exhibits significant heterogeneity, both across sectors and along a number of firm-level characteristics. It also shows that there are large differences in the frequency of price adjustment for these two sets of firms. In the next section, we study the implications of price-setting behaviour for cost-price pass-through and inflation dynamics.

4 Implications of price-setting behaviour for inflation dynamics

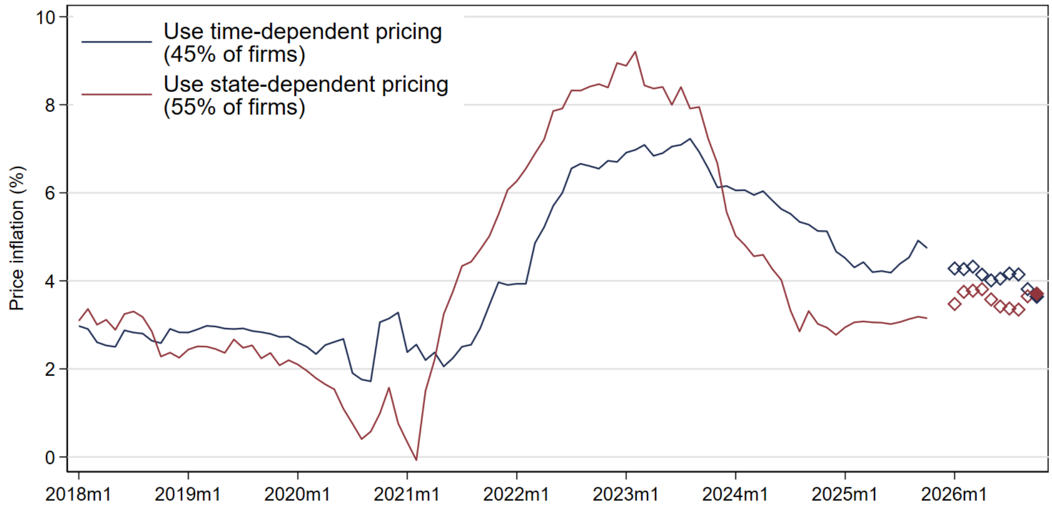
In this section, we analyse the implications of state- and time-dependent pricing for inflation dynamics and the pass-through of costs to prices. We do this using four distinct approaches. In Section 4.1, we analyse the trends in firm output price growth and price growth expectations. Second, in Section 4.2 we use hypothetical unit cost shocks to test the differences between state- and time-dependent firms. Third, in Section 4.3 we analyse the relationship between firm unit cost growth and price growth forecast errors, leveraging the panel dimension of the survey data. In Section 4.4 we use firm-level local projection to test the differences in pass-through of oil supply news shocks and gas supply shocks to firm prices depending on price-setting behaviour. Finally, in Section 4.5, we quantify the contribution of state-dependent pricing in recent inflation dynamics.

4.1 Aggregate trends in price growth

We begin by analysing average firm output price growth since 2018, split by whether firms set prices in a state-dependent or time-dependent manner. We create time-invariant indicators for price-setting behaviour at the firm level, and restrict the sample to firms which have not changed their responses over 2023-2025 to avoid endogeneity concerns. Once switchers are excluded, 55% of firms are state-dependent, and 45% are time-dependent. The trends in price growth are presented in Figure 5.[12] Over the full sample from 2018 to 2025, average output price growth was very similar, at 4.6% for state-dependent firms and 4.7% for time-dependent firms. However, there are significant differences in the (short-term) dynamics of price growth over this period. State-dependent firms experienced a more pronounced slowdown in price growth in 2020 during the first year of the Covid pandemic. But subsequently, price growth for state-dependent firms increased more quickly and reached a higher peak of 9.2% in the three months to February 2023, before falling rapidly over 2024. Price growth for time-dependent also increased over 2021-2023, but it peaked at a lower rate and remained elevated for longer. The decline in price growth

[12] For completeness, in Figure A10, we present a similar figure which includes all firms, including those that have changed their price-setting behaviour at least once over 2023-2025.

Figure 5: Firm output price growth by price-setting behaviour



Notes: This figure shows trends in own-price growth (solid lines) and expected year-ahead own-price growth (diamonds), split by price-setting behaviour. Firms are split into state-dependent and time-dependent pricing based on each firm's most recent response to this question (as of October 2025). The sample includes only firms which have not changed their price-setting behaviour over 2023-2025. The series are three-month moving averages, with the latest data up to October 2025.

among time-dependent firms was also more gradual over 2024. In the three months to October 2025, annual price growth for time-dependent firms was 4.7%, whereas it has declined to 3.2% for state-dependent firms.[13] Looking to the year ahead, expected price growth has converged further: in the three months to October 2026, state-dependent firms expect price growth of 3.7%, and time-dependent firms expect price growth around 3.6%. These are indicated by the solid diamonds in Figure 5.

The trends in firm price growth since 2020 by price-setting behaviour are visually consistent with the theoretical predictions of state- and time-dependent models in the face of large shocks. Over longer time horizons, average price growth is similar for both groups, but state-dependent firms experience both faster increases and decreases in price growth. In the following subsections, we provide further evidence on the differences between state- and time-dependent firms using a randomised survey experiment, analysing firm cost growth and price growth forecast errors, and using firm-level local projections.[14]

[13] The difference in price growth by price-setting behaviour is particularly pronounced between time-dependent firms who change prices annually, and both state-dependent firms and time-dependent firms who change prices more than once a year. This is shown in Figure A11 and highlights the importance of the frequency of price change in inflation dynamics.

[14] Bunn et al. (2024a) also use a randomised survey experiment and forecast errors to analyse non-linearities in cost-price pass-through. Specifically, the authors find a strong asymmetry in pass-through, with positive cost shocks leading to stronger price responses than negative shocks.

4.2 Hypothetical unit cost shocks

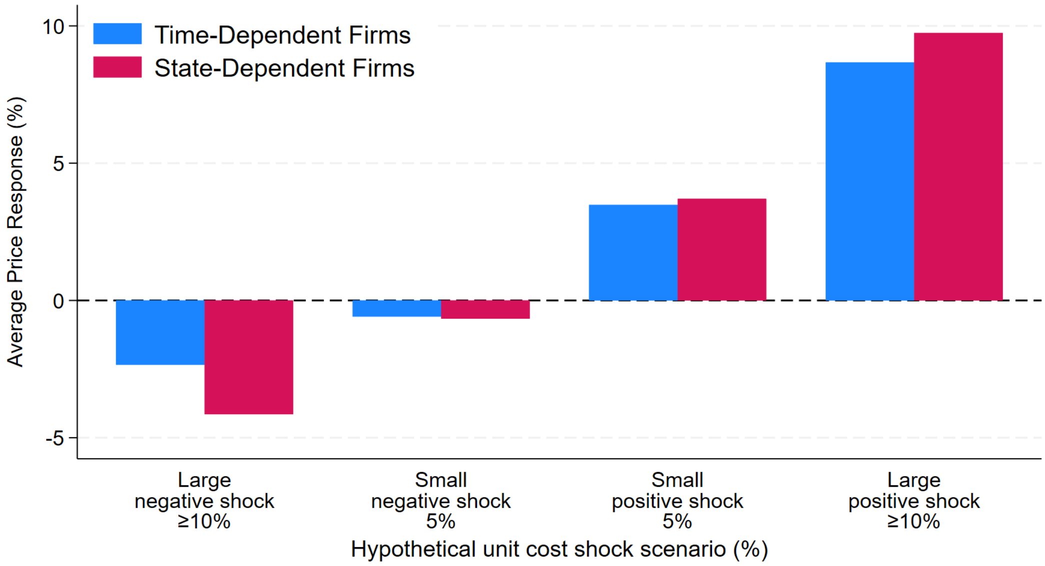
In this section, we analyse the pass-through of costs to prices depending on price-setting behaviour using a randomised survey experiment. Over August to October 2024, firms in the DMP were asked how they would change their prices in response to hypothetical changes in their unit costs. Specifically, firms were randomised into one of four shock 'scenarios': ±5%; ±10%; ±15%; and ±20%. Each firm responded to both the positive and negative scenarios, for a given shock value, and they were randomised into responding to the positive or the negative scenario first. Figure A12 shows example screenshots of this question from the survey platform for the main scenario (Panel A) and reverse scenario (Panel B). Firms are first asked to indicate whether they would change their price or not. If they indicate that they would change their price, they are subsequently asked to provide a point estimate for their price response. Over the three months, the survey received responses from 1,864 firms, yielding 3,728 observations (two scenarios per firm).

Figure 6 shows the average price response to hypothetical cost shocks, separately for state-dependent and time-dependent pricing firms. For presentational purposes, we define 'small shocks' as ±5% and 'large shocks' as ±10%; ±15%; or ±20%.[15] In order to avoid potential endogeneity of the price-setting behaviour to cost shocks, the sample is restricted to firms which have not changed their price-setting behaviour over the sample period (around 80% of businesses).

There are three main takeaways from this figure. First, across both types of firms there is a positive relationship between costs and prices; negative cost shocks lead to lower prices whereas positive cost shocks lead to higher prices. Second, the response of state-dependent firms is stronger than that for time-dependent firms. This is consistent with a faster pass-through of shocks to prices for these firms, as they can respond to changing conditions more quickly. Finally, the third result is that for small shocks (i.e. ±5%), the differences between state- and time-dependent firms are relatively small, whereas they become more meaningful for larger shock values. This is consistent with the theoretical predictions, whereby for larger shocks state-dependent firms are more likely to adjust prices, resulting in quicker pass-through (e.g. Cavallo et al., 2024).

[15] Figure A13 shows the average price response for each individual shock scenario.

Figure 6: Average price responses to hypothetical cost shocks by price-setting behaviour



Notes: This figure shows the average price response to hypothetical unit cost shocks for state-dependent and time-dependent firms. The questions on the price responses to unit cost shocks were asked over August-October 2024. The sample includes only firms which have not changed their price-setting behaviour. 'Small shock' are defined as ±5% and 'large shocks' are defined as ±10%; ±15%; or ±20%.

In Table 2, we test the robustness of the findings from Figure 6 in a regression framework. Column 1 reports the pass-through across all firms: on average, it suggests a cost-price pass-through of 42%, which is highly significant at the 1% level. In Column 2, this is separated into the pass-through of state-dependent vs. time-dependent firms. As suggested by Figure 6, the pass-through increases to 47% for state-dependent firms, whereas it is 37% for time-dependent firms. The row at the bottom of the table indicates that the difference between the two estimates is highly statistically significant. In Column 3, we add a set of additional firm controls in the regression. These include firm employment, firm age, import cost share, non-labour cost share, labour productivity, and industry energy costs. The results remain robust to these additional firm controls. Finally, Column 4 test for differences in pass-through for small versus large shocks. For small shocks (defined as ±5%), pass-through ranges from 40% to 44% for time- and state-dependent firms (and the difference is not statistically significant). However, for large shocks, the difference is much larger (36% for time-dependent firms versus 47% for state-dependent firms) and highly significant. This is consistent with theoretical predictions that the differences in price-setting behaviour are only salient when shocks to the economy are

Table 2: Average price price responses to hypothetical cost shocks by price-setting behaviour

	(1)	(2)	(3)	(4)
Dependent variable:	Average Price Response (%)			
Sample period:	August-October 2024			
Unit cost shock	0.423***			
	(0.012)			
Unit cost shock × Time-Dependent		0.365***	0.365***	
		(0.016)	(0.016)	
Unit cost shock × State-Dependent		0.470***	0.471***	
		(0.017)	(0.017)	
Unit cost shock × Small Shock × Time-Dependent				0.401***
				(0.033)
Unit cost shock × Small Shock × State-Dependent				0.437***
				(0.034)
Unit cost shock × Large Shock × Time-Dependent				0.364***
				(0.017)
Unit cost shock × Large Shock × State-Dependent				0.472***
				(0.017)
Additional firm controls	No	No	Yes	Yes
R^2	0.471	0.478	0.577	0.577
Number of Observations	2,210	2,210	2,204	2,204
Test coefficients equal (p-value)		0.000	0.000	
Small shock coefficients equal (p-value)				0.447
Large shock coefficients equal (p-value)				0.000

Notes: This figure shows the average price response to hypothetical unit cost shocks for state-dependent and time-dependent firms. The questions on the price responses to unit cost shocks were asked over August-October 2024. The sample includes only firms which have not changed their price-setting behaviour. 'Small shocks' are defined as ±5%; 'large shocks' are the remainder. Additional firm controls include: firm employment; firm age; import cost share; non-labour cost share; labour productivity; and industry energy costs. Where data are missing for a particular variable a dummy variable is included to account for that (results not reported). Standard errors are clustered at the firm level and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

larger.

In addition to using the firm-level variation in price-setting behaviour, we obtain similar results if we split the sample by whether the majority of firms in an industry use state-dependent or time-dependent pricing (as shown in Figure 2). This result is shown in Figure A14. Industries where the majority of firms are state-dependent price-setters exhibit faster pass-through, with differences most significant for larger shocks.[16]

In sum, this section presents evidence from a survey experiment that state-dependent firms pass-through cost shocks to prices faster than time-dependent firms. Furthermore, these differences are significant only for large shocks. Although the randomisation provides the strongest evidence of causality, one limitation is that it may not necessarily reflect firm responses in reality. Furthermore, the survey experiment is

[16]A similar result can be shown splitting by goods and services, which is consistent given the majority of firms in the goods sector are state-dependent price-setters, and majority of firms in the services sector are time-dependent, see Figure A7.

focused on price responses over a one-year horizon, so we are not able to consider the dynamics of pass-through over a longer period. In the next section, we address these limitations by considering the relationship between unit cost growth and price growth forecast errors at the firm level.

4.3 Unit cost growth forecast errors

In this section, we analyse the relationship between unit cost growth and price growth forecast errors, and test whether there are significant differences between time-dependent and state-dependent firms. To construct forecast errors, we leverage the panel dimension of the survey, and compare firm realised annual own-price growth and annual unit cost growth to year-ahead expectations for both variables reported a year earlier. Specifically, we define the forecast error of variable Y, for firm i in period t as:

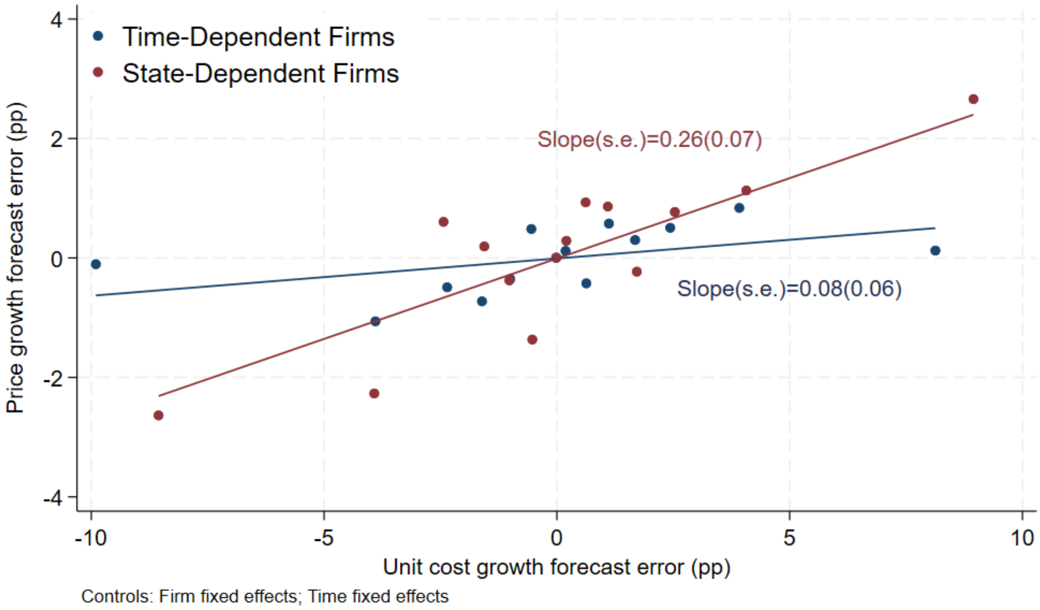
$$ForecastError_{i,t}^{Y} = Y_{i,t} - E_{t-12}[Y_{i,t}]$$

The questions on price growth and price growth expectations have been asked in the survey since 2016, and therefore forecast errors can be constructed consistently since late-2017. The questions on unit cost growth and cost growth expectations have been asked less regularly; forecast errors can only be constructed in 2018 and over 2023-2025 (with gaps).[17] On average, firms expectations correlate strongly with realisations a year later. Figure A15 shows the correlations between realisations and expectations for both unit cost growth and price growth. However, the relationship is not perfect and firms also make forecast errors. We use this variation to test how *unexpected* changes in costs affect subsequent price dynamics.

Figure 7 presents a binned scatter plot of the relationship between unit cost growth and price growth forecast errors, separately for state- and time-dependent firms. For both sets of firms, there is a positive relationship; in other words, positive cost shocks lead to higher price growth than expected, and conversely for negative cost shocks.

[17] To be precise, unit cost growth forecast errors can be constructed over February-April 2018; May-July 2023; May-July 2024; May-July 2025. The questions on unit cost growth are also asked in a different panel than price growth questions. For this reason, the data are collapsed to the quarterly frequency in the regression specification.

Figure 7: Price growth and unit cost growth forecast errors by price-setting behaviour



Notes: This figure shows a binned scatter plot of the relationship between price growth forecast errors and unit cost growth forecast errors, separately for state-dependent and time-dependent firms. The scatter plot additionally controls for firm and time fixed effects. The sample period is 2018; 2023-2025 (with gaps). The sample includes only firms which have not changed their price-setting behaviour. The coefficient estimates and standard errors are taken from Column 2 of Table 3.

Crucially, we also find that the relationship is clearly stronger for state-dependent firms (red line) compared to time-dependent firms (blue line). This reaffirms the finding that state-dependent firms pass-through cost shocks faster to prices, as already suggested in the aggregate trends from Section 4.1 and the hypothetical unit cost shocks from Section 4.2. We next test whether these differences are statistically significant in a regression framework.

In Table 3, we formally test the relationship between unit cost growth and price growth forecast errors. Because we have multiple observations per firm, we include firm fixed effects in these regressions, to capture unobserved firm heterogeneity. Additionally, we include time fixed effects to capture aggregate trends which may be affecting all firms. Column 1 shows that there is a strong positive relationship between cost shocks and price errors – on average, a 1pp positive unit cost error leads to a 0.2pp stronger annual price growth compared to expectations. Column 2 shows that there is a significant difference between state- and time-dependent firms. For state-dependent firms, pass-through increases to 26% and remains highly significant. However, for time-dependent firms, the pass-through is much weaker, at 8%, and not

Table 3: Price growth and unit cost growth forecast errors by price-setting behaviour

	(1)	(2)	(3)	(4)
Dependent variable:	Price Growth Forecast Error (pp)			
Sample period:	2018Q1-2025Q3 (with gaps)			
Unit cost growth forecast error	0.1995*** (0.0538)			
Unit cost growth forecast error X Time-Dependent		0.0757 (0.0628)	0.0864 (0.0640)	
Unit cost growth forecast error X State-Dependent		0.2614*** (0.0715)	0.2552*** (0.0727)	
Expected own-price growth			0.5161*** (0.1818)	
Unit cost growth forecast error X Small Error X Time-Dependent				-0.0503 (0.2098)
Unit cost growth forecast error X Small Error X State-Dependent				0.1691 (0.2492)
Unit cost growth forecast error X Large Error X Time-Dependent				0.0892 (0.0628)
Unit cost growth forecast error X Large Error X State-Dependent				0.2632*** (0.0732)
Time fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
R^2	0.493	0.497	0.515	0.498
Number of Observations	967	967	960	967
Test coefficients equal (p-value)		0.049	0.078	
Small error coefficients equal (p-value)				0.509
Large error coefficients equal (p-value)				0.070

Notes: This table shows the relationship between unit cost growth and price growth forecast errors. In Column 4, 'small errors' are defined as unit cost growth forecast errors smaller than 3.5pp in absolute value (around two-thirds of the sample). The sample includes only firms which have not changed their price-setting behaviour. Standard errors are clustered at the firm level and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

statistically significant from zero. Importantly, the difference between the two coefficients is also statistically significant at the 5% level, as indicated by the row at the bottom of the column. Column 3 shows that this difference remains significant when also controlling for year-ahead price expectations.

One of the main findings from Section 4.2 is that the difference between state- and time-dependent firms is only significant for larger shocks. We perform a similar exercise using forecast errors. Specifically, we define 'small cost growth errors' as those below 3.5pp in absolute value, and 'large cost growth errors' as those greater than 3.5pp in absolute value. Small errors account for around two-thirds of the sample. Column 4 of Table 3 shows that for small errors, the pass-through to price is not significant for both types of firms, and the difference between the coefficients is also not statistically significant (p-value = 0.51). For large errors, the pass-through remains insignificant for time-dependent firms, but becomes highly significant for state-dependent firms. The difference between the two coefficients is also significant at 10% for large errors. Thus, the differences between the two types of price-setting only become salient for larger cost shocks, consistent with the findings from the hypothetical shocks.

Although state-dependent firms respond faster to cost shocks, one might expect time-dependent firms to catch-up and pass-through to be roughly equal over longer time horizons. We cannot test this directly using price growth forecast errors, since these are only defined over a 12 month period. Instead, we test the relationship between cumulative *realised* price growth and unit cost growth errors at the one-year and two-year horizons. These results are shown in Figure A16. The left panel shows the coefficient estimates of realised price growth between $t-1$ and t, on unit cost forecast errors defined over the same period. The pass-through for state-dependent firms is positive and significant at the 5% level, whereas it is much smaller quantitatively and insignificant from zero for time-dependent firms. These results are similar to the findings in Table 3. In the right panel, we instead regress the cumulative realised price growth between $t-1$ and $t+1$ and unit cost growth between $t-1$ and t. This allows us to test whether time-dependent firms 'catch-up' over a longer horizons. Indeed, this is what we find. The pass-through for state-dependent firms is roughly unchanged, whereas for time-dependent firms it increases sharply. Thus, the differences between state- and time-dependent firms concern the *speed* of pass-through, with the amount of pass-through being very similar over longer horizons.

We similarly plot binned scatter plots of the relationship between unit cost growth and price growth forecast errors split by whether the majority of firms in an industry use state-dependent or time-dependent pricing. In Figure A17 we show that industries where the majority of firms are state-dependent price-setters (red lines) show a stronger positive relationship between unit cost growth and price growth forecast errors than sectors or industries where the majority of firms are time-dependent price-setters (blue lines), supporting the results shown in Figure A14.[18]

Firms in the DMP are asked about the average change in the prices they charge over the last 12 months, and about year-ahead expectations for price growth. Therefore, it is not possible to directly separate the extensive vs. intensive margins of price changes using these data. To analyse whether larger cost growth errors lead to a stronger extensive margin response for state-dependent firms, we instead use

[18] Splitting by goods and services also further validates this result but the results are not presented here.

data on the average frequency of price change, presented in Figure 4. We compare whether larger (absolute) unit cost growth errors are correlated with higher frequency of price changes. This is presented in Figure A18. Two things stand out from this figure. First, there is a clear level difference, with state-dependent firms changing prices more frequently on average. Second, the relationship between the frequency of price change and cost errors is positive and significant at 5% for state-dependent firms. Meanwhile, it is essentially flat for time-dependent firms, consistent with the intuition that the frequency is relatively constant for these firms, and independent from shock size.

Overall, this section uses unit cost growth forecast errors are proxies for cost shocks and tests how these relate to real firm pricing decisions using price growth forecast errors. It shows that state-dependent firms have much faster pass-through compared with time-dependent firms, particularly over the first year, and this difference is driven by larger errors. Furthermore state-dependent firms exhibit a strong positive relationship between cost errors and the frequency of price change, whereas this is close to zero for time-dependent firms. In the next section, we use local projections to analyse how exogenous oil supply and gas supply shocks pass through to firm prices, separately for time- and state-dependent firms.

4.4 Firm-level local projections

In this section, we analyse how exogenous cost shocks pass through to firm prices using local projections (Jordà, 2005) estimated at the firm-quarter frequency. Specifically, for firm i, quarter t and year y, we estimate the following specification over a period of up to 12 quarters:[19]

$$\begin{aligned} \pi_{i,t+h} &= \theta_1 SupplyShock_t \times \textit{Time-dependent}_i \\ &+ \theta_2 SupplyShock_t \times \textit{State-dependent}_i \\ &+ \alpha_{i,h} + \sum_{l=1}^{p} \delta'_{l,h} X_{i,t-l} + \lambda_y + \varepsilon_{i,t+h},\ h \in [0,12] \end{aligned} \tag{1}$$

[19] The estimated local projections use data drawn from the 2017Q1 to 2025Q4 period. However, the Känzig (2021) oil supply news shock series and the Alessandri and Gazzani (2025) gas supply shock series extends only to 2024Q4.

The dependent variable is annual (quarter-on-year) own-price growth, $\pi_{i,t+h}$, at horizon $t + h$ based on firm survey responses. On the right hand side, we use either the oil supply news shocks from Känzig (2021) or the gas supply shocks from Alessandri and Gazzani (2025) as the main treatment variables, aggregated to the quarterly frequency.[20] For comparability, we rescale these shocks to increase energy CPI inflation by 1 percentage point (pp) at peak. We include firm-horizon fixed effects in our specification, $\alpha_{i,h}$, calendar year fixed effects λ_y, and lagged firm own-price growth. We also include contemporaneous and lagged macroeconomic series as additional controls: these include CPI inflation, the unemployment rate, and the Bank of England's Bank Rate. Additionally, we control for lagged own-prices and prices of alternative energy-related commodities: UK NBP natural gas prices in the oil supply news shocks model, and Brent crude oil prices in the gas shocks model. The standard errors are clustered at the firm level.

The key coefficients of interest are θ_1 and θ_2, which capture the pass-through of the supply shocks to firms' price growth, separately for time-dependent and state-dependent price-setters, respectively. We next present the main results.

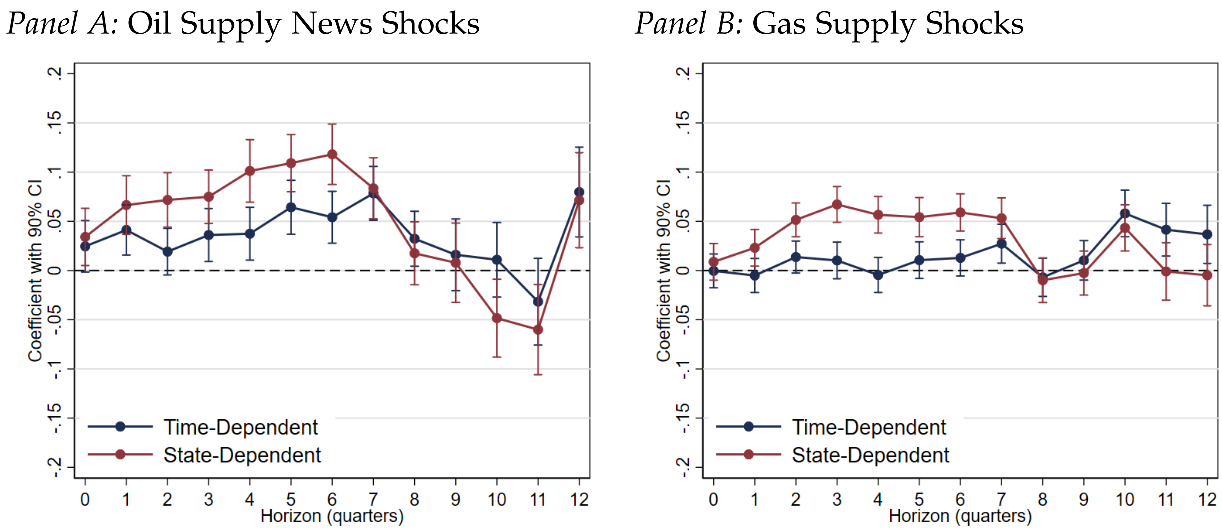
In Figure 8, we estimate the specification in Equation 1 to analyse how oil supply news shocks and gas supply shocks pass through to firms' price growth depending on their price-setting behaviour.[21] In this specification, we keep only firms which have not changed their response to the question on how they set their prices over time. As the figure shows, state-dependent firms react quickly to these shocks. The response for state-dependent firms is close to peak within a year for both shocks, with the peak in the sixth quarter after the oil supply news shock and the third quarter after the gas supply shock.[22] At peak, annual own-price growth for state-dependent price-setters is around 0.12 percentage points higher for a oil supply shock that results in a 1pp increase in energy CPI at peak, and 0.07 percentage points higher for for a gas supply shock that results in a 1pp increase in energy CPI at peak. The profile of responses to

[20] Panel A of Figure A19 presents the time series of the Känzig (2021) oil supply news shocks until 2024Q4, and Panel B of Figure A19 shows the Alessandri and Gazzani (2025) gas supply shocks up to 2024Q4, with major events labelled in both figures.

[21] Figure A20 estimates the average response of firm output price growth to oil supply news shocks and gas supply shocks across the full sample. Firms' price growth responds immediately following the shocks, and is strongest five quarters following the oil supply news shock, and close to peak four quarters after the gas supply shock.

[22] The coefficient estimates for the oil supply new shock are reported in Table A5, and the gas supply shocks in Table A6.

Figure 8: Response of firm price growth to supply shocks by price-setting behaviour



Notes: This figure presents the response of firm own-price growth to supply shocks by price-setting behaviour based on the methodology in Equation 1. Panel A uses oil supply news shocks from Känzig (2021). Panel B uses gas supply shocks from Alessandri and Gazzani (2025). The sample covers firms which are either always state- or time-dependent. It also includes firms with at least seven quarters of price growth data. Standard errors are clustered at the firm level.

these shocks for time-dependent firms is very different. The response of firms, which usually set prices at fixed intervals, is mostly insignificant for the first year after the oil supply shock, and for the first year and a half following gas supply shocks. During the second year, the estimates become more positive and statistically significant for both shocks, and past the eighth quarter, the estimated magnitude is higher than for state-dependent firms. Overall, the results from Figure 8 are consistent with a slower pass-through of oil supply shocks and gas supply shocks to firm prices for time-dependent firms.

To test whether the *difference* in price responses for state-dependent and time-dependent firms is statistically significant, we include time (calendar quarter, λ_t) fixed effects in our baseline local projection specification. In Equation 2, the estimates θ give the *additional* price effect for state-dependent firms, over and above the effect on time-dependent firms. These time fixed effects also control for any macroeconomic trends during the sample period, meaning our additional controls are absorbed in these regressions.

$$
\pi_{i,t+h} = \alpha_{i,h} + \lambda_t + \sum_{l=1}^{2} \omega'_{l,h}\pi_{i,t-l}
+ \theta SupplyShock_t \times State\text{-}dependent_i + \varepsilon_{i,t+h},\ h \in [0,12] \tag{2}
$$

As expected, Figure A21 shows that state-dependent firms have a significantly stronger price response in the first half of the estimation horizon. This difference is statistically significant between the second and sixth quarters after the oil supply news shock (Panel A) and between the first and seventh quarters following the gas supply shock (Panel B). In the last quarters of the horizon, the coefficient estimates become negative, meaning the price response of time-dependent firms is stronger. These findings are consistent with the profiles of responses from Figure 8. They are also consistent with the trends in annual own-price growth presented in Figure 5, which showed that state-dependent firms experienced a stronger increase in price growth, particularly over 2021-2022.

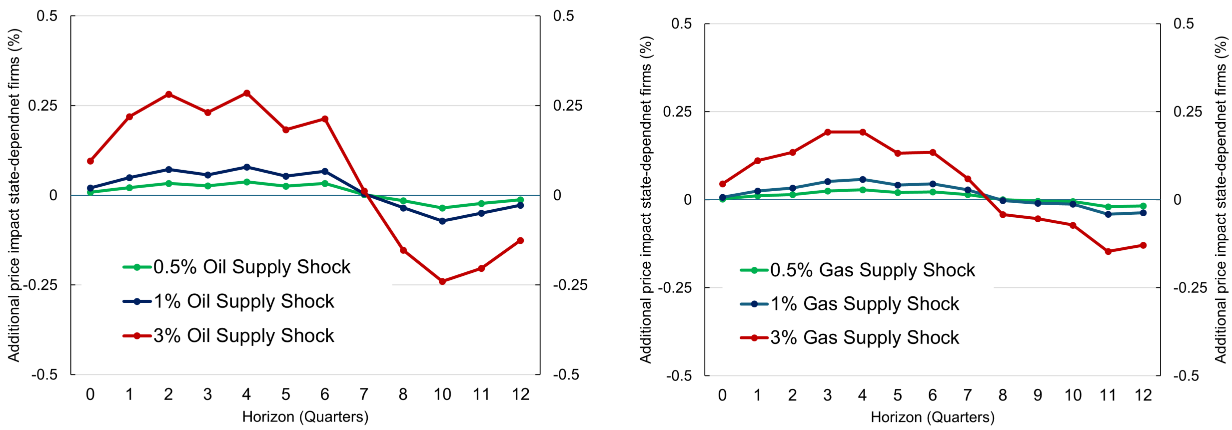
Finally, we test whether the difference between state- and time-dependent firms is greater for larger supply shocks. To implement this, we add a quadratic supply shock term to the specification in Equation 2. This tests precisely whether the difference increases with the size of the shock. Figure 9 shows that there is indeed evidence of a non-linearity for both oil supply news and gas supply shocks.[23] In order to plot the profiles of the estimated shock impacts, we input three different shock magnitudes into our regression estimates: 0.5%, 1%, 3%. Crucially, the differences between state- and time-dependent price-setters increases more than proportionately with shock size. For example, in the second quarter, a 1% oil supply news shock raises firms' price growth by 0.05 percentage points, while a gas supply shock of the same size results in a 0.03 percentage point increase. The corresponding higher price growth estimates for a 3% oil supply news shock or gas supply shock are 0.3 percentage points and 0.1 percentage points, respectively. Thus, our empirical estimates are consistent with the theoretical prediction that the prices of state-dependent firms respond more to large shocks.

In addition to the main results on the impact of oil supply news and gas supply

[23] Table A9 presents the coefficient estimates for oil supply news shocks and Table A10 presents the coefficient estimates for gas supply shocks.

Figure 9: Difference between price responses for large versus small supply shocks

Panel A: Oil Supply News Shocks *Panel B:* Gas Supply Shocks



Notes: This figure presents the difference between state-dependent and time-dependent price responses to oil supply news shocks (Känzig, 2021) and gas supply shocks (Alessandri and Gazzani, 2025) based on the methodology in Equation 2. A positive coefficient means that the price response of state-dependent firms is greater than time-dependent firms. The sample covers firms which are either always state- or time-dependent. It also includes firms with at least seven quarters of price growth data. Standard errors are clustered at the firm level.

shocks, we present several additional results and robustness checks.

Sectoral heterogeneity We run the local projections but splitting by whether the majority of firms in an industry use state-dependent or time-dependent pricing. Figure A22 shows that as in previous exercises that the dominant price-setting behaviour determines the pass-through of cost shocks, and industries where the majority of firms are state-dependent price-setters exhibit stronger pass-through.[24]

Controlling for frequency of price change We next test whether the differences between state- and time-dependent price-setting are also robust to controlling for the frequency of price changes at the point of the shock. In Table A11, in addition to the interaction between oil supply news shocks and the dummy for state/time-dependent price-setting, we add additional interactions for different frequencies of price changes (using data from 2019 and 2022-2025 presented in Figure 4). The interaction with state-dependent price-setting remains robust across multiple horizons, and Panel A of Figure A23 plots these results. The gas supply shock results are similarly robust, as we show in Table A12 and Panel B of A23. Our results emphasise that

[24] Although not presented here the local projection profiles splitting by goods and services are very similar.

the differences between state- and time-dependent firms cannot be explained only by differences in price adjustment frequencies.

4.5 Contribution of state-dependent pricing to inflation dynamics

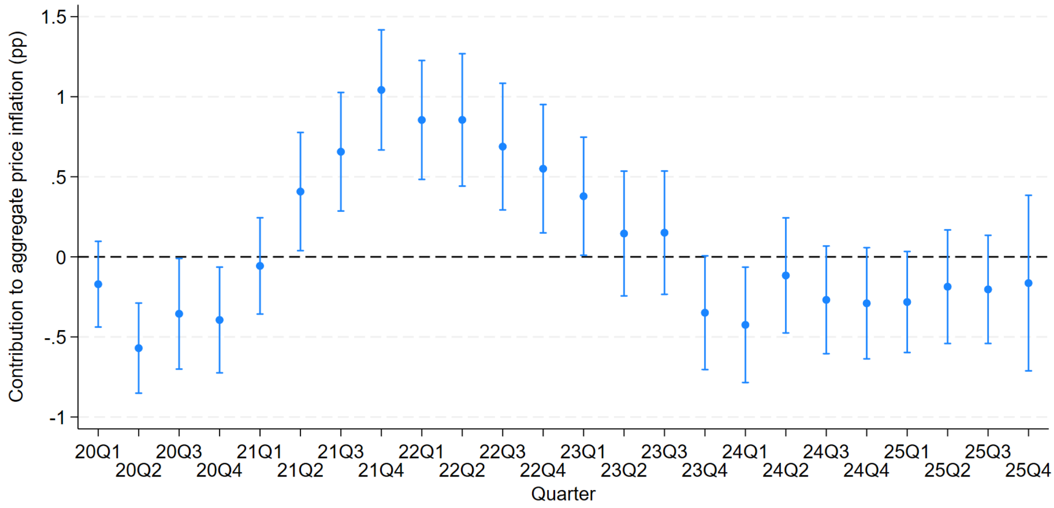
The previous four sub-sections have documented significant differences in cost-price pass-through for state- vs. time-dependent firms, particularly following large shocks. How important are these differences for understanding recent inflation dynamics? In this section, we quantify the contribution of state-dependent pricing to aggregate output price inflation over the last six years. Specifically, we estimate Equation 3 for firm i in sector j and quarter t:

$$\pi_{i,j,t} = \alpha_i + \beta_{j,t} + \sum_{k=20Q1}^{25Q4} \lambda_k SD_i \times 1[Quarter = k] + X_{i,j,t} + \varepsilon_{i,j,t} \tag{3}$$

The dependent variable is firm annual own-price growth, $\pi_{i,j,t}$. This is regressed on an indicator for state-dependent pricing, SD_i, interacted with quarterly time dummies. To control for confounding factors, we include firm fixed effects, α_i, industry-by-time fixed effects, $\beta_{j,t}$, firm employment and non-labour cost shares interacted with time dummies, and price growth and sales growth subjective uncertainty (captured in $X_{i,j,t}$). The estimation period is 2019-2025, and we use 2019 as the reference category. Finally, the regression coefficients are rescaled by the share of state-dependent firms in the sample (0.55), so the values can be interpreted as *contributions* to aggregate price inflation.

The results are presented in Figure 10. As already suggested by Figure 5, there are significant differences in price growth between state- and time-dependent firms in recent years. At peak, firms' use of state-dependent pricing contributed an additional 1pp to aggregate output price inflation near the end of 2021. This is relative to assuming all firms were time-dependent in their pricing, and remains highly significant even after including a demanding set of fixed effects and firm-level controls. This contribution declined over 2023, and by 2024 state-dependent firms have been contributing negatively to price inflation, as price growth of time-dependent firms has remained higher. Note this calculation assumes a constant share of state-dependent firms over time. Changes from time- to state-dependent pricing, which are more

Figure 10: Contribution of state-dependent pricing to aggregate output price inflation



Notes: This figure presents coefficient estimates from a regression of firm output price growth on a dummy for state-dependent pricing interacted with quarterly time dummies. The sample includes only firms which have not changed their price-setting behaviour. The regression controls for the non-labour cost share and the number of employees interacted with time dummies, as well as price growth and sales growth uncertainty. It also includes firm and SIC2-by-quarter fixed effects. The standard errors are clustered at the firm level, and 90% confidence intervals are included. The coefficient estimates are scaled by 0.55, to reflect the average share of state-dependent firms over the full sample. The estimation sample covers 2019-2025, where 2019 is used as the reference category.

likely in high-inflation environments, would further add to these contributions.

These findings have several important practical implications for modelling price-setting behaviour. First, when firms are hit by large shocks, taking into account state-dependent behaviour is key to understanding short-term pricing dynamics. Using models which do not incorporate state-dependency would understate the speed of the price response and lead to potentially large forecast errors. Second, monitoring the price growth of state-dependent firms could be an important leading indicator of broader price increases, as time-dependent firms take longer to adjust their prices. Likewise, tracking the share of state- and time-dependent firms in the economy is an important metric of how stable firms perceive the current pricing environment to be and how quickly they may respond to future shocks, both positive and negative.

5 Conclusion

We study firm price-setting behaviour using new survey questions on state vs. time-dependent price-setting and the frequency of price changes. On average, since 2023, 54% of firms report setting prices in a state-dependent manner, which has increased from 44% in 2019. Furthermore, we document substantial heterogeneity across sectors and by firm characteristics. Firms in the goods sector are more likely to be state-dependent, whereas service providers are more likely to be time-dependent. Smaller firms and those with higher non-labour cost shares are more likely to set prices in response to events. Firm-level uncertainty around future prices, sales, and costs is also positively correlated with state-dependent price-setting. State-dependent firms have also experienced a larger and more persistent increase in the frequency of price changes since 2019.

In the second part of the paper, we analyse the implications of price-setting behaviour for the pass-through of cost shocks and for inflation dynamics. Output price growth for state-dependent firms experienced a sharper increase over 2022-2023, and also a faster subsequent decline, consistent with quicker pass-through of costs to prices. We estimate that firms' use of state-dependent pricing contributed an additional 1pp to aggregate output price inflation at peak near the end of 2021, relative to assuming all firms were time-dependent. But over 2024-2025, state-dependent pricing has been contributing to lower aggregate price growth. Further evidence from a randomised survey experiment, firm-level forecast errors, and local projections confirm a faster pass-through of costs to prices for state-dependent firms. The difference between state- and time-dependent firms is also shown to be larger for bigger shocks, consistent with theoretical predictions. Overall, our paper contributes to the literature on firm price-setting and highlights the importance of considering differences in price-setting, especially when shocks are large.

References

Abberger, K., A. K. Funk, M. Lamla, S. Lein, and S. Siegrist (2024). The pass-through of inflation expectations into prices and wages: Evidence from an rct survey. *CEPR Discussion Papers*, DP19595.

Alessandri, P. and A. Gazzani (2025). Natural gas and the macroeconomy: Not all energy shocks are alike. *Journal of Monetary Economics*, 103749.

Alvarez, F., F. Lippi, and J. Passadore (2017). Are State- and Time-Dependent Models Really Different? *NBER Macroeconomics Annual 31*(1), 379–457.

Amiti, M., O. Itskhoki, and J. Konings (2019). International Shocks, Variable Markups, and Domestic Prices. *The Review of Economic Studies 86*(6), 2356–2402.

Ascari, G. and T. Haber (2022). Non-Linearities, State-Dependent Prices and the Transmission Mechanism of Monetary Policy. *The Economic Journal 132*(641), 37–57.

Auclert, A., R. Rigato, M. Rognlie, and L. Straub (2024). New Pricing Models, Same Old Phillips Curves? *The Quarterly Journal of Economics 139*(1), 121–186.

Ball, L. and N. G. Mankiw (1994). Asymmetric Price Adjustment and Economic Fluctuations. *The Economic Journal 104*(423), 247.

Ball, L. and N. G. Mankiw (1995). Relative-Price Changes as Aggregate Supply Shocks. *The Quarterly Journal of Economics 110*(1), 161–193.

Bils, M. and P. J. Klenow (2004). Some Evidence on the Importance of Sticky Prices. *Journal of Political Economy 112*(5).

Bunn, P., L. Anayi, N. Bloom, P. Mizen, G. Thwaites, and I. Yotzov (2024a). How Curvy is the Phillips Curve? *NBER Working Paper 33234*.

Bunn, P., N. Bloom, A. Crundwell, S. Khan, C. Menzies, P. Mizen, M. Sculthorpe, K. Shah, G. Thwaites, and I. Yotzov (2024b). The Decision Maker Panel: a user's guide. *Bank of England working papers*.

Bunn, P. and C. Ellis (2012a). Examining the Behaviour of Individual UK Consumer Prices. *The Economic Journal 122*(558), F35–F55. Publisher: Oxford Academic.

Bunn, P. and C. Ellis (2012b). How Do Individual UK Producer Prices Behave? *The Economic Journal 122*(558), F16–F34.

Calvo, G. A. (1983). Staggered prices in a utility-maximizing framework. *Journal of Monetary Economics 12*(3), 383–398.

Cavallo, A., F. Lippi, and K. Miyahara (2024). Large Shocks Travel Fast. *American Economic Review: Insights 6*(4), 558–574.

Davies, R. (2021). Prices and inflation in the uk: A new dataset. *CEP Occasional Paper CEPOP55*.

Dedola, L., E. Gautier, A. Nakov, S. Santoro, E. de Veirman, L. Henkel, and B. Fagandini (2023). Some Implications of Micro Price-Setting Evidence for Inflation Dynamics and Monetary Transmission.

Dedola, L., L. Henkel, C. Höynck, C. Osbat, and S. Santoro (2024). What does new micro price evidence tell us about inflation dynamics and monetary policy transmission?

Dixon, H. D. and C. Grimme (2022). State-dependent or time-dependent pricing? New evidence from a monthly firm-level survey: 1980–2017. *European Economic Review 150*, 104319.

Gagliardone, L., M. Gertler, S. Lenzu, and J. Tielens (2024). Anatomy of the Phillips Curve: Micro Evidence and Macro Implications. *American Economic Review*.

Gagliardone, L., M. Gertler, S. Lenzu, and J. Tielens (2025). Micro and Macro Cost-Price Dynamics in Normal Times and During Inflation Surges. *NBER Working Paper 33478*.

Gautier, E., M. Marx, and P. Vertier (2023). How do gasoline prices respond to a cost shock? *Journal of Political Economy Macroeconomics 1*(4), 707–741.

Ghassibe, M., B. Wanengkirtyo, and I. Yotzov (2025). Intertemporal pass-through.

Godl-Hanisch, I. and M. Menkhoff (2024). Firms' pass-through dynamics: A survey approach. *Working Paper*.

Gopinath, G. and O. Itskhoki (2010). Frequency of Price Adjustment and Pass-Through*. *The Quarterly Journal of Economics 125*(2), 675–727.

Ilut, C., R. Valchev, and N. Vincent (2020). Paralyzed by fear: Rigid and discrete pricing under demand uncertainty. *Econometrica 88*(5), 1899–1938.

Jordà, O. (2005). Estimation and Inference of Impulse Responses by Local Projections. *American Economic Review 95*(1), 161–182.

Klenow, P. J. and O. Kryvtsov (2008). State-Dependent or Time-Dependent Pricing: Does It Matter for Recent U.S. Inflation? *. *Quarterly Journal of Economics 123*(3), 863–904.

Känzig, D. R. (2021). The Macroeconomic Effects of Oil Supply News: Evidence from OPEC Announcements. *American Economic Review 111*(4), 1092–1125.

Maćkowiak, B. and M. Wiederholt (2009). Optimal sticky prices under rational inattention. *American Economic Review 99*(3), 769–803.

Mankiw, N. G. and R. Reis (2002). Sticky information versus sticky prices: a proposal to replace the new keynesian phillips curve. *The Quarterly Journal of Economics 117*(4), 1295–1328.

Montag, H. and D. Villar (2023). Price-Setting During the Covid Era.

Morris, R. and R. de Vincent-Humphreys (2019). Price-setting behaviour: insights from a survey of large firms. Technical report.

Nakamura, E. and J. Steinsson (2008). Five Facts about Prices: A Reevaluation of Menu Cost Models *. *Quarterly Journal of Economics 123*(4), 1415–1464.

Petrella, I., E. Santoro, and Y. Winkelmann (2025). Inflation and price flexibility. *European Economic Review*, 105056.

Ravn, M., S. Schmitt-Grohé, and M. Uribe (2006). Deep habits. *The Review of Economic Studies 73*(1), 195–218.

Rebelo, S., M. Santana, and P. Teles (2025). Behavioral sticky prices. *Journal of Monetary Economics*, 103828.

Reis, R. (2006). Inattentive producers. *The Review of Economic Studies 73*(3), 793–821.

Rotemberg, J. J. (1982). Monopolistic price adjustment and aggregate output. *The Review of Economic Studies 49*(4), 517–531.

Taylor, J. (1979). Staggered Wage Setting in a Macro Model. *The American Economic Review, Papers and Proceedings 69*(2), 108–113.

Woodford, M. (2003). *Interest and Prices: Foundations of a Theory of Monetary Policy*.

Yotzov, I., L. Anayi, N. Bloom, P. Bunn, P. Mizen, Öztürk, and G. Thwaites (2023). Firm Inflation Uncertainty. *AEA Papers and Proceedings 113*, 56–60.

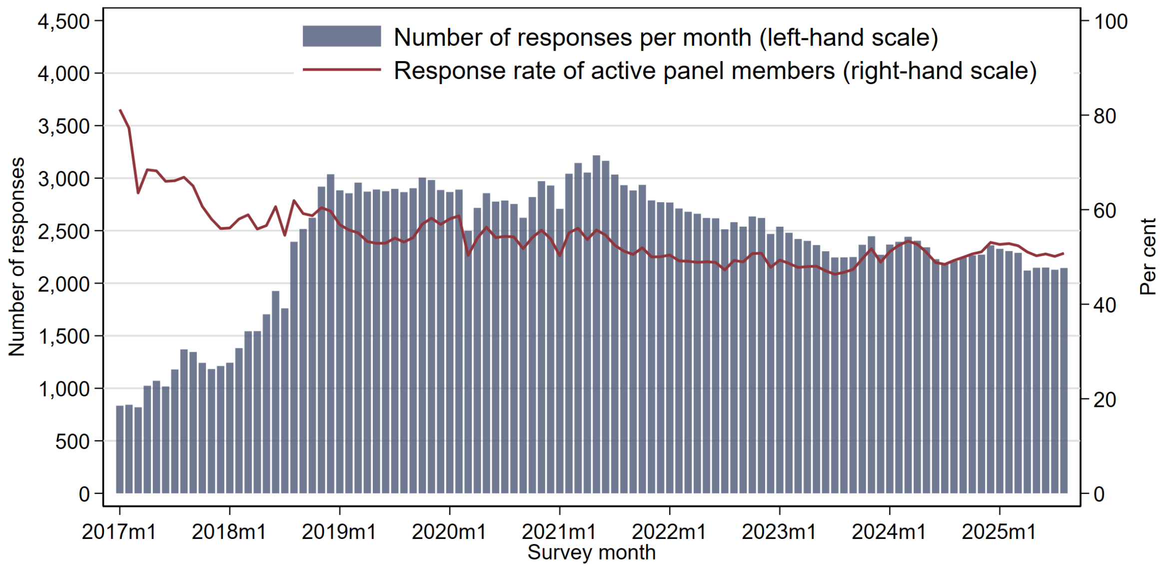
Online Appendix
State and Time-Dependent Pricing

For Online Publication

December 10, 2025

A Figures

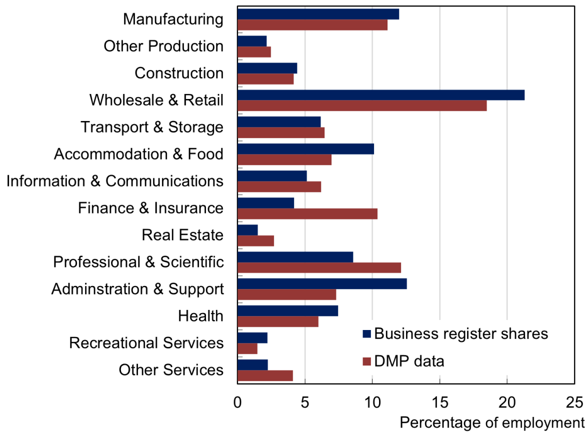
Figure A1: DMP response rate



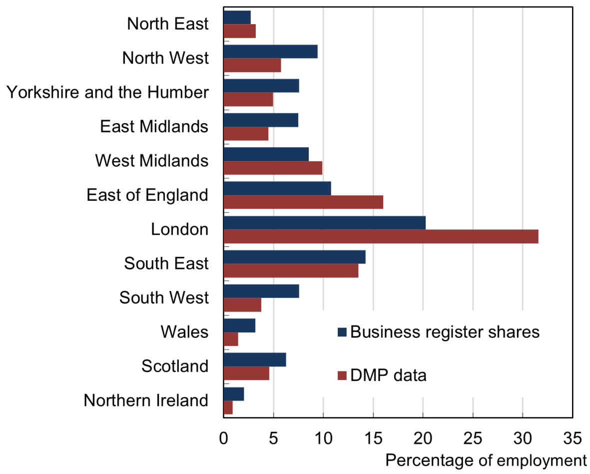
Notes: This figure presents the number of monthly responses to the DMP. The solid line shows the *active* response rate, referring to the response rate among firms which have responses at least once over the past 12 months.

Figure A2: Coverage of DMP survey by industry and region

Panel A: Industry



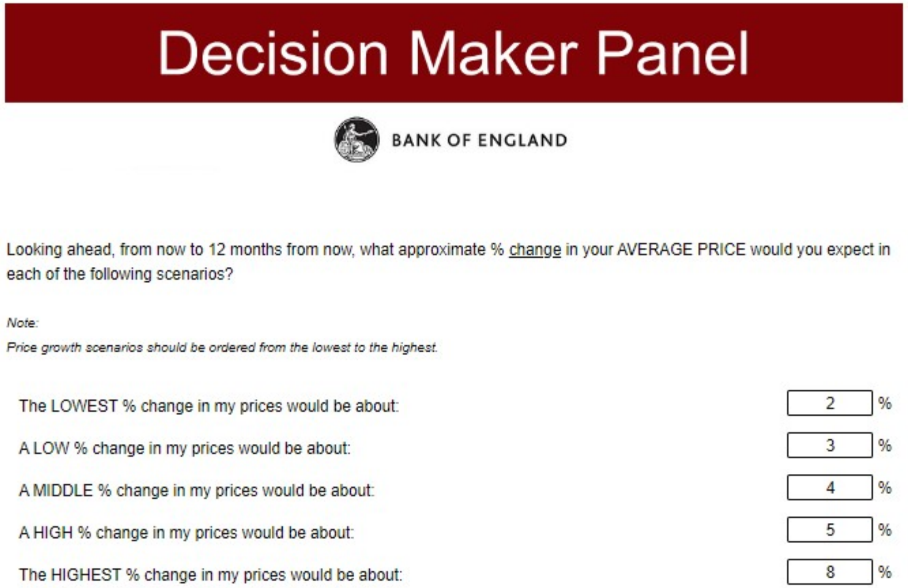
Panel B: Regions



Notes: This figure compares the coverage of the DMP survey across industries (Panel A) and by region (Panel B), based on data over 2017-2023.

Figure A3: Format of question on expected own-price growth

Panel A: Scenarios


Decision Maker Panel

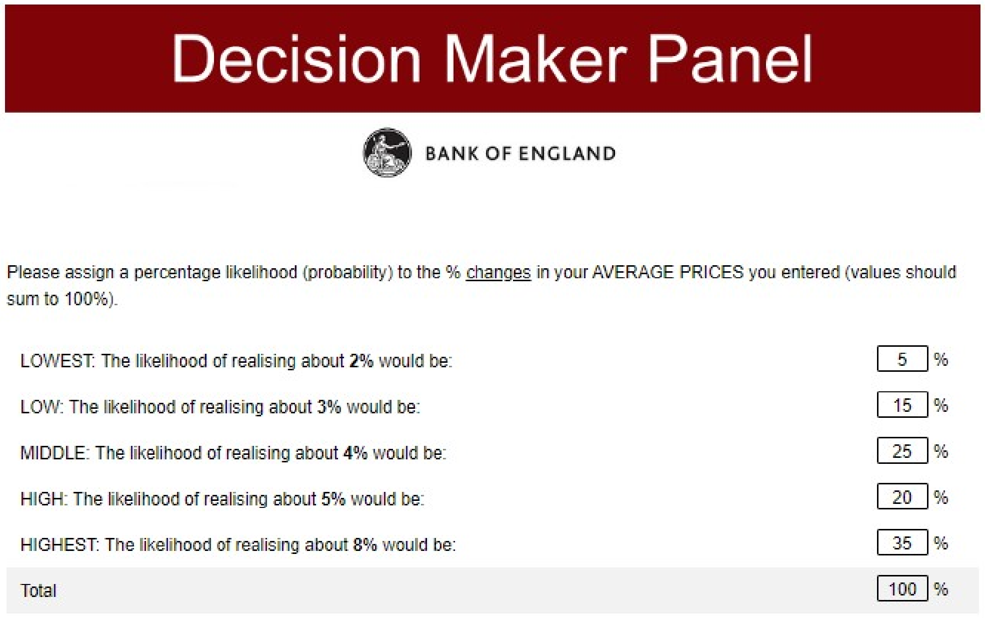
BANK OF ENGLAND

Looking ahead, from now to 12 months from now, what approximate % change in your AVERAGE PRICE would you expect in each of the following scenarios?

Note:
Price growth scenarios should be ordered from the lowest to the highest.

The LOWEST % change in my prices would be about:	2	%
A LOW % change in my prices would be about:	3	%
A MIDDLE % change in my prices would be about:	4	%
A HIGH % change in my prices would be about:	5	%
The HIGHEST % change in my prices would be about:	8	%

Panel B: Probabilities


Decision Maker Panel

BANK OF ENGLAND

Please assign a percentage likelihood (probability) to the % changes in your AVERAGE PRICES you entered (values should sum to 100%).

LOWEST: The likelihood of realising about **2%** would be:	5	%
LOW: The likelihood of realising about **3%** would be:	15	%
MIDDLE: The likelihood of realising about **4%** would be:	25	%
HIGH: The likelihood of realising about **5%** would be:	20	%
HIGHEST: The likelihood of realising about **8%** would be:	35	%
Total	100	%

Figure A4: Format of question on state vs. time-dependent pricing


Decision Maker Panel

BANK OF ENGLAND

Which of the following best describes how your business usually sets prices?

Mostly change prices in response to specific events (e.g. changes in costs or demand)

Mostly change prices at fixed intervals (e.g. once a year or once a quarter, etc.)

Figure A5: Format of question on state vs. time-dependent pricing (August-October 2025)


Decision Maker Panel

BANK OF ENGLAND

Which of the following best describes how your business has set prices in each of the following years?

	2019	2023	2025
Mostly change prices in response to specific events (e.g. changes in costs or demand)	○	○	○
Mostly change prices at fixed intervals (e.g. once a year or once a quarter, etc.)	○	○	○

Figure A6: Format of question on frequency of price change in 2019, 2024, 2025

Decision Maker Panel

BANK OF ENGLAND

Approximately, how often did you change/do you expect to change your prices in each of the following years?

Notes:
(a) Where possible, please consider the average across all products and services. If that is not possible, please answer for your main product/service.

	2019	2024	2025
Daily	○	○	○
Weekly	○	○	○
Monthly	○	○	○
Quarterly	○	○	○
Half-yearly	○	○	○
Annually	○	○	○
Prices did not change/not expected to change	○	○	○

Figure A7: State- vs. time-dependent price setting by sector

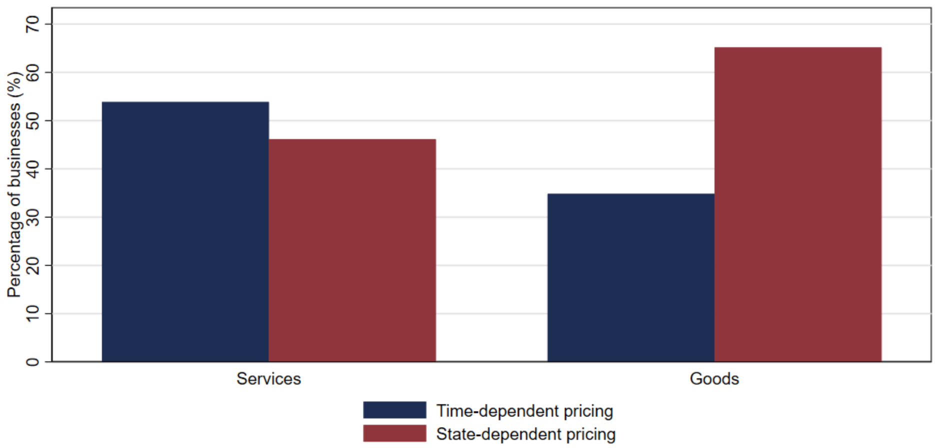
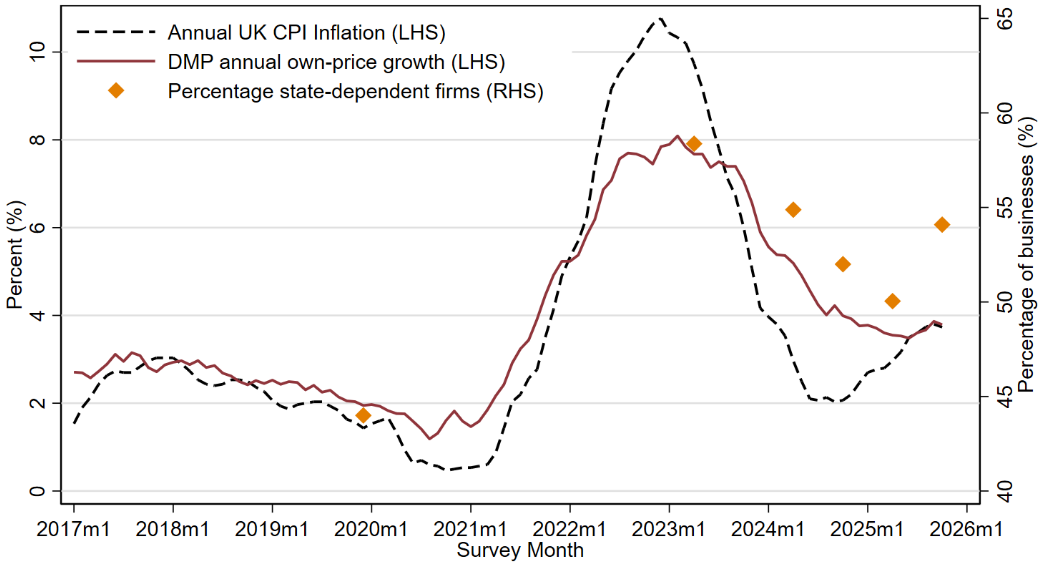


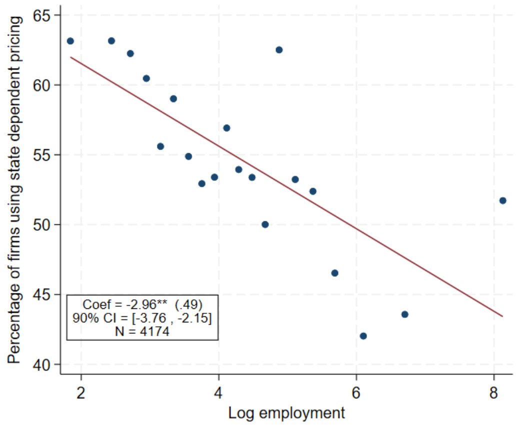
Figure A8: Firm annual price growth, annual CPI inflation, and share of state-dependent firms



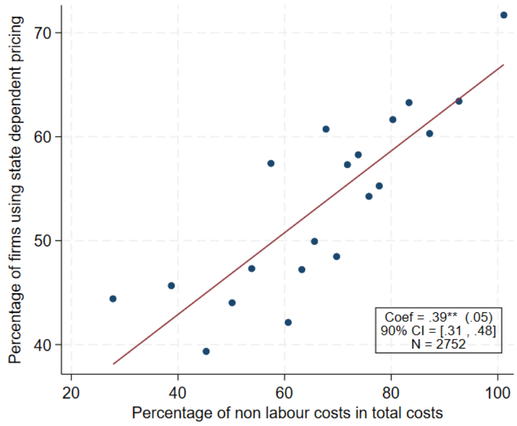
Notes: The data on annual own-price growth are based on data from the Decision Maker Panel. The data on annual CPI inflation is taken from the Office for National Statistics. The series are three-month moving averages. The percentage of state-dependent firms is based on responses to the question: 'Which of the following best describes how your business usually sets prices?'. Respondents were asked to choose one of the following options: (i) Mostly change prices in response to specific events (eg changes in costs or demand), (ii) Mostly change prices at fixed intervals (eg once a year or once a quarter, etc).

Figure A9: Key correlates of price-setting behaviour

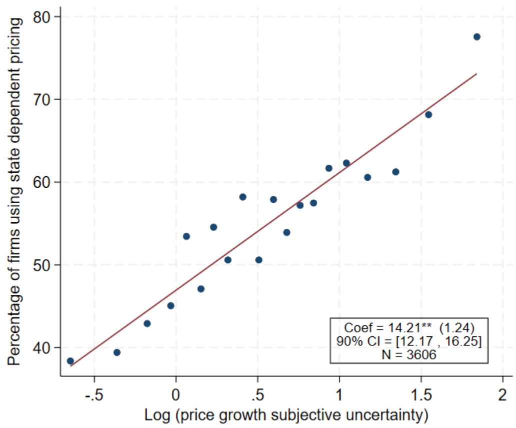
Panel A: Firm employment



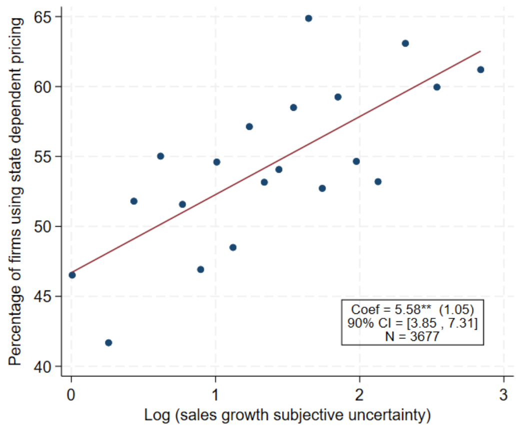
Panel B: Non-labour cost shares



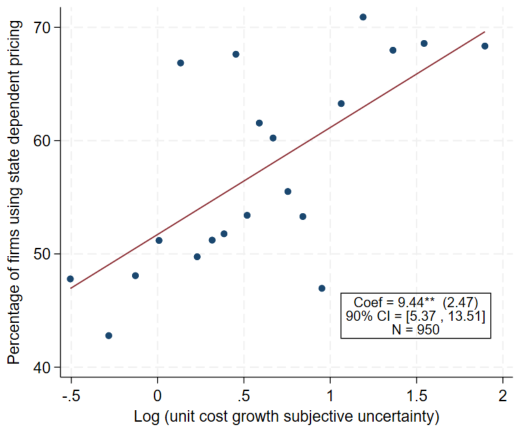
Panel C: Inflation uncertainty



Panel D: Sales uncertainty

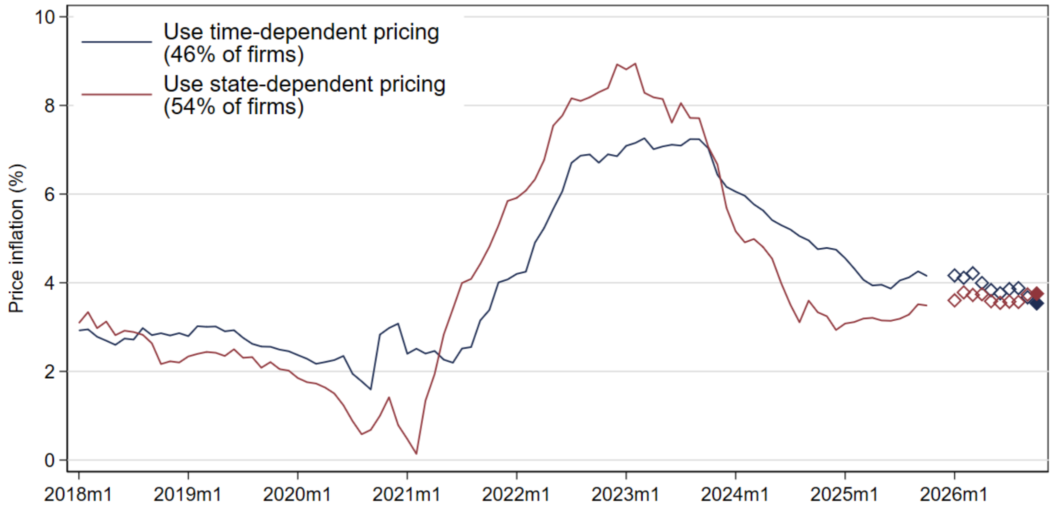


Panel E: Cost uncertainty



Notes: Results are based on data collected over four response periods: Feb-Apr 2023, Feb-Apr 2024, Aug-Oct 2024, and Feb-Apr 2025.

Figure A10: Firm output price growth by price-setting behaviour (time-varying)



Notes: This figure shows trends in own-price growth (solid lines) and expected year-ahead own-price growth (diamonds), split by price-setting behaviour. Firms are split into state-dependent and time-dependent pricing based on each firm's most recent response to this question (as of October 2025). The series are three-month moving averages, with the latest data up to October 2025.

Figure A11: Firm output price growth for state-dependent, annual time-dependent firms, and time-dependent firms with more than annual frequency of price setting

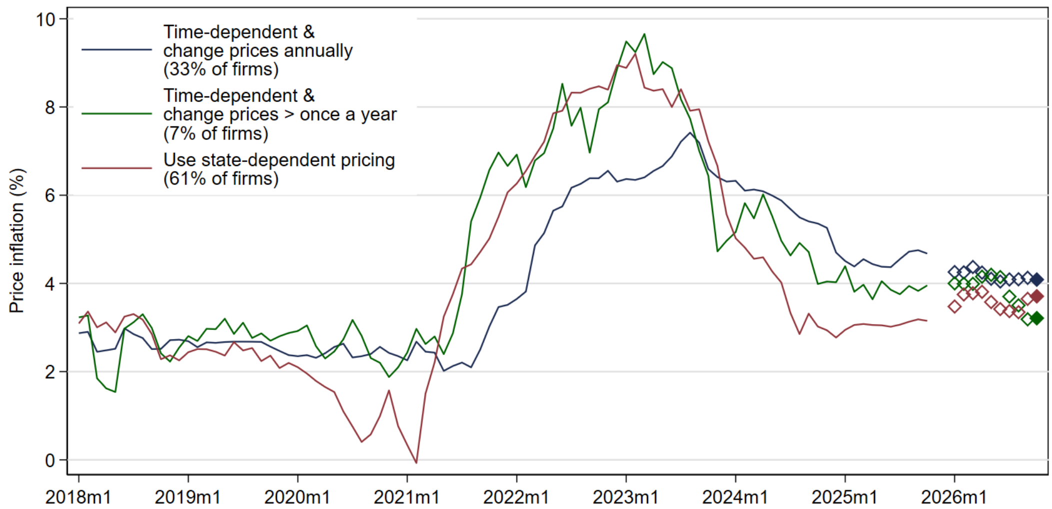
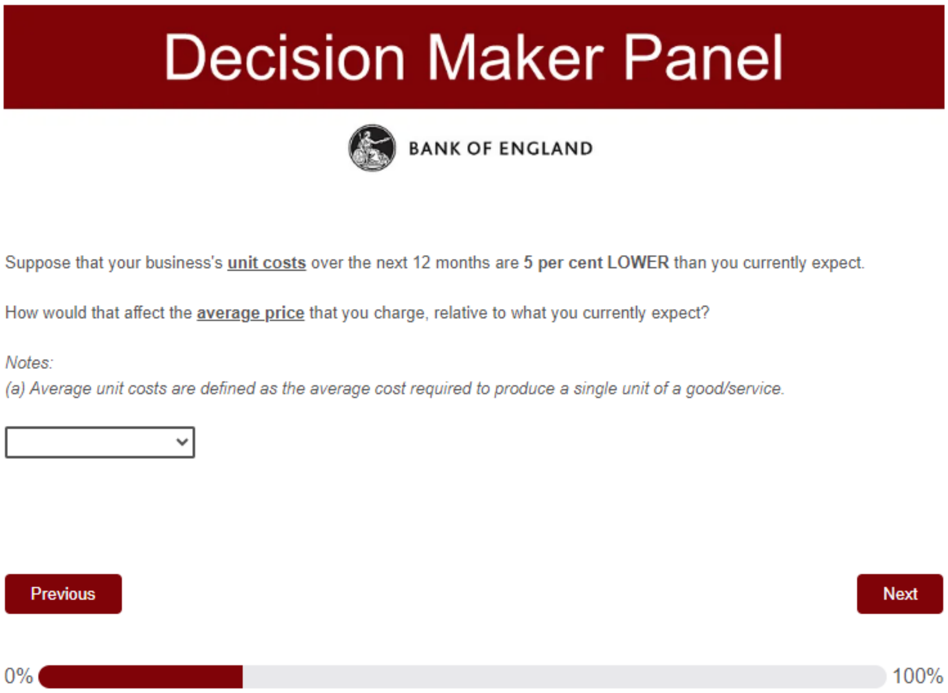


Figure A12: Format of question on hypothetical unit cost shocks

Panel A: Main scenario



Panel B: Flipped scenario

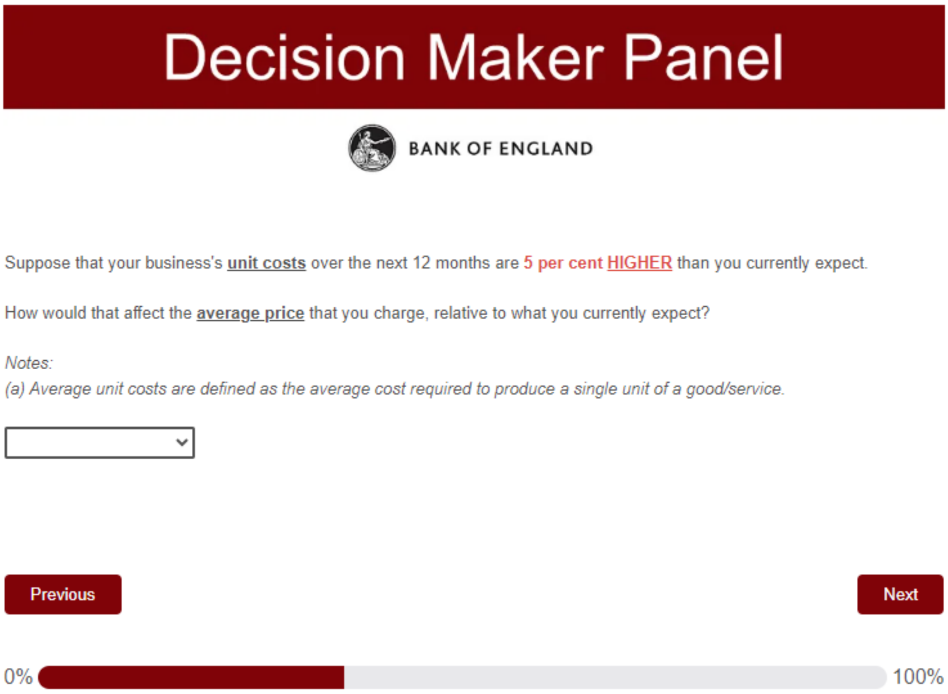
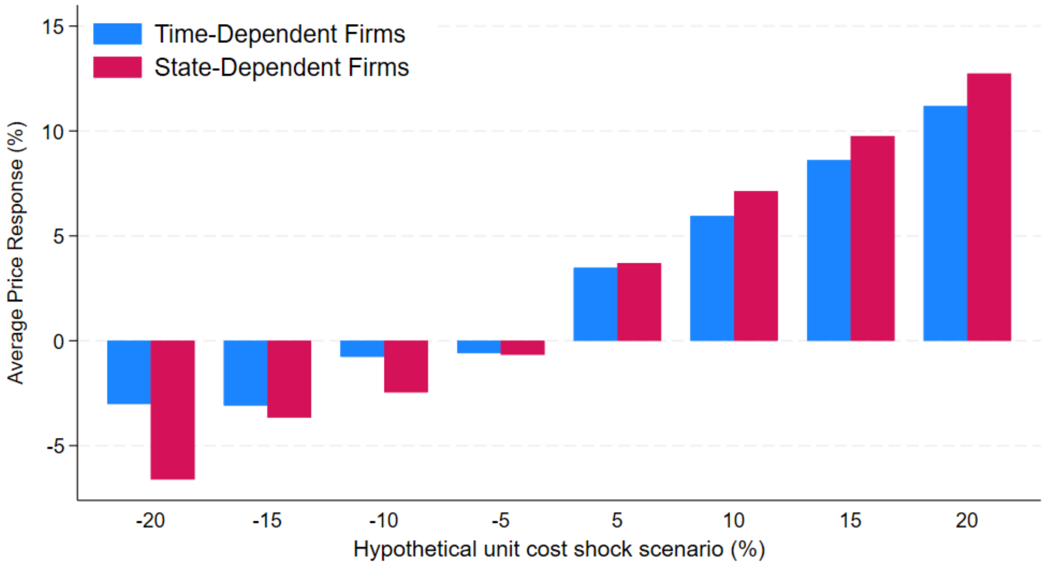
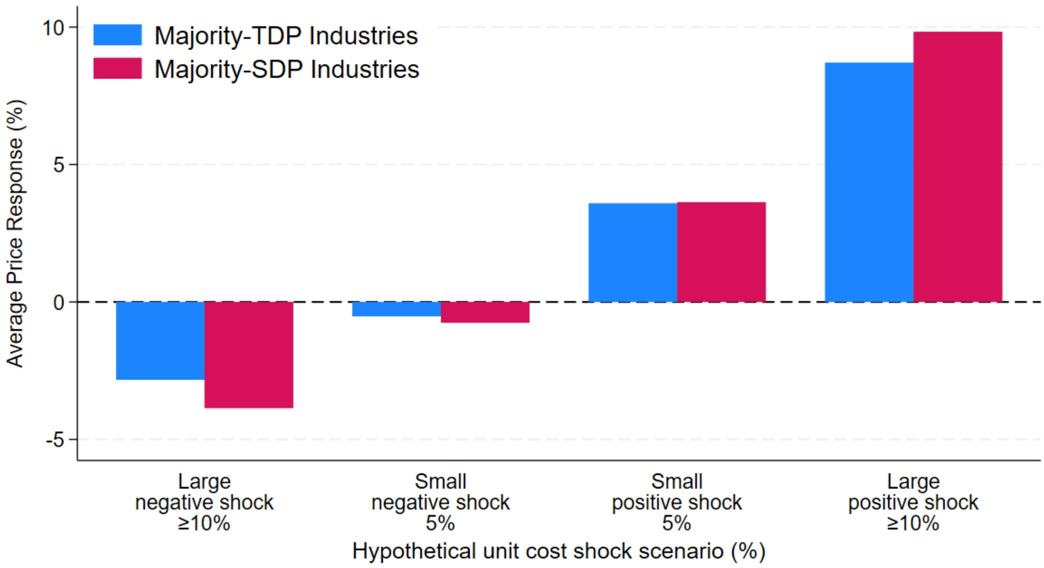


Figure A13: Average price responses to hypothetical cost shocks by price-setting behaviour



Notes: This figure shows the average price response to hypothetical unit cost shocks for state-dependent and time-dependent firms. The questions on the price responses to unit cost shocks were asked over August-October 2024. The sample includes only firms which have not changed their price-setting behaviour.

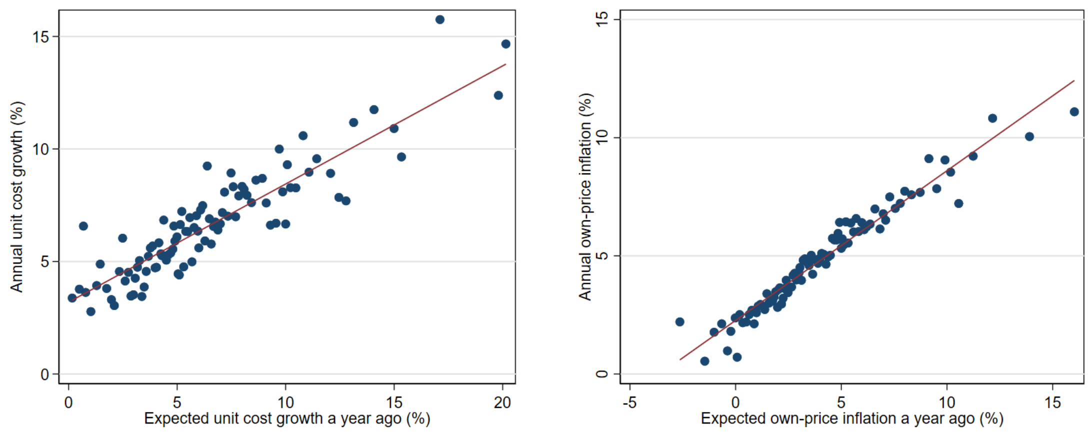
Figure A14: Average price responses to hypothetical cost shocks split by majority state- or time-dependent price-setting industries



Notes: This figure shows the average price response to hypothetical unit cost shocks split by majority state- or time-dependent price-setting industries. The questions on the price responses to unit cost shocks were asked over August-October 2024. The sample includes only firms which have not changed their price-setting behaviour. 'Small shock' are defined as ±5% and 'large shocks' are defined as ±10%; ±15%; or ±20%.

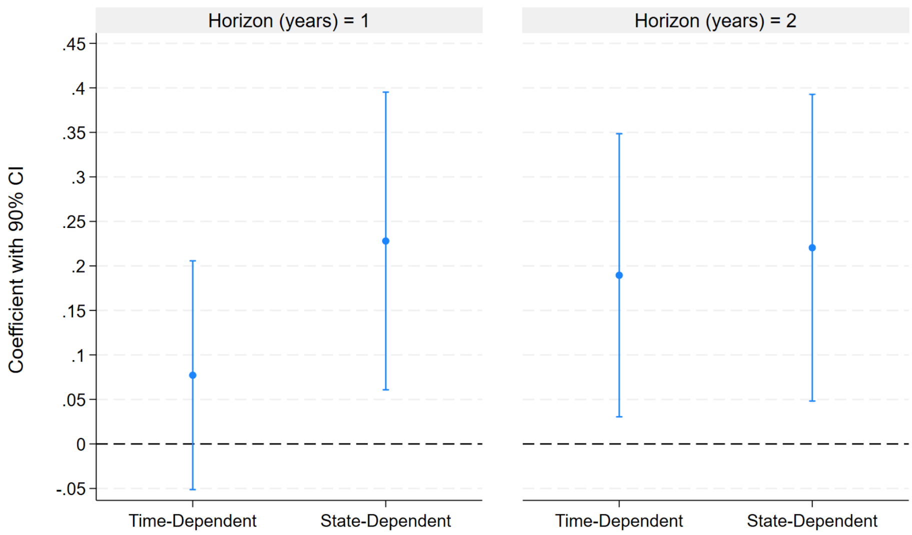
Figure A15: Comparison of realisations and expectations for unit cost growth and price growth

Panel A: Unit cost growth *Panel B:* Price growth



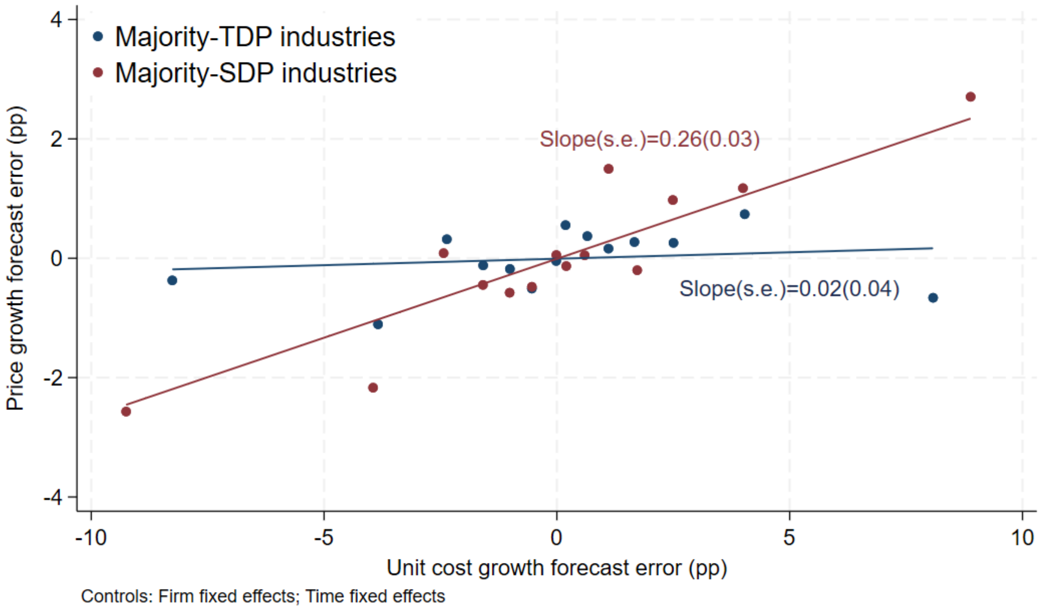
Notes: This figure plots realisations and year-ahead expectations formed a year earlier for unit cost growth (Panel A) and own-price growth (Panel B).

Figure A16: Impact of unit cost growth forecast errors on firm cumulative price growth over multiple horizons



Notes: This figure shows coefficient estimates from regressions of cumulative own-price growth at one-year and two-year horizons on contemporaneous unit cost growth forecast errors, split by state-dependent and time-dependent price-setting. The regressions control for firm and time fixed effects. Standard errors are clustered at the firm level and 90% confidence intervals are displayed.

Figure A17: Price growth and unit cost growth forecast errors split by majority state- or time-dependent price-setting industries



Notes: This figure shows a binned scatter plot of the relationship between price growth forecast errors and unit cost growth forecast errors, separately for majority state- or time-dependent price-setting industries. The scatter plot additionally controls for firm and time fixed effects. The sample period is 2018; 2023-2025 (with gaps). The sample includes only firms which have not changed their price-setting behaviour.

Figure A18: Binned scatter plot of frequency of price changes and unit cost growth forecast errors, by price-setting behaviour

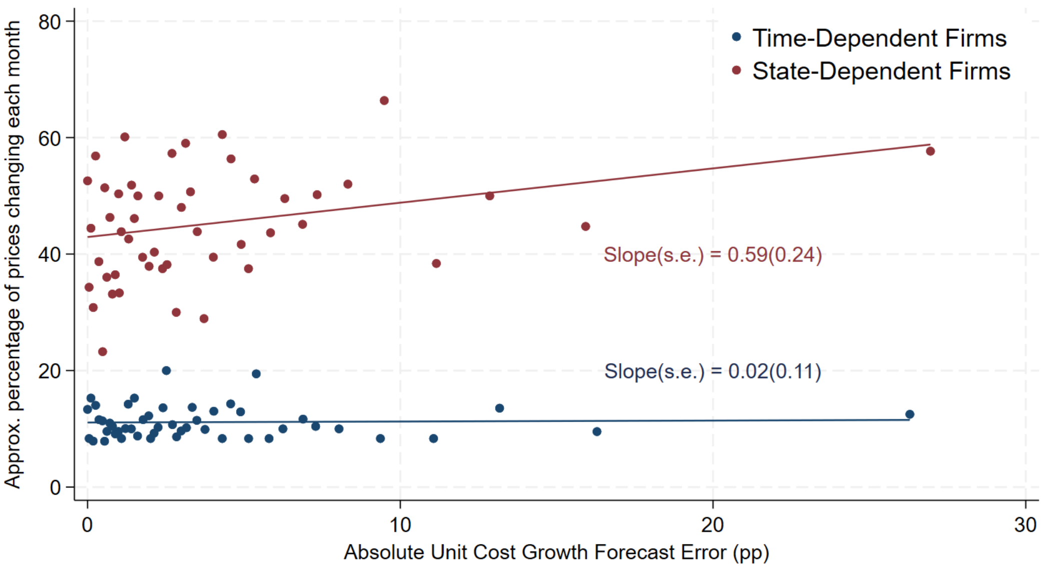
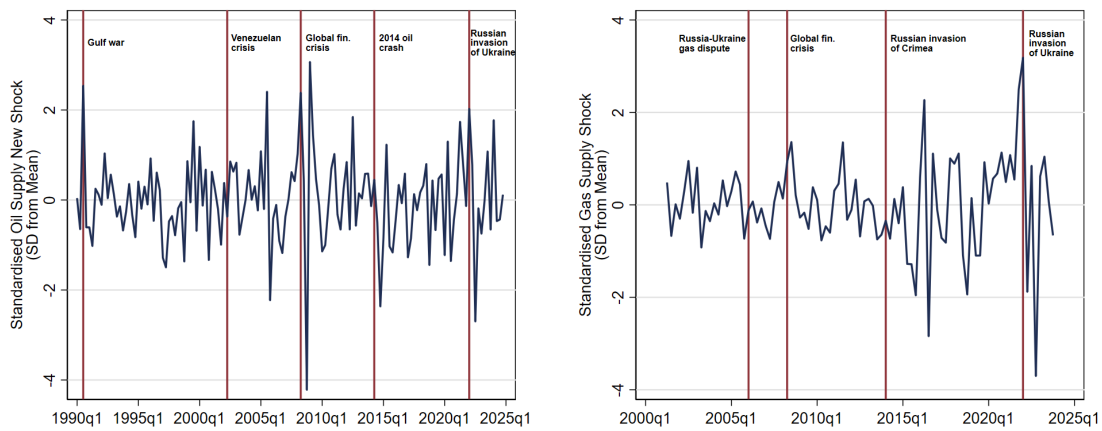


Figure A19: Time series of normalised supply shocks at the quarterly frequency

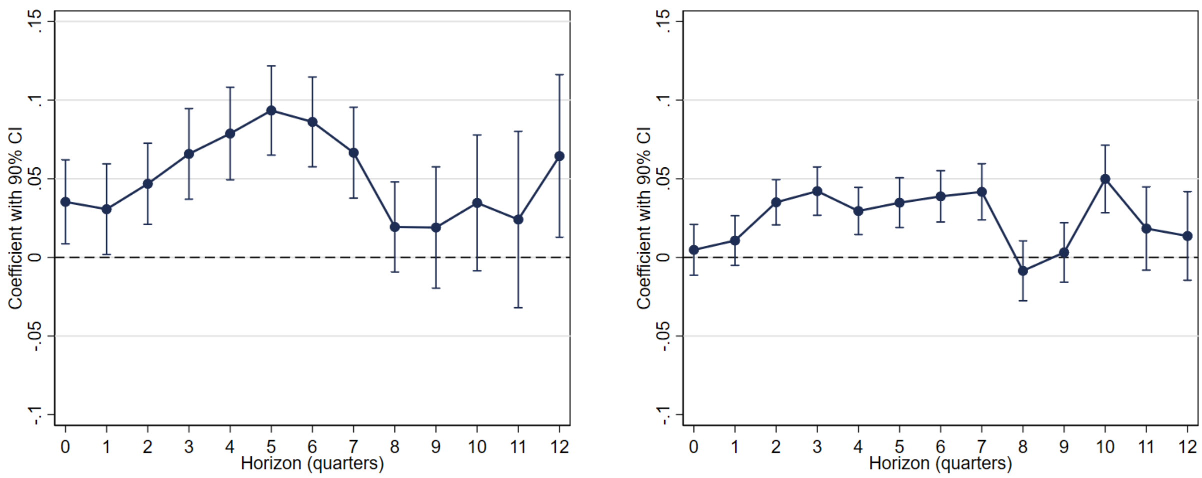
Panel A: Oil Supply News Shocks *Panel B:* Gas Supply Shocks



Notes: Panel A plots the time series of the normalised Känzig (2021) oil supply news shocks at the quarterly frequency. Panel B plots the time series of the normalised Alessandri and Gazzani (2025) gas supply shocks at the quarterly frequency.

Figure A20: Response of firm price growth to supply shocks (full sample)

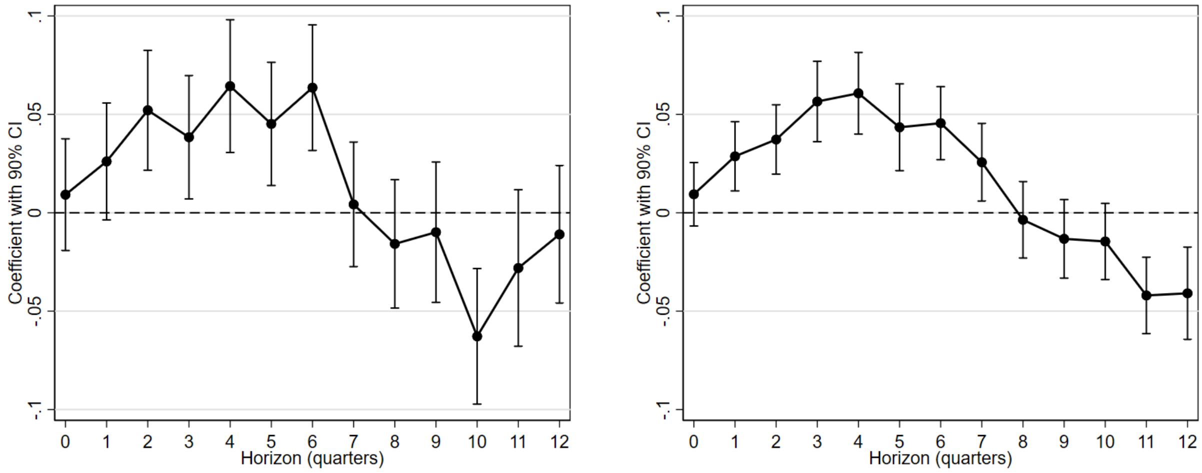
Panel A: Oil Supply News Shocks *Panel B:* Gas Supply Shocks



Notes: This figure presents the response of firm own-price growth to oil supply news shocks (Känzig, 2021) and gas supply shocks (Alessandri and Gazzani, 2025) across the full sample. The sample covers firms which are either always state- or time-dependent. It also includes firms with at least seven quarters of price growth data. Standard errors are clustered at the firm level.

Figure A21: Difference between state- and time-dependent pricing responses to supply shocks

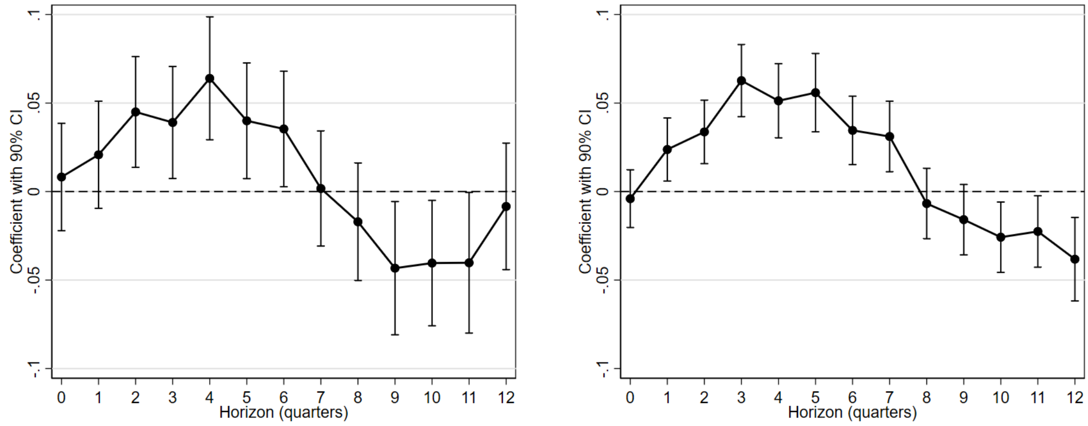
Panel A: Oil Supply News Shocks *Panel B:* Gas Supply Shocks



Notes: This figure presents the difference between state-dependent and time-dependent price responses to oil supply news shocks (Känzig, 2021) and gas supply shocks (Alessandri and Gazzani, 2025) based on the methodology in Equation 2. A positive coefficient means that the price response of state-dependent firms is greater than time-dependent firms. The sample covers firms which are either always state- or time-dependent. It also includes firms with at least seven quarters of price growth data. Standard errors are clustered at the firm level.

Figure A22: Difference between the pricing responses to supply shocks of majority state- or time-dependent price-setting industries

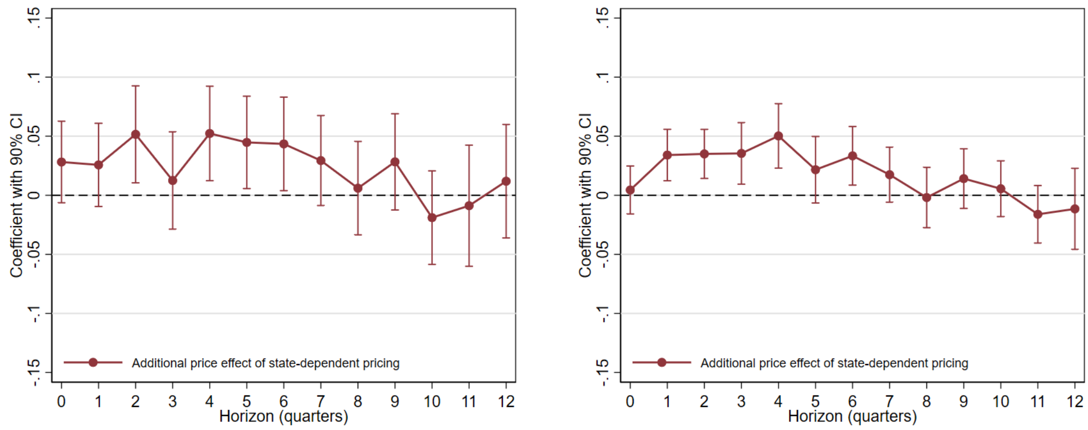
Panel A: Oil Supply News Shocks *Panel B:* Gas Supply Shocks



Notes: This figure presents the difference between price responses to oil supply news shocks (Känzig, 2021) and gas supply shocks (Alessandri and Gazzani, 2025) split by majority state- or time-dependent price-setting industries and based on the methodology in Equation 2. A positive coefficient means that the price response for industries with a majority of firms with state-dependent behaviour is greater than industries with a majority of firms with time-dependent price-setting behaviour. The sample covers firms which are either always state- or time-dependent. It also includes firms with at least seven quarters of price growth data. Standard errors are clustered at the firm level.

Figure A23: Difference between state- and time-dependent price responses: Controlling for frequency of price change

Panel A: Oil Supply News Shocks *Panel B:* Gas Supply Shocks



B Tables

Table A1: Share of firms switching price-setting behaviour split by the number of times they have responded to the question

Percentage of Businesses (%)	No. of times firms switched price-setting behaviour				
No. of times firms responded to the price-setting behaviour question	0	1	2	3	4
1 (37% of firms)	100	0	0	0	0
2 (22% of firms)	75	25	0	0	0
3 (15% of firms)	62	26	12	0	0
4 (12% of firms)	61	22	14	4	0
5 (13% of firms)	55	17	18	8	2

Table A2: Determinants of changes in price-setting behaviour

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Switch to State-Dependent Pricing (scaled by 100)					
Sample period:	2024-2025					
Estimation:	OLS					
Δ Subjective Sales Uncertainty	0.537***					0.529***
	(0.136)					(0.138)
Δ Subjective Price Uncertainty		0.872**				0.636
		(0.399)				(0.413)
ln(Employment) X 2025			0.643			0.045
			(0.621)			(0.710)
% of non-labour costs in total costs X 2025				0.011		0.004
				(0.063)		(0.066)
Industry energy costs X 2025					0.809**	0.744*
					(0.384)	(0.399)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.320	0.316	0.312	0.313	0.313	0.323
Observations	4,170	4,113	4,302	4,302	4,296	4,024

Notes: The dependent variable is a dummy for whether a firm has switched from time-dependent to state-dependent pricing between survey responses, scaled by 100 for presentational purposes. The reference category is firms which have switched from state- to time-dependent pricing and firms which have not changed price-setting behaviour. Standard errors are clustered at the firm level and reported in parentheses, stars indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A3: The impact of oil supply news shocks (OSNS) on firm price growth: Full Sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Dependent variable:	Annual Own-Price Growth (%)												
Horizon (Quarter):	0	1	2	3	4	5	6	7	8	9	10	11	12
$OSNS_t$	0.035**	0.031*	0.047***	0.066***	0.079***	0.093***	0.086***	0.067***	0.019	0.019	0.035	0.024	0.064**
	(0.016)	(0.018)	(0.016)	(0.017)	(0.018)	(0.017)	(0.017)	(0.018)	(0.017)	(0.023)	(0.026)	(0.034)	(0.031)
π_{it-1}	0.373***	0.300***	0.156***	0.058***	-0.022	-0.093***	-0.178***	-0.194***	-0.182***	-0.176***	-0.126***	-0.107***	-0.042
	(0.021)	(0.021)	(0.021)	(0.018)	(0.018)	(0.017)	(0.018)	(0.023)	(0.022)	(0.022)	(0.026)	(0.028)	(0.026)
π_{it-2}	0.125***	-0.004	-0.059***	-0.127***	-0.182***	-0.223***	-0.179***	-0.149***	-0.124***	-0.073***	-0.065**	-0.009	0.016
	(0.018)	(0.019)	(0.020)	(0.020)	(0.019)	(0.021)	(0.022)	(0.020)	(0.024)	(0.025)	(0.025)	(0.027)	(0.028)
CPI_t	0.242**	0.167*	0.104	0.188*	0.116	0.212**	-0.183*	-0.231**	-0.147	-0.319***	0.149	-0.367***	-0.624***
	(0.101)	(0.094)	(0.103)	(0.100)	(0.099)	(0.102)	(0.096)	(0.100)	(0.106)	(0.114)	(0.136)	(0.141)	(0.142)
CPI_{t-1}	0.114	0.143	0.259***	0.210**	0.256***	0.087	0.265***	0.235**	0.196*	0.152	-0.560***	-0.472***	-0.648***
	(0.097)	(0.094)	(0.100)	(0.100)	(0.095)	(0.103)	(0.098)	(0.093)	(0.109)	(0.122)	(0.166)	(0.166)	(0.166)
$UnRate_t$	-0.320	0.433	0.516*	0.580*	1.523***	1.275***	1.431***	0.850***	-0.069	-0.433	-1.217***	1.496	3.697***
	(0.295)	(0.290)	(0.279)	(0.311)	(0.299)	(0.300)	(0.300)	(0.319)	(0.329)	(0.334)	(0.408)	(1.062)	(1.061)
$UnRate_{t-1}$	0.998***	0.144	0.825***	1.224***	0.905***	1.446***	0.650**	0.427	0.967***	0.465	0.963*	0.183	-1.662***
	(0.333)	(0.313)	(0.308)	(0.305)	(0.307)	(0.302)	(0.299)	(0.333)	(0.331)	(0.371)	(0.493)	(0.543)	(0.515)
$BankRate_t$	0.165	-0.390	-0.762*	-0.132	-0.895**	-1.126***	-0.329	0.446	0.579	1.724***	2.039***	-1.536	-3.470***
	(0.378)	(0.371)	(0.404)	(0.426)	(0.398)	(0.396)	(0.403)	(0.411)	(0.435)	(0.461)	(0.568)	(1.108)	(1.119)
$BankRate_{t-1}$	-0.186	-0.144	0.523	0.064	0.825*	1.140**	0.197	-0.709	-0.681	-1.928***	-0.696	6.215***	10.173***
	(0.445)	(0.453)	(0.493)	(0.521)	(0.489)	(0.489)	(0.504)	(0.501)	(0.541)	(0.599)	(0.681)	(2.086)	(2.203)
$OSNS_{t-1}$	0.072***	0.085***	0.078***	0.114***	0.131***	0.103***	0.091***	0.043*	0.020	-0.002	-0.028	0.143***	0.209***
	(0.021)	(0.020)	(0.020)	(0.019)	(0.020)	(0.021)	(0.021)	(0.023)	(0.024)	(0.025)	(0.029)	(0.050)	(0.048)
$OSNS_{t-2}$	0.047**	0.076***	0.008	0.040	0.015	-0.015	-0.000	-0.027	-0.051*	-0.028	-0.114***	-0.007	0.108***
	(0.023)	(0.024)	(0.024)	(0.027)	(0.024)	(0.025)	(0.025)	(0.027)	(0.027)	(0.029)	(0.035)	(0.039)	(0.040)
$GasPrice_t$	0.001	-0.001	0.007***	0.006***	0.007***	0.008***	0.005***	0.006***	-0.001	-0.003	0.006*	0.008**	0.010***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.004)
$GasPrice_{t-1}$	0.001	0.006***	0.010***	0.008***	0.006***	0.005***	0.007***	-0.001	-0.001	-0.008***	-0.013***	0.002	0.006*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.634	0.576	0.536	0.518	0.520	0.531	0.526	0.513	0.503	0.501	0.490	0.492	0.500
Observations	8,020	7,913	7,854	7,766	7,715	7,680	7,665	7,220	6,667	6,213	5,719	5,234	4,754

Notes: This table presents the response of firm own-price growth to oil supply news shocks (Känzig, 2021) across the full sample based on the methodology in Equation 1. The sample covers firms which are either always state- or time-dependent. It also includes firms with at least seven quarters of price growth data. Standard errors are clustered at the firm level and reported in parentheses, stars indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A4: The impact of gas supply shocks on firm price growth: Full Sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Dependent variable:	Annual Own-Price Growth (%)												
Horizon (Quarter):	0	1	2	3	4	5	6	7	8	9	10	11	12
Gas Shock$_t$	0.005	0.011	0.035***	0.042***	0.029***	0.035***	0.039***	0.042***	-0.009	0.003	0.050***	0.018	0.014
	(0.010)	(0.010)	(0.009)	(0.009)	(0.009)	(0.010)	(0.010)	(0.011)	(0.012)	(0.011)	(0.013)	(0.016)	(0.017)
π_{it-1}	0.373***	0.300***	0.157***	0.059***	-0.021	-0.091***	-0.178***	-0.193***	-0.182***	-0.177***	-0.126***	-0.107***	-0.041
	(0.021)	(0.021)	(0.021)	(0.018)	(0.018)	(0.017)	(0.018)	(0.023)	(0.022)	(0.022)	(0.026)	(0.028)	(0.026)
π_{it-2}	0.124***	-0.004	-0.059***	-0.127***	-0.182***	-0.224***	-0.179***	-0.150***	-0.124***	-0.074***	-0.064**	-0.011	0.015
	(0.018)	(0.019)	(0.020)	(0.020)	(0.019)	(0.021)	(0.022)	(0.020)	(0.024)	(0.025)	(0.025)	(0.027)	(0.028)
CPI$_t$	0.274*	0.216	0.279*	0.081	0.010	0.164	-0.088	-0.235	-0.147	-0.492***	-0.036	-0.583***	-0.418**
	(0.161)	(0.141)	(0.147)	(0.135)	(0.137)	(0.147)	(0.145)	(0.155)	(0.164)	(0.175)	(0.169)	(0.187)	(0.170)
CPI$_{t-1}$	0.224	0.152	0.080	0.301**	0.297**	0.097	0.138	0.057	0.055	0.039	-0.587***	-0.017	-0.497***
	(0.172)	(0.153)	(0.149)	(0.144)	(0.151)	(0.150)	(0.159)	(0.160)	(0.184)	(0.197)	(0.191)	(0.198)	(0.185)
UnRate$_t$	-0.510	0.378	0.272	0.745**	1.430***	1.016***	1.185***	1.477***	0.057	0.569	-1.147**	-1.199	-0.668
	(0.348)	(0.323)	(0.307)	(0.332)	(0.317)	(0.318)	(0.318)	(0.397)	(0.395)	(0.405)	(0.530)	(0.878)	(0.863)
UnRate$_{t-1}$	0.970***	0.080	0.441	0.397	0.086	0.653**	-0.034	-0.582*	0.104	-0.613*	-0.125	-0.536	-1.560***
	(0.327)	(0.328)	(0.300)	(0.307)	(0.298)	(0.295)	(0.308)	(0.345)	(0.355)	(0.372)	(0.430)	(0.510)	(0.500)
BankRate$_t$	-0.589	-0.909**	-0.521	0.117	-0.876**	-0.629	0.383	0.930**	1.284***	1.892***	4.682***	3.635***	2.782**
	(0.380)	(0.384)	(0.378)	(0.398)	(0.371)	(0.386)	(0.376)	(0.386)	(0.376)	(0.420)	(0.655)	(1.095)	(1.090)
BankRate$_{t-1}$	0.702	0.219	-0.114	-0.617	0.341	0.257	-0.849*	-1.382***	-1.384***	-1.770***	-1.314**	-1.023	-1.152
	(0.450)	(0.452)	(0.452)	(0.459)	(0.438)	(0.467)	(0.452)	(0.468)	(0.462)	(0.487)	(0.546)	(1.513)	(1.588)
Gas Shock$_{t-1}$	0.005	0.024	0.027*	0.056***	0.027*	0.048***	0.070***	0.044**	0.029	0.034	0.078***	0.072***	0.030
	(0.016)	(0.018)	(0.015)	(0.017)	(0.017)	(0.018)	(0.018)	(0.021)	(0.019)	(0.022)	(0.021)	(0.026)	(0.025)
Gas Shock$_{t-2}$	0.012	-0.011	-0.012	0.020	0.009	0.033***	0.031**	0.033**	0.048***	0.052***	0.183***	0.140***	0.076***
	(0.012)	(0.012)	(0.011)	(0.012)	(0.011)	(0.012)	(0.013)	(0.015)	(0.013)	(0.015)	(0.024)	(0.026)	(0.024)
OilPrice$_t$	0.032**	0.018	-0.001	0.009	0.030**	0.003	-0.024*	-0.040***	-0.036**	-0.046***	-0.033**	0.003	-0.036**
	(0.013)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.013)	(0.013)	(0.015)	(0.015)	(0.016)	(0.018)	(0.017)
OilPrice$_{t-1}$	-0.016	0.014	0.023*	0.034***	0.017	0.011	0.018	0.031**	-0.009	0.015	-0.039**	-0.026	0.018
	(0.012)	(0.011)	(0.012)	(0.012)	(0.011)	(0.012)	(0.012)	(0.013)	(0.013)	(0.015)	(0.017)	(0.018)	(0.016)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.634	0.575	0.533	0.515	0.518	0.528	0.525	0.513	0.504	0.501	0.494	0.494	0.499
Observations	8,020	7,913	7,854	7,766	7,715	7,680	7,665	7,220	6,667	6,213	5,719	5,234	4,754

Notes: This table presents the response of firm own-price growth to gas supply shocks (Alessandri and Gazzani, 2025) across the full sample based on the methodology in Equation 1. The sample covers firms which are either always state- or time-dependent. It also includes firms with at least seven quarters of price growth data. Standard errors are clustered at the firm level and reported in parentheses, stars indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A5: The impact of oil supply news shocks (OSNS) on firm price growth by price-setting behaviour

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Dependent variable:	Annual Own-Price Growth (%)												
Horizon (Quarter):	0	1	2	3	4	5	6	7	8	9	10	11	12
$OSNS_t \times$ Time-Dependent$_i$	0.025	0.041***	0.019	0.036**	0.037**	0.064***	0.054***	0.078***	0.032*	0.016	0.011	-0.032	0.080***
	(0.016)	(0.015)	(0.014)	(0.016)	(0.016)	(0.017)	(0.016)	(0.017)	(0.017)	(0.022)	(0.023)	(0.027)	(0.028)
$OSNS_t \times$ State-Dependent$_i$	0.034*	0.067***	0.072***	0.075***	0.101***	0.109***	0.118***	0.084***	0.018	0.008	-0.048**	-0.060**	0.071**
	(0.018)	(0.018)	(0.017)	(0.016)	(0.019)	(0.018)	(0.019)	(0.019)	(0.019)	(0.024)	(0.024)	(0.028)	(0.029)
π_{it-1}	0.374***	0.300***	0.156***	0.058***	-0.020	-0.094***	-0.179***	-0.197***	-0.187***	-0.181***	-0.133***	-0.113***	-0.046*
	(0.021)	(0.021)	(0.021)	(0.018)	(0.018)	(0.017)	(0.018)	(0.023)	(0.023)	(0.022)	(0.026)	(0.027)	(0.026)
π_{it-2}	0.125***	-0.005	-0.060***	-0.129***	-0.186***	-0.228***	-0.185***	-0.159***	-0.134***	-0.085***	-0.076***	-0.021	0.009
	(0.018)	(0.019)	(0.019)	(0.020)	(0.019)	(0.021)	(0.022)	(0.021)	(0.025)	(0.026)	(0.025)	(0.028)	(0.028)
CPI_t	0.243***	0.389***	0.330***	0.481***	0.377***	0.308***	0.033	0.089	0.265***	-0.073	0.087	-0.292***	-0.597***
	(0.079)	(0.073)	(0.073)	(0.074)	(0.080)	(0.081)	(0.077)	(0.079)	(0.095)	(0.095)	(0.103)	(0.098)	(0.100)
CPI_{t-1}	0.090	0.013	0.014	-0.116	-0.020	0.084	0.256***	0.145*	-0.135	0.099	-0.160	-0.174	-0.275**
	(0.070)	(0.070)	(0.073)	(0.079)	(0.075)	(0.073)	(0.072)	(0.084)	(0.103)	(0.103)	(0.116)	(0.108)	(0.119)
$UnRate_t$	-0.250	0.250	0.448**	0.809***	1.397***	1.945***	2.675***	3.179***	2.924***	2.766***	2.405***	1.754***	2.444***
	(0.165)	(0.191)	(0.197)	(0.224)	(0.235)	(0.227)	(0.238)	(0.260)	(0.289)	(0.303)	(0.304)	(0.356)	(0.510)
$UnRate_{t-1}$	0.647***	0.657***	1.053***	1.337***	1.413***	1.404***	0.823***	-0.156	-0.465**	-1.109***	-1.847***	-1.618***	-1.985***
	(0.185)	(0.206)	(0.200)	(0.196)	(0.195)	(0.201)	(0.210)	(0.205)	(0.236)	(0.273)	(0.294)	(0.262)	(0.271)
$BankRate_t$	0.095	-0.656**	-1.012***	-0.748**	-1.193***	-2.094***	-2.130***	-2.355***	-2.737***	-2.138***	-2.507***	-2.364***	-1.600**
	(0.282)	(0.302)	(0.284)	(0.300)	(0.325)	(0.322)	(0.326)	(0.335)	(0.358)	(0.387)	(0.465)	(0.505)	(0.624)
$BankRate_{t-1}$	-0.159	0.569*	0.908***	0.674**	1.073***	1.979***	1.916***	2.267***	2.887***	2.107***	2.889***	4.188***	6.615***
	(0.290)	(0.312)	(0.284)	(0.293)	(0.324)	(0.322)	(0.330)	(0.337)	(0.390)	(0.424)	(0.502)	(0.644)	(1.116)
$OSNS_{t-1}$	0.051***	0.072***	0.042***	0.065***	0.108***	0.095***	0.082***	0.011	-0.052**	-0.045**	-0.095***	0.008	0.123***
	(0.016)	(0.016)	(0.015)	(0.015)	(0.016)	(0.016)	(0.016)	(0.018)	(0.020)	(0.018)	(0.023)	(0.026)	(0.029)
$OSNS_{t-2}$	0.045***	0.007	-0.030**	0.012	0.006	-0.020	-0.028*	-0.072***	-0.080***	-0.043***	-0.054**	0.031	0.028
	(0.016)	(0.017)	(0.015)	(0.016)	(0.016)	(0.016)	(0.016)	(0.017)	(0.017)	(0.017)	(0.022)	(0.024)	(0.028)
$GasPrice_t$	0.000	0.003**	0.010***	0.009***	0.009***	0.010***	0.009***	0.012***	0.007***	0.003**	0.003	0.001	0.008***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
$GasPrice_{t-1}$	-0.000	0.004***	0.006***	0.004***	0.006***	0.006***	0.009***	0.002	0.003*	0.004*	0.001	0.009***	0.011***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.634	0.575	0.535	0.515	0.517	0.524	0.515	0.491	0.474	0.465	0.456	0.461	0.480
Observations	8,020	7,913	7,854	7,766	7,715	7,680	7,665	7,220	6,667	6,213	5,719	5,234	4,754
Test state/time dependent coefficients equal (p-value)	0.579	0.160	0.005	0.041	0.002	0.018	0.001	0.791	0.462	0.710	0.005	0.248	0.695

Notes: This table presents the response of firm own-price growth to oil supply news shocks from Känzig (2021) by price-setting behaviour based on the methodology in Equation 1. The sample covers firms which are either always state- or time-dependent. It also includes firms with at least seven quarters of price growth data. Standard errors are clustered at the firm level and reported in parentheses, stars indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A6: The impact of gas supply shocks on firm price growth by price-setting behaviour

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Dependent variable:	Annual Own-Price Growth (%)												
Horizon (Quarter):	0	1	2	3	4	5	6	7	8	9	10	11	12
Gas Shock$_t \times$ Time-Dependent$_i$	-0.000	-0.005	0.014	0.010	-0.005	0.011	0.013	0.027**	-0.007	0.010	0.058***	0.041**	0.037**
	(0.010)	(0.011)	(0.010)	(0.011)	(0.011)	(0.011)	(0.011)	(0.012)	(0.012)	(0.012)	(0.014)	(0.016)	(0.018)
Gas Shock$_t \times$ State-Dependent$_i$	0.009	0.023**	0.051***	0.067***	0.057***	0.054***	0.059***	0.053***	-0.010	-0.003	0.043***	-0.001	-0.005
	(0.011)	(0.011)	(0.010)	(0.011)	(0.011)	(0.012)	(0.011)	(0.013)	(0.014)	(0.014)	(0.014)	(0.018)	(0.019)
π_{it-1}	0.373***	0.300***	0.157***	0.058***	-0.022	-0.092***	-0.179***	-0.193***	-0.182***	-0.176***	-0.126***	-0.106***	-0.040
	(0.021)	(0.021)	(0.021)	(0.018)	(0.018)	(0.017)	(0.018)	(0.023)	(0.022)	(0.022)	(0.026)	(0.028)	(0.026)
π_{it-2}	0.125***	-0.003	-0.057***	-0.125***	-0.180***	-0.222***	-0.177***	-0.148***	-0.124***	-0.074***	-0.065***	-0.013	0.013
	(0.018)	(0.019)	(0.020)	(0.020)	(0.019)	(0.021)	(0.022)	(0.020)	(0.024)	(0.024)	(0.025)	(0.027)	(0.027)
CPI$_t$	0.274*	0.217	0.282*	0.085	0.007	0.166	-0.087	-0.234	-0.147	-0.492***	-0.036	-0.579***	-0.420**
	(0.161)	(0.141)	(0.147)	(0.135)	(0.137)	(0.147)	(0.145)	(0.155)	(0.164)	(0.175)	(0.169)	(0.187)	(0.170)
CPI$_{t-1}$	0.224	0.151	0.079	0.299**	0.299**	0.094	0.137	0.055	0.055	0.040	-0.587***	-0.014	-0.493***
	(0.172)	(0.153)	(0.149)	(0.144)	(0.151)	(0.149)	(0.158)	(0.160)	(0.184)	(0.196)	(0.191)	(0.198)	(0.185)
UnRate$_t$	-0.510	0.377	0.272	0.748**	1.437***	1.017***	1.179***	1.476***	0.057	0.566	-1.152**	-1.225	-0.681
	(0.348)	(0.323)	(0.307)	(0.331)	(0.315)	(0.317)	(0.316)	(0.397)	(0.395)	(0.405)	(0.529)	(0.877)	(0.863)
UnRate$_{t-1}$	0.969***	0.080	0.441	0.392	0.074	0.647**	-0.036	-0.584*	0.105	-0.610	-0.120	-0.512	-1.544***
	(0.327)	(0.327)	(0.300)	(0.306)	(0.297)	(0.295)	(0.307)	(0.345)	(0.355)	(0.372)	(0.429)	(0.510)	(0.500)
BankRate$_t$	-0.587	-0.910**	-0.523	0.110	-0.872**	-0.632	0.381	0.929**	1.285***	1.897***	4.686***	3.647***	2.788**
	(0.380)	(0.384)	(0.377)	(0.398)	(0.371)	(0.386)	(0.377)	(0.386)	(0.376)	(0.421)	(0.655)	(1.094)	(1.092)
BankRate$_{t-1}$	0.700	0.221	-0.112	-0.609	0.334	0.260	-0.849*	-1.383***	-1.385***	-1.774***	-1.315**	-1.013	-1.136
	(0.450)	(0.452)	(0.451)	(0.458)	(0.438)	(0.467)	(0.452)	(0.468)	(0.462)	(0.487)	(0.545)	(1.508)	(1.588)
Gas Shock$_{t-1}$	0.005	0.025	0.027*	0.056***	0.028*	0.048***	0.070***	0.044**	0.029	0.034	0.078***	0.072***	0.030
	(0.016)	(0.018)	(0.015)	(0.017)	(0.017)	(0.018)	(0.018)	(0.021)	(0.019)	(0.022)	(0.021)	(0.026)	(0.025)
Gas Shock$_{t-2}$	0.012	-0.011	-0.011	0.020*	0.009	0.033***	0.031**	0.033**	0.048***	0.052***	0.183***	0.141***	0.077***
	(0.012)	(0.012)	(0.011)	(0.012)	(0.011)	(0.012)	(0.012)	(0.015)	(0.013)	(0.015)	(0.024)	(0.026)	(0.024)
OilPrice$_t$	0.032**	0.018	-0.001	0.009	0.030**	0.003	-0.024*	-0.040***	-0.036**	-0.046***	-0.033**	0.004	-0.036**
	(0.013)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.013)	(0.013)	(0.015)	(0.015)	(0.016)	(0.018)	(0.017)
OilPrice$_{t-1}$	-0.016	0.014	0.022*	0.034***	0.017	0.011	0.018	0.031**	-0.009	0.015	-0.040**	-0.027	0.017
	(0.012)	(0.011)	(0.012)	(0.012)	(0.011)	(0.012)	(0.012)	(0.013)	(0.013)	(0.015)	(0.017)	(0.018)	(0.016)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.634	0.576	0.534	0.517	0.520	0.529	0.526	0.513	0.504	0.501	0.494	0.495	0.500
Observations	8,020	7,913	7,854	7,766	7,715	7,680	7,665	7,220	6,667	6,213	5,719	5,234	4,754
Test state/time dependent coefficients equal (p-value)	0.349	0.008	0.000	0.000	0.000	0.001	0.000	0.031	0.799	0.288	0.212	0.000	0.004

Notes: This table presents the response of firm own-price growth to gas supply shocks from Alessandri and Gazzani (2025) by price-setting behaviour based on the methodology in Equation 1. The sample covers firms which are either always state- or time-dependent. It also includes firms with at least seven quarters of price growth data. Standard errors are clustered at the firm level and reported in parentheses, stars indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A7: The impact of oil supply news shocks (OSNS) by firm price-setting behaviour: Including time fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Dependent variable:	Annual Own-Price Growth (%)												
Horizon (Quarter):	0	1	2	3	4	5	6	7	8	9	10	11	12
$OSNS_t \times$ State-Dependent$_i$	0.009	0.026	0.052***	0.038**	0.064***	0.045**	0.064***	0.004	-0.016	-0.010	-0.063***	-0.028	-0.011
	(0.017)	(0.018)	(0.018)	(0.019)	(0.020)	(0.019)	(0.019)	(0.019)	(0.020)	(0.022)	(0.021)	(0.024)	(0.021)
π_{it-1}	0.373***	0.300***	0.157***	0.058***	-0.021	-0.092***	-0.176***	-0.193***	-0.181***	-0.174***	-0.126***	-0.107***	-0.041
	(0.021)	(0.021)	(0.021)	(0.018)	(0.018)	(0.017)	(0.018)	(0.023)	(0.022)	(0.022)	(0.026)	(0.028)	(0.026)
π_{it-2}	0.126***	-0.003	-0.059***	-0.127***	-0.182***	-0.225***	-0.180***	-0.149***	-0.124***	-0.073***	-0.064**	-0.011	0.014
	(0.018)	(0.019)	(0.020)	(0.020)	(0.019)	(0.021)	(0.022)	(0.020)	(0.024)	(0.025)	(0.025)	(0.027)	(0.028)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.635	0.577	0.537	0.519	0.522	0.532	0.528	0.515	0.507	0.505	0.497	0.498	0.502
Observations	8,020	7,913	7,854	7,766	7,715	7,680	7,665	7,220	6,667	6,213	5,719	5,234	4,754

Notes: This table presents the difference between state-dependent and time-dependent price responses to oil supply news shocks (Känzig, 2021) based on the methodology in Equation 2. A positive coefficient means that the price response of state-dependent firms is greater than time-dependent firms. The sample covers firms which are either always state- or time-dependent. It also includes firms with at least seven quarters of price growth data. Standard errors are clustered at the firm level.Standard errors are clustered at the firm level and reported in parentheses, stars indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A8: The impact of gas supply shocks by firm price-setting behaviour: Including time fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Dependent variable:	Annual Own-Price Growth (%)												
Horizon (Quarter):	0	1	2	3	4	5	6	7	8	9	10	11	12
Gas Shock$_t \times$ State-Dependent$_i$	0.009	0.029***	0.037***	0.057***	0.061***	0.043***	0.046***	0.026**	-0.004	-0.013	-0.015	-0.042***	-0.041***
	(0.010)	(0.011)	(0.011)	(0.012)	(0.013)	(0.013)	(0.011)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.014)
π_{it-1}	0.373***	0.299***	0.155***	0.057***	-0.023	-0.093***	-0.178***	-0.193***	-0.180***	-0.173***	-0.125***	-0.105***	-0.039
	(0.021)	(0.021)	(0.021)	(0.018)	(0.018)	(0.017)	(0.018)	(0.023)	(0.022)	(0.022)	(0.026)	(0.028)	(0.026)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.635	0.577	0.537	0.520	0.523	0.532	0.529	0.515	0.507	0.505	0.496	0.499	0.503
Observations	8,020	7,913	7,854	7,766	7,715	7,680	7,665	7,220	6,667	6,213	5,719	5,234	4,754

Notes: This table presents the difference between state-dependent and time-dependent price responses to gas supply shocks (Alessandri and Gazzani, 2025) based on the methodology in Equation 2. A positive coefficient means that the price response of state-dependent firms is greater than time-dependent firms. The sample covers firms which are either always state- or time-dependent. It also includes firms with at least seven quarters of price growth data. Standard errors are clustered at the firm level. Standard errors are clustered at the firm level and reported in parentheses, stars indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A9: The impact of oil supply news shocks (OSNS) on firm price growth by price-setting behaviour: Testing for non-linear effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Dependent variable:	Annual Own-Price Growth (%)												
Horizon (Quarter):	0	1	2	3	4	5	6	7	8	9	10	11	12
$OSNS_t \times$ State-Dependent$_i$	0.014	0.037**	0.061***	0.047**	0.071***	0.049**	0.065***	0.004	-0.027	-0.015	-0.068***	-0.041	-0.021
	(0.018)	(0.019)	(0.019)	(0.019)	(0.021)	(0.020)	(0.020)	(0.020)	(0.021)	(0.024)	(0.022)	(0.026)	(0.024)
$OSNS_t^2 \times$ State-Dependent$_i$	0.006*	0.012***	0.011***	0.010**	0.008**	0.004	0.002	0.000	-0.008**	-0.004	-0.004	-0.009**	-0.007
	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
π_{it-1}	0.373***	0.300***	0.156***	0.058***	-0.021	-0.092***	-0.176***	-0.193***	-0.180***	-0.173***	-0.125***	-0.105***	-0.040
	(0.021)	(0.021)	(0.021)	(0.018)	(0.018)	(0.017)	(0.018)	(0.023)	(0.022)	(0.022)	(0.026)	(0.028)	(0.026)
π_{it-2}	0.126***	-0.004	-0.059***	-0.128***	-0.183***	-0.225***	-0.180***	-0.149***	-0.123***	-0.073***	-0.064**	-0.010	0.016
	(0.018)	(0.019)	(0.020)	(0.020)	(0.019)	(0.021)	(0.022)	(0.020)	(0.024)	(0.025)	(0.025)	(0.027)	(0.028)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.635	0.577	0.537	0.519	0.522	0.532	0.528	0.515	0.507	0.505	0.497	0.498	0.502
Observations	8,020	7,913	7,854	7,766	7,715	7,680	7,665	7,220	6,667	6,213	5,719	5,234	4,754

Notes: This table presents the difference between state-dependent and time-dependent price responses to oil supply news shocks (Känzig, 2021) based on the methodology in Equation 2. A positive coefficient means that the price response of state-dependent firms is greater than time-dependent firms. The sample covers firms which are either always state- or time-dependent. It also includes firms with at least seven quarters of price growth data. Standard errors are clustered at the firm level.Standard errors are clustered at the firm level and reported in parentheses, stars indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A10: The impact of gas supply shocks on firm price growth by price-setting behaviour: Testing for non-linear effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Dependent variable:	Annual Own-Price Growth (%)												
Horizon (Quarter):	0	1	2	3	4	5	6	7	8	9	10	11	12
Gas Shock$_t$ × State-Dependent$_i$	0.003	0.019*	0.027**	0.046***	0.055***	0.041***	0.045***	0.032***	0.004	-0.006	-0.006	-0.037***	-0.034**
	(0.010)	(0.011)	(0.011)	(0.012)	(0.012)	(0.013)	(0.011)	(0.012)	(0.012)	(0.012)	(0.011)	(0.012)	(0.013)
Gas Shock$_t^2$ × State-Dependent$_i$	0.004***	0.006***	0.006***	0.006***	0.003**	0.001	0.000	-0.004***	-0.006***	-0.004***	-0.006***	-0.004**	-0.003
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
π_{it-1}	0.370***	0.295***	0.152***	0.053***	-0.025	-0.094***	-0.178***	-0.191***	-0.177***	-0.170***	-0.122***	-0.103***	-0.037
	(0.021)	(0.021)	(0.021)	(0.018)	(0.018)	(0.017)	(0.018)	(0.023)	(0.022)	(0.022)	(0.026)	(0.027)	(0.026)
π_{it-2}	0.124***	-0.005	-0.060***	-0.129***	-0.182***	-0.223***	-0.178***	-0.146***	-0.121***	-0.071***	-0.059**	-0.010	0.016
	(0.018)	(0.019)	(0.020)	(0.020)	(0.019)	(0.021)	(0.022)	(0.020)	(0.024)	(0.025)	(0.025)	(0.027)	(0.027)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.636	0.579	0.539	0.522	0.523	0.532	0.529	0.516	0.509	0.507	0.498	0.499	0.503
Observations	8,020	7,913	7,854	7,766	7,715	7,680	7,665	7,220	6,667	6,213	5,719	5,234	4,754

Notes: This table presents the difference between state-dependent and time-dependent price responses to gas supply shocks (Alessandri and Gazzani, 2025) based on the methodology in Equation 2. A positive coefficient means that the price response of state-dependent firms is greater than time-dependent firms. The sample covers firms which are either always state- or time-dependent. It also includes firms with at least seven quarters of price growth data. Standard errors are clustered at the firm level. Standard errors are clustered at the firm level and reported in parentheses, stars indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A11: Difference between state- and time-dependent firms' price growth responses to an oil supply news shock: Controlling for frequency of price change

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Dependent variable:	Annual Own-Price Growth (%)												
Horizon (Quarter):	0	1	2	3	4	5	6	7	8	9	10	11	12
$OSNS_t \times$ State-Dependent$_i$	0.028	0.026	0.052**	0.013	0.052**	0.045*	0.043*	0.029	0.006	0.028	-0.019	-0.009	0.012
	(0.021)	(0.021)	(0.025)	(0.025)	(0.024)	(0.024)	(0.024)	(0.023)	(0.024)	(0.025)	(0.024)	(0.031)	(0.029)
$OSNS_t \times$ No Price Change$_i$	-0.040	-0.014	0.010	0.011	-0.020	0.009	0.005	0.015	0.022	-0.011	-0.006	-0.091**	-0.072**
	(0.029)	(0.031)	(0.034)	(0.036)	(0.038)	(0.033)	(0.037)	(0.034)	(0.032)	(0.035)	(0.034)	(0.044)	(0.035)
$OSNS_t \times$ Half-Yearly Price Change$_i$	-0.048	0.019	0.000	-0.032	0.048	0.000	0.051	-0.003	0.005	-0.032	-0.091***	0.018	-0.039
	(0.030)	(0.034)	(0.034)	(0.029)	(0.032)	(0.033)	(0.037)	(0.029)	(0.031)	(0.035)	(0.035)	(0.036)	(0.040)
$OSNS_t \times$ Quarterly$_i$	0.010	0.037	-0.007	0.079*	-0.040	-0.030	0.021	-0.010	-0.044	-0.060	-0.011	-0.063	-0.089*
	(0.030)	(0.030)	(0.037)	(0.042)	(0.042)	(0.040)	(0.034)	(0.044)	(0.050)	(0.044)	(0.046)	(0.044)	(0.047)
$OSNS_t \times$ Monthly+ Price Change$_i$	-0.038	-0.013	0.000	0.086**	0.059	0.010	0.022	-0.089**	-0.073*	-0.095**	-0.132***	-0.021	0.008
	(0.040)	(0.039)	(0.039)	(0.039)	(0.043)	(0.038)	(0.040)	(0.042)	(0.041)	(0.046)	(0.045)	(0.050)	(0.043)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.633	0.576	0.533	0.519	0.521	0.531	0.528	0.518	0.509	0.508	0.500	0.499	0.502
Observations	7,725	7,630	7,579	7,513	7,487	7,429	7,409	6,990	6,472	6,032	5,567	5,120	4,642

Notes: Standard errors are clustered at the firm level and reported in parentheses, stars indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A12: Difference between state- and time-dependent firms' price growth responses to a gas supply shock: Controlling for frequency of price change

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Dependent variable:	Annual Own-Price Growth (%)												
Horizon (Quarter):	0	1	2	3	4	5	6	7	8	9	10	11	12
Gas Shock$_t \times$ State-Dependent$_i$	0.004	0.034**	0.035***	0.035**	0.050***	0.022	0.033**	0.017	-0.002	0.014	0.006	-0.016	-0.012
	(0.012)	(0.013)	(0.013)	(0.016)	(0.017)	(0.017)	(0.015)	(0.014)	(0.016)	(0.015)	(0.014)	(0.015)	(0.021)
Gas Shock$_t \times$ No Price Change$_i$	-0.015	-0.012	-0.022	-0.009	-0.025	0.020	-0.003	0.048*	0.040*	-0.019	-0.012	-0.033	-0.054**
	(0.017)	(0.022)	(0.019)	(0.022)	(0.021)	(0.027)	(0.023)	(0.026)	(0.021)	(0.020)	(0.020)	(0.020)	(0.025)
Gas Shock$_t \times$ Half-Yearly Price Change$_i$	0.003	-0.010	0.008	0.025	0.003	0.033	0.026	0.038**	0.017	-0.029	-0.015	-0.047**	-0.009
	(0.018)	(0.019)	(0.019)	(0.022)	(0.021)	(0.021)	(0.018)	(0.019)	(0.022)	(0.022)	(0.020)	(0.019)	(0.025)
Gas Shock$_t \times$ Quarterly$_i$	0.030	0.015	0.020	0.048*	0.009	0.048*	0.020	0.019	-0.002	-0.060*	-0.068**	-0.069**	-0.109***
	(0.019)	(0.018)	(0.021)	(0.026)	(0.029)	(0.026)	(0.024)	(0.024)	(0.030)	(0.032)	(0.027)	(0.030)	(0.034)
Gas Shock$_t \times$ Monthly+ Price Change$_i$	0.014	-0.011	0.007	0.052**	0.040	0.044*	0.014	-0.011	-0.022	-0.068***	-0.043*	-0.036	-0.041
	(0.020)	(0.023)	(0.022)	(0.026)	(0.027)	(0.026)	(0.023)	(0.021)	(0.022)	(0.026)	(0.025)	(0.029)	(0.033)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.633	0.576	0.534	0.520	0.522	0.532	0.529	0.519	0.509	0.508	0.499	0.500	0.504
Observations	7,725	7,630	7,579	7,513	7,487	7,429	7,409	6,990	6,472	6,032	5,567	5,120	4,642

Notes: Standard errors are clustered at the firm level and reported in parentheses, stars indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.