The Future in Today's Prices: Evidence from a Survey of US Firms

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Abstract

Do firms adjust prices to realized costs, expected costs, or both? We address this question using a new survey of U.S. small and medium-sized businesses that separately measures realized cost changes since the last price adjustment and expected cost changes over the subsequent year, including the portion attributable to the new trade policies introduced in 2025. We use such cross-sectional exposure to changes in tariffs as instruments to identify the causal effects of realized and expected costs on price changes. We find an incomplete pass-through, of about 70%, of current costs to reset prices. In addition, reset prices incorporate about 40% of future costs expected over the next year. The relative importance of these channels varies across firms: frequent price adjusters load primarily on current costs, whereas sticky-price firms place greater weight on expected costs; goods producers largely adjust contemporaneously to cost shifts, while services firms are more forward-looking; and higher trade-related uncertainty shifts pricing toward expectations. While several leading pricing models can rationalize a role for expected costs for today's prices, the evidence aligns most closely with endogenous pricing frameworks in which uncertainty also reshapes the reset-price kernel across horizons.

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1 Introduction

A central feature of modern macroeconomic models is that firms set prices in a forward-looking manner. In New Keynesian and related frameworks, inflation dynamics depend not only on current marginal costs but also on firms' expectations about future costs and economic conditions. At the firm level, this behavior is characterized by a pricing rule in which the optimal reset price reflects a weighted average of expected marginal costs over the future duration of the price. In reduced form, a convenient benchmark that captures this forward-looking logic is represented by

$$\Delta P_i = \alpha + \beta\, \Delta C_i + \gamma\, \Delta C_i^e + \varepsilon_i, \tag{1}$$

where price changes respond to both realized cost changes since the last adjustment and expected future cost changes over the horizons during which the price is expected to remain in place, and possibly beyond.

This paper provides new micro-level evidence on how firms adjust prices in response to realized and expected cost changes. The evidence comes from a new quarterly survey of U.S. small and medium-sized businesses (SMBs), with approximately 500–600 firms per quarter from 2022:Q2 to 2025:Q4. The survey is designed to map directly into equation (1): it elicits (i) the firm's realized price change, (ii) the contemporaneous cost change since the previous price adjustment, and (iii) the firm's expected cost change over the subsequent year, measured at the time the price change is implemented – objects that are rarely observed jointly in standard firm-level datasets. Moreover, by focusing on SMBs – rather than large multiproduct firms – the empirical setting is closer to the single-product benchmark underlying much of the theoretical pricing literature.

Using these data, we estimate the causal effects of contemporaneous realized and expected future cost changes on firms' price adjustments by leveraging cross-firm variation in each component induced by differential exposure to trade-policy shocks. The baseline estimates indicate economically meaningful roles for both channels. The implied pass-through from realized trade-related cost changes to prices is approximately 0.7. In addition, expected future cost increases are partially incorporated at the time of price adjustment, with an estimated coefficient of about 0.4. Thus, firms' reset prices reflect both realized cost movements since the last adjustment and forward-looking considerations about anticipated cost changes.

Yet, results are quite nuanced: The importance of current and expected costs varies sharply across firms and environments. Frequent adjusters display largely contemporaneous pricing: nearly full pass-through of realized costs and little sensitivity

to expected future costs. Infrequent adjusters, by contrast, place substantially more weight on expected costs, with a muted response to realized cost changes. We also find systematic sectoral differences. Goods-producing firms exhibit near-complete contemporaneous pass-through and limited anticipatory pricing, whereas service-sector firms are significantly more forward-looking, loading on both realized and expected cost changes. Note that this result is not simply an artifact of differential price stickiness between the two sectors, with sticky service sector prices and flexible goods prices. Even estimating only within the set of firms with stickier prices, services firms are still more forward-looking than goods firms.

An important finding emerges regarding uncertainty: uncertainty shifts pricing toward expectations, which two exercises establish. Using subjective uncertainty inferred from moments of firms' tariff-related cost expectations, we find that firms facing higher uncertainty respond more strongly to expected future costs, consistent with a tilt toward forward-looking pricing when the cost outlook is more uncertain.

Our identification strategy that underlies these results exploits unexpected trade policy changes as a source of cross-sectional variation. We use heterogeneity in firms' exposure to tariff changes announced in early 2025 to construct instruments for realized and expected cost changes. Trade policy generates plausibly exogenous variation in both realized costs and cost expectations, with exposure varying across firms by import intensity, sector, firm age, and supply-chain structure. By directly eliciting from firms the portion of their realized and expected cost changes attributable to trade policy, we obtain distinct instruments for contemporaneous and expected cost movements and isolate their independent effects on price changes.

We interpret this heterogeneity through a generalized-hazard framework of price setting. In this class of models, a firm's reset price is inherently intertemporal: it reflects a weighted average of expected marginal costs over the periods in which the price is likely to remain in place. These weights are summarized by the reset-price kernel, which is pinned down by the price's survival profile—equivalently, by the expected duration of the price and the full path of adjustment hazards. Changes in the strength of pricing frictions shift this survival profile by altering the timing of adjustment, and thereby reallocate kernel weight toward nearer or more distant horizons. As a result, differences in adjustment frictions translate directly into differences in which horizons of costs matter most when firms reset prices.

This perspective rationalizes the empirical heterogeneity we document. Firms that adjust prices frequently place most weight on current costs, while firms with infrequent adjustment load more heavily on expected future costs, consistent with longer expected price durations and a more back-loaded reset-price kernel. In principle, uncertainty

could further tilt pricing toward expectations—for example, through the familiar option value of waiting. Such considerations, in conjunction with our empirical findings are most naturally interpreted through menu-cost frameworks, where differences in frictions and uncertainty map into differences in the reset-price kernel, rather than through fixed-horizon Taylor pricing or Calvo models with an invariant hazard.

Finally, a complementary way to assess the importance of cost expectations for price changes follows the sufficient-statistics approach of Werning (2022), and provides an independent validation of our results. In time-dependent pricing models, the effect of anticipated shocks on current inflation can be summarized by a single statistic: the ratio of the duration of the ongoing price spell to the average price duration. We compute this sufficient statistic at the firm level. In our data, it is orthogonal to average price stickiness and sectoral classification. Yet firms with higher values of this statistic exhibit systematically greater pass-through of expected future cost changes into current prices. This monotonic relationship is precisely what the theory predicts. It reinforces the interpretation of our results that cross-firm differences in the loading on expected costs reflect the timing structure of price adjustment, rather than mechanical correlations between realized and expected cost changes.

The remainder of the paper proceeds as follows. Section 2 describes the survey data and measurement of prices, costs, expectations, and trade exposure. Section 3 presents the empirical strategy and baseline results. Section 4 develops the generalized hazard framework and derives testable predictions linking pricing frictions, uncertainty, and the horizon profile of cost pass-through. Section 5 explores heterogeneity by adjustment frequency, sector, and uncertainty, and discusses aggregate implications. Section 6 concludes.

Related Literature

This paper contributes to three strands of literature. The first studies the role of expectations in inflation and price setting. A large macro tradition estimates forward-looking Phillips curves and the link between inflation and expected marginal costs using aggregate data Galí and Gertler (1999); Sbordone (2002) and evaluates identification and specification challenges in that approach (Mavroeidis et al., 2014; Barnichon and Mesters, 2020). More recently, a growing micro literature uses firm surveys to study how inflation and cost expectations map into firms' pricing and real decisions (Coibion et al., 2018; Andrade et al., 2022; Boneva et al., 2019; Coibion et al., 2019; Abberger et al., 2024). We contribute by combining direct firm-level measures of expected cost changes at the time of price adjustment with trade-policy-based identification, which allows us to separately quantify contemporaneous and anticipatory

pass-through. Much of the existing survey evidence relates expected costs to expected prices over a common horizon. Our estimates instead isolate pre-emptive price adjustment to expected future costs and, in doing so, help discipline the pricing mechanisms embedded in forward-looking models.

A second strand of the literature studies the pass-through of cost shocks into prices, often exploiting large realized shocks or discrete policy events in micro price data. Prominent examples include exchange-rate movements and tax changes (Gopinath et al., 2010; Karadi and Reiff, 2019), as well as tariffs (Amiti et al., 2019; Fajgelbaum et al., 2020; Cavallo et al., 2021, 2025). We complement this work by using trade policy to identify not only pass-through from realized cost changes, but also anticipatory pass-through from expected future costs measured directly at the firm level, building on recent work that exploits survey-based measures of cost expectations (Meyer and Sheng, 2025; Ghassibe et al., 2025).[1]

Our analysis also speaks to an ongoing debate about the magnitude of pass-through to prices, specifically as faced by domestic consumers. Existing estimates vary widely. Using border prices, Amiti et al. (2019) find near-complete pass-through of tariffs into the prices paid by U.S. importers, while studies based on firm–product–level retail prices from large retailers find substantially lower pass-through (Cavallo et al., 2021, 2025). Our estimates lie between these benchmarks and are notably higher than those obtained from large-retailer data, despite also relying on firm-level information. There are several possible reasons for this difference. First, we use directly measured firm-level actual and expected cost increases rather than proxies based on statutory tariff rates or effective tariff rates derived from more aggregated data. As these rates likely overstate the true cost burden by not accounting for firm-specific exemptions or foreign supplier concessions, pass-through rates estimated using such measures would be a lower bound for true rates. Secondly, we focus on SMBs while larger firms may be more able to obtain such exemptions and concessions.[2] Lastly, SMBs are less likely to engage in multi-product pricing strategies, such as spreading price increases across products that are both affected and unaffected by a given cost shock, that would complicate the identification of pass-through using cross-product rather than cross-firm variation in prices and tariffs. Notably, retail pass-through can also be further shaped by distribution margins: as emphasized by Burstein et al. (2003), distribution costs are large and local-input intensive, creating a wedge between border costs and

[1] While not directly identifying a purely anticipatory pass-through of the type we document, Cavallo et al. (2025) find that some large retailers exhibited a very quick pass-through with prices of affected goods rising within days of tariff implementation.

[2] Indeed, the Appendix of Cavallo et al. (2021) discusses lower pass-through experienced at the border for larger importers.

final consumer prices.

The third strand develops generalized-hazard and endogenous-adjustment models, including menu-cost frameworks, that discipline how price sensitivity is distributed across horizons (Alvarez et al., 2022; Werning, 2022). In these models, pricing frictions shape the reset-price kernel and thus the relative weight placed on current versus expected future marginal costs. Our contribution is to articulate the resulting predictions for cost pass-through and bring them to the data, exploiting heterogeneity in adjustment frequency, sector, and uncertainty to assess which pricing frameworks best organize the empirical patterns.

2 Survey Data

We use a new quarterly survey of U.S. small and medium-sized businesses (SMBs) designed to measure firm outcomes and expectations at the decision-maker level. The survey is administered by Morning Consult (see also Hajdini et al., 2024). It was first fielded in 2022:Q2, as repeated cross-sections of roughly 500–600 firms and became a permanent quarterly survey in 2024:Q4. Survey respondents are owners and other decision-makers of SMBs recruited through vetted panel providers, with multiple checks to ensure data quality and to limit inattentive or automated responses.[3] Sampling is stratified by firm size, with equal quotas for sole proprietors, firms with 2–10 employees, 11–100 employees, and 101–500 employees. Our analysis primarily uses the 2025:Q3 wave (fielded between August 20, 2025 and August 29, 2025).

We reweight observations to match the national SMB population using iterative proportional fitting (IPF), targeting region, industry, and firm size. In the weighted data, sectoral composition and firm characteristics are broadly consistent with external benchmarks: the most common sectors include retail trade, professional/scientific/technical services, construction, and health care and social assistance; firms are most likely to be located in the South Census region; and the median firm has been operating for more than seven years. The distribution of revenues is comparable to Census aggregates, with a modest tilt toward lower revenue ranges consistent with an SMB-focused frame (see Figure A.1). Personal socio-demographic attributes and role characteristics of respondents are reported in Table A.1; most respondents are C-level decision-makers, and the survey records race, gender, education, and political affiliation.

[3]For more information on Morning Consult's data-collection methodology, see "Morning Consult: Our Methodology," Morning Consult, https://pro.morningconsult.com/our-methodology. Accessed March 6, 2025.

The central variables for this paper measure pricing and cost dynamics around firms' own price-setting decisions, with explicit separation of trade-policy components. Firms report the frequency of price changes and the time since the last adjustment. For the most recent price change, they report the size and direction of the price adjustment and the cumulative change in costs since the previous price change. Costs are reported both in total and for the portion attributable to trade policy, which permits a transparent decomposition of trade-related versus non-trade cost pressures. The survey also elicits forward-looking beliefs at the time of price adjustment. Firms report expected cost changes over the subsequent 12 months, including average, downside, and upside scenarios, and separately report the trade-policy-driven component of those expected cost changes. Firms additionally report expected price changes over the same horizon. Finally, the survey measures exposure to trade policy directly: firms indicate which tariff or trade-policy categories affect their costs, how long they expect those effects to persist, and the average tariff rate paid on imported goods and services. Appendix C contains the main survey questions.

To ensure data quality, we exclude respondents who mechanically select "stay the same" across the full block of cost and price expectation questions spanning multiple horizons and categories (e.g., unit cost or price developments, but also borrowing and credit costs). This exclusion targets inattentive response patterns rather than economically meaningful zero changes.

3 Theoretical Framework for Estimation

In this section, we first discuss a general theoretical pricing framework that links price setting to realized and expected cost changes. We then discuss our empirical specification and identification strategy in detail.

3.1 Price Setting and Expected Costs

To derive a theoretical relation between firms' price setting behavior and both realized and expected cost changes, we build on a general class of linear quadratic pricing setting such as Alvarez et al. (2022) or Werning (2022). Assume an environment in which firms face idiosyncratic restrictions on their ability to reset prices. Time is discrete, denoted by t. A firm that resets its price in period t chooses a (log) reset price p_t^*. Between resets, the price remains fixed. We assume that the firm's frictionless (log) target price $p_t^\dagger$, net of time-invariant markups, equals its (log) real marginal cost,

mc_t, such that

$$p_t^\dagger = mc_t. \tag{2}$$

Let $\tau > 0$ denote the (random) time until the next reset. The distribution of τ is summarized by its survival function, in equation (3),

$$S_j \equiv \Pr_t(\tau > j), \qquad j \geq 0. \tag{3}$$

Here, $S_j \in (0,1)$ represents the probability that a price chosen in t remains effective j periods ahead. For now, we assume that the sequence $\{S_j\}$ is given.[4]

A second-order approximation to the firm profit function yields a quadratic objective defined by deviations from the optimal target price $p_t^\dagger$.[5] Future profits are discounted at the firms' discount factor $\beta \in (0,1)$. Conditional on being able to reset its price in period t, the firm thus minimizes the expected discounted squared deviations between its chosen price p_t^* and its desired target prices over the random lifetime of the price set in t:

$$p_t^* = \arg\min_{p_t} \mathbb{E}_t \left[\sum_{k=0}^{\tau-1} \beta^k \left(p_t - p_{t+k}^\dagger \right)^2 \right]. \tag{4}$$

Note that $\mathbb{E}_t(\tau - 1)$ is the expected duration of a price set in t, until the next reset. The first-order condition equals the optimal reset price in period t to a discounted average of expected target prices $\mathbb{E}_t p_{t+k}^\dagger$ over the price's random duration:

$$p_t^* = \frac{\mathbb{E}_t \left[\sum_{k=0}^{\tau-1} \beta^k \, p_{t+k}^\dagger \right]}{\mathbb{E}_t \left[\sum_{k=0}^{\tau-1} \beta^k \right]} = \sum_{k \geq 0} \frac{\beta^k S_k}{\sum_{k \geq 0} \beta^k S_k} \mathbb{E}_t p_{t+k}^\dagger \tag{5}$$

The weight of each future period $t+k$ is a function of the normalized, discounted survival probability of prices into period $t+k$. Since $p_{t+k}^\dagger = mc_{t+k}$, this relationship immediately implies a linear mapping between expected marginal costs at each horizon and the reset price. Proposition 1 summarizes the sensitivity of the optimal reset price in t to expectations over real marginal costs in period $t+k$.

Proposition 1 (General weight formula)**.** *For any exogenous reset process summarized by $\{S_j\}_{j \geq 0}$, the sensitivity of the optimal reset price to expected marginal costs at*

[4] The sequence might itself be implied by a state-dependent or age-dependent hazard rate of adjustment.

[5] See Appendix D.1 for a detailed derivation of the second-order approximation and equation 4.

horizon j is given by

$$\frac{\partial p_t^*}{\partial\, \mathbb{E}_t mc_{t+j}} \;=\; w_j \;\equiv\; \frac{\beta^j\, S_j}{\sum_{k\geq 0} \beta^k S_k}, \qquad \forall j \geq 0 \tag{6}$$

with $\sum_{j=0}^{\infty} w_j = 1$. The weight w_j assigned to expected marginal costs j periods ahead equals their discounted survival probability $\beta^j\, S_j$, normalized by the expected discounted lifetime of the price, $\sum_{k\geq 0} \beta^{\,k} S_k$.

Proof see Appendix D.1 ■

Equation (6) in Proposition 1 highlights the central intuition: a price set in period t will still be relevant in future periods only if it survives until then, so expected future marginal costs are weighted by the joint effect of discounting and survival. The discount factor β^k captures the standard intertemporal weighting of future periods, while the survival probability S_k adjusts for the probability that the firm's price is still active then. Weights over all periods are normalized such that they sum to unity.

Our survey questions elicit changes in firms' reset prices, as well as costs and expected costs. Equation (5) can be used to derive a general mapping between these variables. Using the accounting identity $\mathbb{E}_t mc_{t+j} = mc_t + \mathbb{E}_t \Delta mc_{t,t+j}$, equation (5) and $\sum_{j\geq 0} w_j = 1$ it then follows that

$$p_t^* = \sum_{j=0}^{\infty} w_j \big(mc_t + \mathbb{E}_t \Delta mc_{t,t+j}\big) = mc_t + \sum_{j=1}^{\infty} w_j\, \mathbb{E}_t \Delta mc_{t,t+j}. \tag{7}$$

Assume that, before the most recent price change, firms are in steady state, so that p_t^* captures the price change of a firm relative to its steady state price $\bar{p} = 0$, and, similarly, mc_t represents the change in marginal costs relative to steady state. Equation (7) then implies that today's pricing decisions depend on both realized costs and a function of expected future costs. Moreover, under our assumptions of constant markups, the pass-through of realized cost changes at the point of price reset t should be equal to unity and not depend on, and hence be uninformative of, any parameters of the model. Instead, the pass-through of future expected price changes between period t and $t+j$, should be below unity and depend on the discounted survival probability of the price until period $t+j$.[6]

[6] An alternative way to express the relation in equation (7) is

$$p_t^* = \sum_{j=0}^{\infty} w_j \big(mc_t + \mathbb{E}_t \Delta mc_{t,t+j}\big) = mc_t + \sum_{j=1}^{\infty} W_j\, \mathbb{E}_t \Delta mc_{t+j-1,t+j}. \tag{8}$$

where $W_j = \sum_{k=j} w_k$. Intuitively, the pass-through of any marginal cost change between future

3.2 Empirical Strategy and Identification

We next outline our empirical identification of the pricing behavior of firms. Specifically, our aim is to identify the adjustment of prices to current cost changes and, separately, anticipated future cost changes. Let i index firms. Then, based on our survey design, we consider the following empirical model:

$$\Delta P_i \;=\; \alpha \;+\; \beta\,\Delta C_i \;+\; \gamma\,\Delta C_i^e \;+\; \varepsilon_i, \tag{9}$$

where ΔP_i is the percent change in the firm's price for its main product/service since the last adjustment, ΔC_i is the contemporaneous percent change in marginal cost since the last price adjustment, ΔC_i^e is the firm's expected percent change in marginal cost over the next 12 months, and ε_i captures other determinants of ΔP_i. These determinants may include additional cost shocks that the firm expects to start materializing later than over the next 12 months, or changes in the markup.

A specificity of our survey is that it allows for direct observation of ΔP_i for the dependent variable and the inclusion of both the current change in marginal cost ΔC_i and the expected future change in marginal cost ΔC_i^e in the regression (see, respectively, questions Q4, Q5, and Q6 in the Appendix). This is key to identify how expected costs impact current pricing decisions. Indeed, drivers of cost changes can be persistent, implying some correlation between ΔC_i^e and ΔC_i. A regression that only includes one of the two terms cannot distinguish between the impact of future expected costs on price changes and the impact of current costs on price changes.

While including both regressors addresses correlations between ΔC_i^e and ΔC_i, this is not sufficient to identify the causal impact of expected cost changes on prices. Indeed, in models with non-constant elasticities of substitution, firm i's desired markup can be correlated with its marginal costs and indeed, the sign of the correlation can depend on the structural shock driving the cost changes (e.g., Aruoba et al., 2024).

3.3 Trade Policy as a Source of Exogenous Variation

To tighten identification, we exploit the heterogeneous exposure of firms to trade and the unexpected and large changes in trade policy that occurred in 2025 before our survey was fielded (in August). Crucially, while trade policy is arguably similar for all firms within the US, there exists ample variation in both expectations over trade policy and firms' cost exposure to trade policy changes. We use this exogenous variation as an instrument for current and expected cost changes.

periods $t-1+j$ and $t+j$ depends on the cumulative discounted survival probability of the price from $t-1+j$ into the future.

Specifically, the survey elicits two trade-policy-linked measures of cost changes from each firm:

$$Z_{1i} \equiv \Delta(C_i \mid \text{trade policy}), \tag{10}$$

$$Z_{2i} \equiv \Delta(C_i^e \mid \text{trade policy}). \tag{11}$$

While Z_{1i} denotes the *realized* change in unit costs since the last price adjustment that is *due to trade policy*, Z_{2i} denotes the *expected* change in unit costs, *due to trade policy* (both are elicited in our survey using questions Q5 and Q6 in the Appendix). We use both as instruments for ΔC_i and ΔC_i^e in equation (9).

Our instruments must satisfy relevance and exclusion conditions. The relevance condition is quite straightforward given that we elicit firms' change in cost that is linked to the new trade policies. We can also test for this assumption empirically by reporting the usual first-stage F-statistics.

The exclusion restrictions require that firm specific exposures to the 2025 exogenous changes in trade policy affect firms' price setting only via cost realizations ΔC_i and expectations ΔC_i^e and independently from other firm-specific determinants, ε_i, so that $\mathbb{E}[Z_{1i}\varepsilon_i] = 0$ and $\mathbb{E}[Z_{2i}\varepsilon_i] = 0$. As discussed above, endogeneity issues are of concern when current and expected cost changes for firm i are caused by shocks that also shift firm i's desired markup. Our approach amounts to assuming that, to first-order, trade-policy changes affect producers' costs and not their desired markups.[7]

4 Results

This section presents our main empirical results. First, using firm-level exposure to the 2025 trade-policy episode as an instrument, we find economically large pass-through from both realized cost changes and expected cost changes: in the full sample, we obtain a coefficient of $\widehat{\beta} \approx 0.7$ for the pass-through of realized cost changes to prices and a coefficient of $\widehat{\gamma} \approx 0.4$ for the pass-through of expected cost changes to prices. Second, the relative importance of the two channels is highly heterogeneous: frequent adjusters respond almost entirely to contemporaneous costs, whereas infrequent adjusters load much more on expected costs. Third, splitting by residual trade-related uncertainty

[7] In addition, our approach assumes that trade-policy announced in 2025 will mostly affect firm costs within 1-year. An important feature of the 2025 tariff increases that is relevant to this assumption is that, if there is any correlation of near-term cost expectations with those beyond a year, it is likely negative as a prominent narrative surrounding the tariff increases was of initially high rates meant to extract concessions in exchange for trade deals that would lower levies. Thus, if there is any remaining bias in our identification strategy, it is likely to bias us away from finding anticipatory pass-through of expected cost changes.

Table 1: Price Changes and (Expected) Cost Changes

	(1) OLS	(2) IV	(3) IV First Stages	(4) IV First Stages
	ΔP_i	ΔP_i	ΔC_i	ΔC_i^e
ΔC_i	0.598***	0.679***		
	(0.051)	(0.137)		
ΔC_i^e	0.253***	0.427***		
	(0.077)	(0.150)		
Z_{1i}			0.592***	0.024
			(0.088)	(0.067)
Z_{2i}			-0.075	0.588***
			(0.098)	(0.089)
Constant	4.158***	3.063***	2.564***	3.145***
	(0.599)	(1.079)	(0.893)	(0.520)
N	537	539	539	539
R^2	0.365	0.331	0.154	0.271
SW F-stats			55.53	53.46

Note: Columns (1) and (2) contain OLS and IV regressions of price changes on actual contemporaneous cost changes and expected future cost changes as in equation (9). The instruments used are Z_{1i} defined in equation (10) and Z_{2i} defined in equation (11). Columns (3) and (4) are the first-stage regressions from the IV. Both OLS and IV estimates are obtained using jackknife procedures that excludes observations that are overly influential to our main coefficients of interest. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

reveals an additional reallocation across horizons, with high-uncertainty firms pricing expected cost changes much more strongly than low-uncertainty firms. Finally, consistency with the sufficient-statistics approach of Werning (2022) reinforces our interpretation that the loading on expectations reflects a structural role for anticipated future costs in price setting.

4.1 Estimating Causal Effects

Our benchmark estimation of equation (9), presented in Table 1, reveals that actual price changes have an OLS coefficient on contemporaneous cost changes of about 0.6 and on expected cost changes over the next year of 0.25. When we instrument with variables constructed from (expected) cost changes due to trade costs, the coefficient on contemporaneous cost changes grows to 0.68 and the coefficient on expected cost changes to 0.43. Both instruments are strong, with Sanderson-Windmeijer F-stats for multiple endogenous regressors that well exceed the rule-of-thumb threshold of 10.

Note from Table 2 that univariate regressions of price changes on either actual or expected cost changes tend to overstate the pass-through of both actual contempora-

Table 2: Univariate Regressions of Price Changes on (Expected) Cost Changes

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS		IV		IV First Stages	
	ΔP_i	ΔP_i	ΔP_i	ΔP_i	ΔC_i	ΔC_i^e
ΔC_i	0.679***		0.874***			
	(0.075)		(0.104)			
ΔC_i^e		0.558***		0.764***		
		(0.081)		(0.120)		
Z_{1i}					0.649***	
					(0.090)	
Z_{2i}						0.631***
						(0.087)
Constant	5.432***	5.247***	4.442***	4.038***	2.512***	2.873***
	(0.635)	(0.748)	(0.923)	(0.889)	(0.715)	(0.510)
N	538	539	543	531	543	531
R^2	0.189	0.103	0.216	0.163	0.206	0.269
SW F-stats					51.66	52.50

Note: Columns (1) and (2) ((3) and (4)) contain OLS (IV) univariate regressions of price changes on either actual contemporaneous cost changes or expected future cost changes. The instruments used are Z_{1i} defined in equation (10) and Z_{2i} defined in equation (11). Columns (5) and (6) are the first-stage regressions from the IV. Both OLS and IV estimates are obtained using jackknife procedures that excludes observations that are overly influential to our main coefficients of interest. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

neous and expected future cost changes. This reflects the identification problem of the positive correlation between cost changes and expectations.

4.2 Heterogeneity of Cost Pass-through

In what follows, we document substantial cross-firm heterogeneity in the pass-through of realized and expected costs into prices.

We start with some basic facts surrounding sectoral heterogeneity. First, we assess whether firms with stickier prices set prices with more emphasis on expected future cost movements than contemporaneous ones. Figure A.3 in the Appendix displays the distribution of average price durations across firms in our sample. We answer this question by splitting our sample of firms at the sample median duration of 6 months. Column (1) of Table 3 reports the results of our estimation but now including only SMBs who indicate a price duration of six or fewer months. In both the reduced-form and IV regressions, we see that only contemporaneous costs matter and, in both cases, have a one-to-one relationship with prices. Column (2) limits the estimation to firms that report typically changing prices every seven or more months. Indeed, the reduced-

form relationships indicate that prices for these firms move more with expected future cost movements and less with contemporaneous cost changes. As we will show later, this tendency of firms with stickier prices to have a higher loading of price changes on further-ahead expected cost changes is a property that is common across several common models of price setting.

Next, we examine differences between goods- and services-producing firms by estimating our main equation within each of these groups of firms, as shown in columns (3) and (4) in Table 3, respectively. We document that the pass-through from expected cost changes into prices is larger for services-producing firms. Importantly, we note that in this sector heterogeneity does not simply reflect a difference due to services (goods) firms typically having higher (lower) price durations. When we look only within firms with average price durations of seven or more months, it is the services firms within that group that show a large and statistically significant coefficient on expected cost changes while prices of goods firms do not show a statistically significant response to expected cost changes.

Table 3: Heterogeneous Pass-through by Price Duration and Sector

	(1)	(2)	(3)	(4)
	Avg. Price Duration		Sector	
	$\leq$ 6 months	$\geq$ 7 months	Goods	Services
	ΔP_i	ΔP_i	ΔP_i	ΔP_i
ΔC_i	1.017***	0.340*	0.734***	0.438***
	(0.211)	(0.206)	(0.207)	(0.169)
ΔC_i^e	0.254	0.504**	0.122	0.449***
	(0.207)	(0.198)	(0.267)	(0.136)
Constant	2.528*	4.318***	5.119***	3.653***
	(1.386)	(1.460)	(1.523)	(1.046)
N	278	259	110	427
R^2	0.264	0.472	0.311	0.323
SW F-stats ΔC_i	26.12	31.12	16.15	34.62
SW F-stats ΔC_i^e	24.73	34.71	7.60	53.61
P-val: Equal γ	0.38		0.27	

Note: This table contains IV regressions (2nd stage) of price changes on actual contemporaneous cost changes and expected future cost changes as in equation (9). The instruments used are Z_{1i} defined in equation (10) and Z_{2i} defined in equation (11). Columns (1) and (2) refer to a sample split of firms with average price durations 6 months or less vs 7 months or more (all results in Table A.3 in the Appendix). Columns (3) and (4) refer to a sample split between goods- and services-producing firms (all results in Table A.4 in the Appendix). IV estimates are obtained using jackknife procedures that excludes observations that are overly influential to our main coefficients of interest. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Heterogeneous Pass-through by Uncertainty and Duration Ratio

	(1)	(2)	(3)	(4)
	Trade Cost Uncertainty		Ongoing-Completed Duration Ratio	
	Low	High	$< .75$	$\geq .75$
	ΔP_i	ΔP_i	ΔP_i	ΔP_i
ΔC_i	0.949***	0.252	0.673**	0.528***
	(0.163)	(0.423)	(0.337)	(0.174)
ΔC_i^e	-0.036	0.799**	-0.093	0.572***
	(0.179)	(0.315)	(0.320)	(0.176)
Constant	4.139***	2.979	5.935**	3.555***
	(1.225)	(1.824)	(2.417)	(1.089)
N	327	205	180	324
R^2	0.285	0.123	0.177	0.351
SW F-stats ΔC_i	34.50	11.49	18.90	29.86
SW F-stats ΔC_i^e	21.43	21.73	13.83	51.15
P-val: Equal γ	0.02		0.07	

Note: This table contains IV regressions (2nd stage) of price changes on actual contemporaneous cost changes and expected future cost changes as in equation (9). The instruments used are Z_{1i} defined in equation (10) and Z_{2i} defined in equation (11). Columns (1) and (2) splits our sample between firms with below or above median residual trade cost uncertainty (all results in Table A.5 in the Appendix). Columns (3) and (4) splits our sample between firms whose time since their last price change as a ratio of their average price duration is below or above .75 (all results in Table A.6 in the Appendix). IV estimates are obtained using jackknife procedures that excludes observations that are overly influential to our main coefficients of interest. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

We next present one of our central findings. Table 4 presents results examining whether pass-through differs in degree according to some additional channels. First, in columns (1) and (2), we split firms by residual trade-related uncertainty (below vs. above the median). This residual uncertainty is the dispersion of trade-attributed cost expectations after controlling for the cross-sectional relationship with realized trade-related costs and the mean expected trade cost change. The estimates show a sharp reallocation across channels: low-uncertainty firms (column (1)) exhibit close to one-for-one pass-through of contemporaneous costs and essentially no response to expected costs, whereas high-uncertainty firms (column (2)) load strongly on expected cost changes and much less on contemporaneous costs. The difference in the response to expected cost changes is statistically significant with a p-value of 0.02 across these two groups. This pattern is consistent with state-dependent pricing models in which uncertainty reshapes the effective reset-price kernel across horizons, and it is harder to reconcile with exogenous-hazard models in which uncertainty does not reallocate the timing weights.

Lastly, we estimate a sample split informed by Werning (2022). This paper derives a sufficient statistic summarizing the pass-through of a shock to expectations into current inflation that is valid for any time-dependent model. The statistic is the ratio of the duration of ongoing price spells to the average price duration. Werning (2022) derives that, among a sample of Calvo-pricing firms, this ratio would be 1, while among a sample of Taylor-pricing firms, this ratio would be $\frac{1}{2}$. In a menu-cost model (specifically, the Sheshinski-Weiss model) where frequency of price adjustment is fixed in the very short run, this ratio would be between 0 and $\frac{1}{2}$. We calculate a similar statistic for each firm and, in light of the Calvo and Taylor benchmarks, we split the sample at 0.75 and re-estimate our main IV equation over each subsample.[8] Column (3) shows that firms who have changed prices relatively more recently (fewer months ago than 0.75 times their average price duration), react only to contemporaneous cost changes and not expected future cost changes while firms who have changed prices relatively less recently (at least as many months ago as 0.75 times their average price duration) react to both contemporaneous and expected future cost changes. The difference in the response to expected cost changes is marginally statistically significant with a p-value of 0.07 across these two groups. We note that this result is not an artifact of this sufficient statistic reflecting other properties of these firms—within our sample, this statistic is unrelated to average price duration or the sector of the firm.

5 Pricing Models

To interpret the empirical evidence, the section below introduces a simple theoretical framework that clarifies how firms map current and expected cost changes into price adjustments. To do so, we discuss three leading pricing models, Calvo pricing, Taylor pricing and a menu-cost model, within the generalized linear quadratic firm problem described in section 3.1. Rather than to provide a fully specified quantitative analysis of our empirical results, we focus on qualitative insights derived from these models.

5.1 Price Rigidity and Specific Hazard Structures

Our main result in Table 1 finds a coefficient on cost change expectations significantly above 0. Here, we show that this result aligns with models of price setting in the presence of pricing rigidities. We begin with benchmark environments in which the

[8]The model suggests using the length of the ongoing price spell as of the time of the price change which, given our measurement of most recent price changes, would be the time between the two most recent price changes. This duration is not elicited in our survey and so we instead use the time since the most recent price change. To compute this ratio, we also exclude firms that report a (denominator) average price-change duration of 0.

timing of price resets is exogenous (Taylor and Calvo), and then consider a generalized-hazard menu-cost model in which the adjustment hazard depends on deviations from desired prices.

First, under Taylor pricing (e.g., Taylor, 1980), firms can reset its price on a fixed schedule, every N periods. There is no uncertainty over the timing of price resets, and thus the probability of price survival. Proposition 2 solves for the pricing weights on expected future marginal costs, as defined in Proposition 1. It follows from our empirical evidence of $w_1 > 0$ that prices are not fully flexible and $N > 1$.

Proposition 2 (Taylor contracts)**.** *In the Taylor pricing model, prices are fixed for N periods. It follows that $S_j = 1$ for $0 \leq j \leq N-1$ and $S_j = 0$ thereafter. Substituting into equation (6) gives*

$$w_j = \begin{cases} \frac{(1-\beta)\,\beta^j}{1-\beta^N} & \text{if } 0 \leq j \leq N-1, \\ 0, & \text{if } j \geq N. \end{cases} \tag{12}$$

Each horizon up to $N-1$ enters with a constant geometric decay due to discounting. The limiting cases $N = 1$ correspond to flexible prices, while $N \to \infty$ approximates full price rigidity.

Proof see Appendix D.1 ■

Second, in the Calvo model (e.g., Calvo, 1983), the timing of price resets is random, with θ as the probability of not being able to reset prices in every period. Proposition 3 describes the weights defined in Proposition 1. Again, $w_1 > 0$ suggest that price rigidities are present, $\theta > 0$.

Proposition 3 (Calvo pricing)**.** *In the Calvo pricing model, the probability of not resetting the price in any given period is constant and equal to $\theta \in (0,1)$. It follows that $S_j = \theta^j$. Substituting into equation (6) gives*

$$w_j = (1-\beta\theta)(\beta\theta)^j \qquad \forall j \geq 0.$$

Weights decline geometrically with horizon j. The degree of price rigidity, governed by θ, determines how strongly the firm internalizes expected future marginal costs. The limiting cases $\theta = 0$ correspond to flexible prices, while $\theta \to 1$ approximates full price rigidity.

Proof see Appendix D.1 ■

Third, following the generalized-hazard approach of Alvarez et al. (2022), we consider a menu-cost model represented by a generalized adjustment hazard $\lambda(x_t)$ and

defined over $x_t \equiv p_t - p_t^\dagger$, the price gap between the posted price and the frictionless benchmark. In this class of models, probability of price adjustment is a function of the price gap, that is, it is state-dependent. We assume that this hazard function is symmetric around 0 and increasing in $|x|$; the price adjustment hazard rises in the size of the price gap. The hazard function is locally linear in x, for small and medium gaps, that is, $\lambda(x) \approx \lambda_1|x|$ for $\lambda_1 > 0$. We also assume the price gap x_t evolves as a Gaussian random walk, $x_{k+1} = x_k + \varepsilon_{k+1}$, with normally distributed errors $\varepsilon_k \sim \mathcal{N}(0, \sigma^2)$.

To connect this state-dependent environment to the reset-price kernel w_j, we use a first-order mean-field approximation in which the random, state-dependent adjustment hazard at each horizon is replaced by its expectation. This yields a horizon-dependent adjustment probability governed by the expected size of the price gap at each horizon, and therefore a non-Calvo reset-price kernel in which the weight placed on future marginal costs reflects the state-dependent nature of adjustment without solving the full path-dependent problem.

Proposition 4 (Menu-cost)**.** *Suppose price adjustment is summarized by a generalized hazard $\lambda(x)$ that is symmetric, increasing in $|x|$, and locally linear, $\lambda(x) \approx \lambda_1|x|$. Let the price gap follow a Gaussian random walk. Then the reset-price kernel implied by the linear–quadratic pricing problem takes a stretched-exponential form,*

$$w_j = \frac{\beta^j e^{-Aj^{3/2}}}{\sum_{k\geq 0} \beta^k e^{-Ak^{3/2}}}, \qquad A = \frac{2}{3}\lambda_1 \sigma \sqrt{\frac{2}{\pi}}.$$

where σ is the standard deviation of innovations to the price gap x_t.

Proof see Appendix D.1 ■

5.2 The Role of Price Rigidity

We next discuss the role of price rigidity under each of the models discussed above. Table A.3 suggests that the pass-through of expectations into prices is higher for firms with more rigid pricing, $w_1^{rigid} > w_1^{flex}$, a pattern that maps directly into the model's implication that greater rigidity can shift weight toward longer horizons.

Corollary 1 shows the ambiguous effect of price rigidity on weights in the Taylor and Calvo pricing models.

Corollary 1 (Exogenous pricing models)**.** *Under Taylor and Calvo pricing, the sensitivity weights on expected marginal costs $w_j(N)$ satisfies*

$$\frac{\partial w_j^{Taylor}(N)}{\partial N} \begin{cases} \leq 0 & \forall 0 \leq j \leq N-1 \\ \geq 0 & \forall j > N-1 \end{cases} \qquad \frac{\partial w_j^{Calvo}(\theta)}{\partial \theta} \begin{cases} \leq 0 & \forall j < \frac{\beta\theta}{(1-\beta\theta)} \\ \geq 0 & \forall j \geq \frac{\beta\theta}{(1-\beta\theta)} \end{cases} \tag{13}$$

Proof see Appendix D.2 ■

The predictions in the corollary align well with the empirical results. In particular, as Table 3 shows, an increase in price rigidity increases the coefficient on expected costs: The coefficient on expected cost changes is 0.25 and not significantly different from 0 for firms with relatively flexible prices. Instead, it goes up to 0.50 and is highly statistically significant for firms with relatively sticky prices. These changes align with the predictions of Corollary 1: coefficients w_j for a period sufficiently in the future are predicted to increase in price stickiness by both models. Increases in pricing frictions shift away weight from today's cost changes towards expected cost changes. Is this likely the case under a reasonable parameterization? To compare to our empirical results where expectations are 12-month ahead, we assume that w_1 in equation 7 corresponds to the estimated coefficient. Given an annual Calvo parameter of around 0.18 (based on a quarterly parameter of 0.65), and a rate of time preference of 0.97, the cutoff for j equals 0.194 , comfortably below a one-year horizon.

Corollary 2 discusses the effect of price rigidity on weights for the menu cost model. Here, we utilize the microfoundation that rationalizes generalized hazards in Alvarez, Lippi, and Oskolkov (2022). In this case, random menu costs ψ follow $\psi \sim G$ and adjustment occurs when a random cost draw ψ falls below adjustment gain $U(x)$. We index menu costs by a parameter κ such that higher κ corresponds to uniformly higher adjustment costs $\psi_\kappa = \kappa\psi$.

Corollary 2 (Menu cost model)**.** *For small changes in menu costs and small price gaps, for each $j \geq 0$,*

$$\frac{\partial w_j}{\partial \kappa} = w_j \left(\frac{\partial \log S_j}{\partial \kappa} - \sum_{m \geq 0} w_m \frac{\partial \log S_m}{\partial \kappa} \right) \tag{P}$$

and there exists a cutoff $j^\star(\kappa)$ such that weights w_j decrease at short and increase at long horizons:

$$\frac{\partial w_j}{\partial \kappa} < 0 \quad \textit{for } j < j^\star(\kappa), \qquad \frac{\partial w_j}{\partial \kappa} > 0 \quad \textit{for } j > j^\star(\kappa),$$

Proof see Appendix D.3

Intuitively, an increase in menu costs raises the threshold for price adjustment at any given price gap, making adjustment less likely and lowering the state-dependent hazard. As a result, prices are expected to remain fixed for longer, increasing the relevance of more distant horizons for optimal price setting. This change does not

uniformly dampen responsiveness across horizons. Rather, higher menu costs reallocate sensitivity away from short horizons—where adjustment becomes less likely—and toward longer horizons that become increasingly relevant as expected price durations lengthen. Notably, these predictions of increased pricing frictions are in line with those of the Calvo and Taylor models, and align with our empirical findings.

5.3 Uncertainty and Price Setting

A key finding from the empirical analysis is that uncertainty increases the importance of expected cost changes for today's pricing decisions. Exogenous pricing models like Calvo and Taylor conventionally do not entail such a prediction,[9] but endogenous pricing models do.

As is well known, uncertainty over future marginal costs in the Calvo and Taylor pricing frameworks does not affect the pass-through of expected costs into reset prices, as adjustment probabilities are exogenously fixed and independent of the volatility of shocks. As a result, higher uncertainty does not affect firms' pricing decisions through the duration structure itself. The survival profile and thus the relative weights assigned to different horizons remains unchanged. This finding usually emerges from the certainty equivalence of the linear-quadratic approximation of the pricing problem underlying the weights in Proposition 1.

By contrast, our empirical finding that uncertainty matters for pricing points to state-dependent pricing models if one wants to account for the effect of uncertainty in the future on today's prices. In such state-dependent settings, two well-known potentially opposing effects are generally at work: first, a volatility effect, that is, increased uncertainty raises the hazard of adjustment and shortens the expected lifetime of the current price. As a consequence, more weight is placed on the immediate horizon and front-loaded away from future horizons. Second, higher uncertainty also increases the option value of waiting and can widen inaction bands, so the net effect on hazards is ambiguous.

Given these two forces, pass-through rises at a given horizon when the strength of the real option effect exceeds the rate at which the kernel shifts mass away from that horizon. For short horizons, the volatility effect may dominate, reducing weights while for sufficiently distant horizons, the effect may reverse and pass-through increase. Embedding a news shock to firms' productivity within the menu-cost framework of

[9] A separate, through related mechanism is the precautionary pricing channel documented by (Oh, 2020; Cho et al., 2021) in higher-order solutions of the nonlinear pricing problem. Here, while firms raise prices in a precautionary manner in the face of higher uncertainty, the pass-through of expected marginal cost changes into price is unchanged to first order.

Table 5: Simulation: Heterogeneous Pass-through by Uncertainty and Menu Costs

	(1)	(2)	(3)	(4)
	Cost Uncertainty		Menu Cost	
	Low	High	Low	High
	ΔP_i	ΔP_i	ΔP_i	ΔP_i
ΔC_i	0.254***	0.302***	0.254***	0.205***
	(19.65)	(17.45)	(19.65)	(17.20)
ΔC_i^e	0.306***	0.384***	0.306***	0.309***
	(15.34)	(17.81)	(15.34)	(15.29)
Constant	0.0111**	-0.0112**	0.0111**	0.0179***
	(3.19)	(-2.84)	(3.19)	(5.47)
N	549	549	549	549
R^2	0.567	0.621	0.567	0.573
K	0.2	0.2	0.2	0.4
σ_S	0.02	0.04	0.02	0.02

Note: This table contains regression results based on simulated data. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Nakamura and Steinsson (2010), we show that a menu-cost model can align with empirical findings on the role of uncertainty, and price durations. In the model, firms receive news in period $t = 0$ about a temporary shock that will affect their productivity in period $t = k$. The magnitude of the shock is uncertain, with uncertainty calibrated by σ_S. The parameter K governs the size of menu costs. We simulate the model under high and low uncertainty, as well as high and low menu cost, then estimate our main pass-through specification on the simulated data.

Table 5 reports regression results based on the simulated data. Columns (1) and (2) present the pass-through of realized cost changes since the last price adjustment and expected cost changes over the following 12 months to realized price changes in the period when the news shock materializes. These columns correspond to simulations with low and high uncertainty about the magnitude of the news shock. Consistent with the empirical evidence in Table 4, the pass-through of expected costs is higher when firms face greater uncertainty. Columns (3) and (4) vary the menu-cost parameter. We find that the pass-through of expectations is larger for firms with higher menu costs, that is, firms that adjust prices less frequently. This result mirrors the empirical evidence reported in Table 3.

5.4 Limitations and Further Lessons

One of our empirical findings shows that the estimated pass-through of realized marginal cost changes into prices is significantly below unity for firms with long average price durations. At first glance, this finding appears at odds with the predictions of the

linear–quadratic pricing model in Section 3.1. In particular, equation (7) implies full pass-through from realized marginal cost shocks to optimal prices.

A natural explanation for this discrepancy is the presence of strategic complementarities in price setting (e.g., Albagli et al., 2025; Alvarez et al., 2023). When firms' pricing decisions respond not only to their own marginal costs but also to competitors' prices, adjustments to cost shocks are attenuated. As a result, the effective pass-through from realized firm-level cost changes into prices falls below one. Another potential explanation is that firms imperfectly observe their marginal costs and that the survey elicits noisy signals about these costs. In that case, it is optimal for firms to only partially adjust their prices to such noisy cost changes.

6 Conclusion

This paper provides new evidence on how firms incorporate current and expected costs into price setting, and how pricing frictions shape the relative importance of these channels. Using firm-level data that directly measure realized and expected cost changes—and their trade-policy components—we show that prices respond both to contemporaneous costs and to anticipated future costs, but in systematically different ways across firms. Frequent adjusters (and goods producers) exhibit largely contemporaneous pass-through, while sticky-price firms (and service producers, independently of pricing frictions) load more heavily on expectations, with uncertainty tilting pricing further toward forward-looking considerations.

These patterns are difficult to reconcile with pricing models in which the adjustment hazard is exogenous and independent of firms' states. By contrast, they arise naturally in frameworks such as menu-cost models, where the timing of adjustment and the reset-price kernel are endogenous to the price gap and firms' expectations. From a policy perspective, the results suggest that what matters for pass-through of cost shocks is not only the average expected path of costs, but also how unevenly such shocks are anticipated and transmitted across firms. A promising avenue for future work is therefore to further study the role of uncertainty – its sources, its interaction with adjustment frictions, and its implications for inflation outcomes.

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A Tables and Figures

Table A.1: Owner Characteristics

	%		%
Race		**Urban vs. Rural**	
White	79.0	Urban	30.1
Black	15.0	Suburban	50.6
Other	6.1	Rural	19.3
Ethnicity		**Census Region**	
Non-Hispanic	90.8	Northeast	19.4
Hispanic	9.2	Midwest	18.5
		South	35.8
Gender		West	26.2
Male	58.1		
Female	41.9	**Role**	
		C-Level	72.7
Education		Vice President	1.5
less than college	47.2	Director	8.8
bachelor's degree	33.6	Manager	17.0
postgraduate degree	19.2		
Political Ideology			
Liberal	25.6		
Moderate	39.1		
Conservative	35.3	N=599	

Notes: Weighted percentages of respondents in different demographic groups and categories. *Sources:* Authors' calculations using data from Morning Consult.

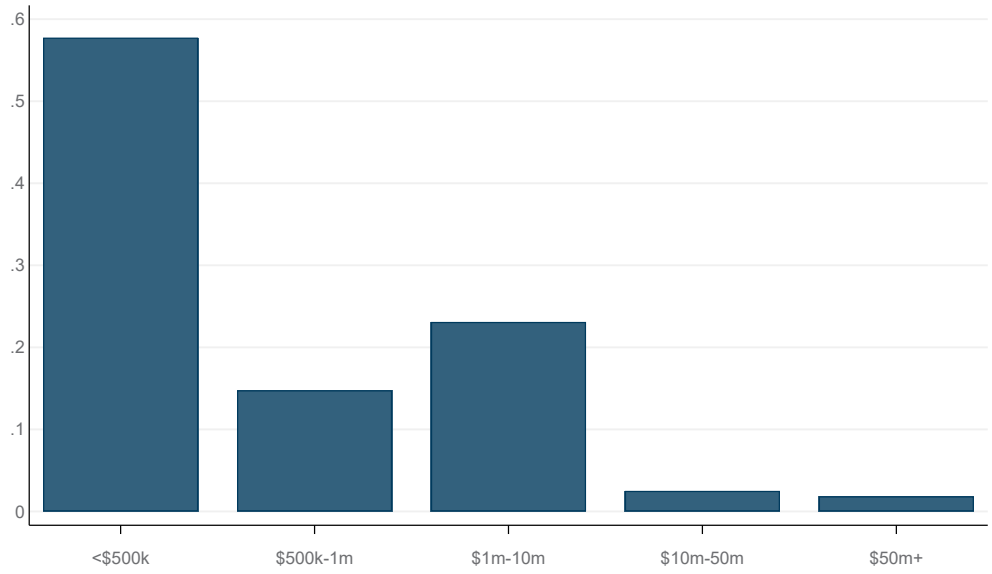
Table A.2: Industry

	Weight	Target
Group 1	**32.0**	**32.2**
Professional, Scientific, and Technical Services	16.2	14.4
Finance and Insurance	5.7	4.0
Real Estate and Rental and Leasing	5.1	5.9
Management of Companies and Enterprises	2.8	0.2
Information	2.2	1.5
Administrative and Support and Waste Management and Remediation Services	0.0	6.2
Group 2	**26.0**	**24.6**
Health Care and Social Assistance	8.3	11.2
Education Services	6.6	1.7
Arts, Entertainment, and Recreation	5.6	2.3
Accommodation and Food Services	5.5	9.3
Group 3	**20.3**	**18.8**
Retail Trade	16.3	10.5
Wholesale Trade	3.9	4.4
Transportation and Warehousing	0.1	3.8
Group 4	**17.7**	**17.4**
Construction	10.8	12.8
Manufacturing	4.0	4.0
Agriculture, Forestry, Fishing and Hunting	2.2	0.3
Utilities	0.7	0.1
Mining, Quarrying, and Oil and Gas Extraction	0.0	0.2
Group 5	**4.1**	**7.0**
Other Services (except Public Administration)	4.1	7.0

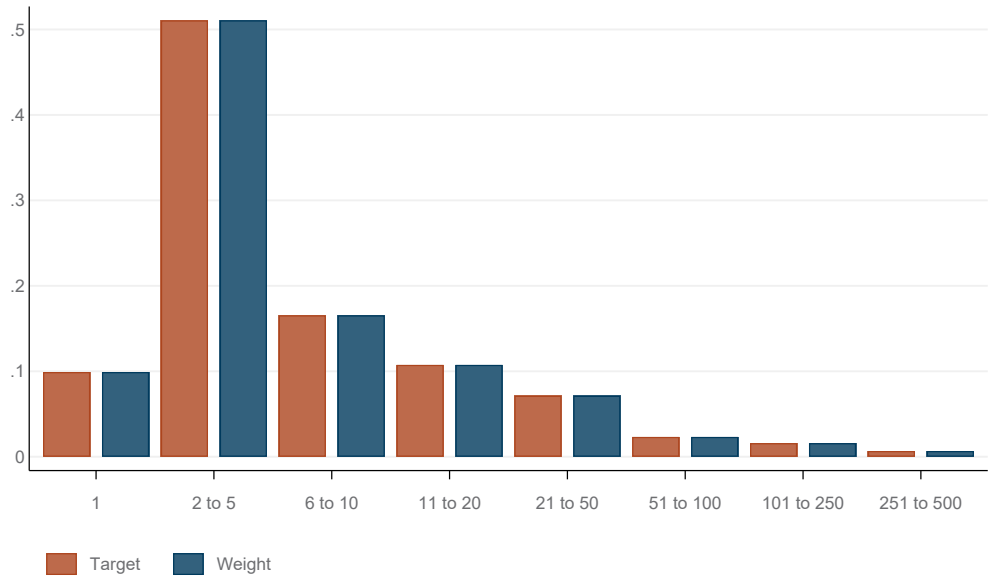
Notes: The table shows the distribution of firms in our sample across sectors. *Sources:* Authors' calculations using data from Morning Consult.

Figure A.1: Firm Characteristics I

(a) Revenues



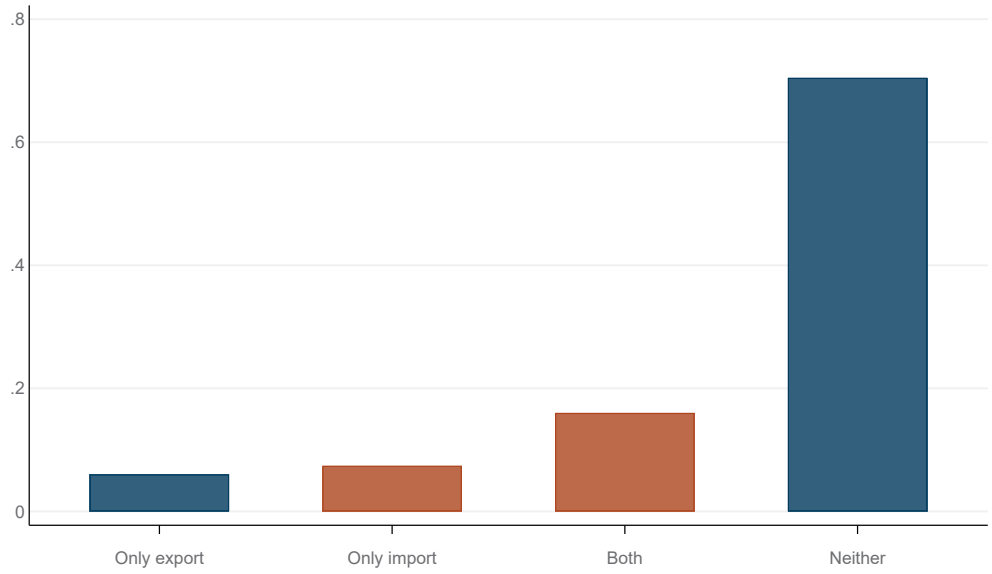
(b) Employees



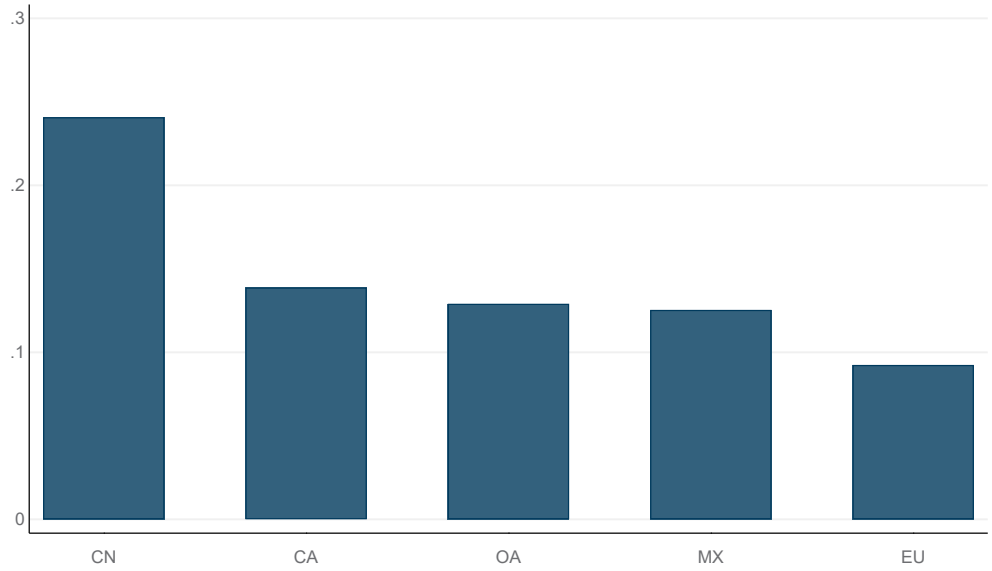
Notes: The figure displays the distribution of annual revenue (panel a) and the number of employees (panel b) across firms in the sample.

Figure A.2: Firm Characteristics II

(a) Trade status



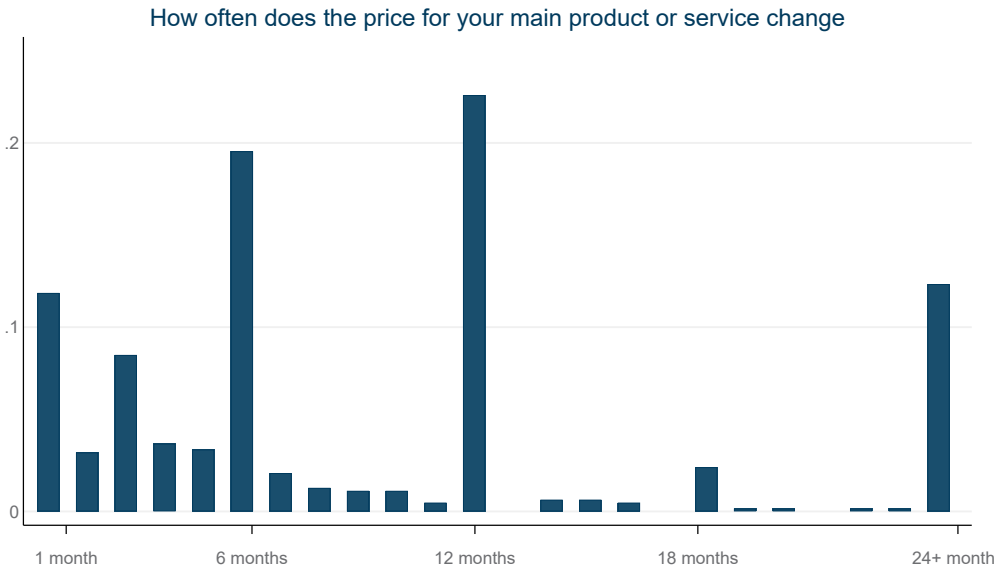
(b) Tariff Impact



Notes: The figure displays the distribution of trade status (panel a) and impact of tariffs (panel b) across firms in the sample.

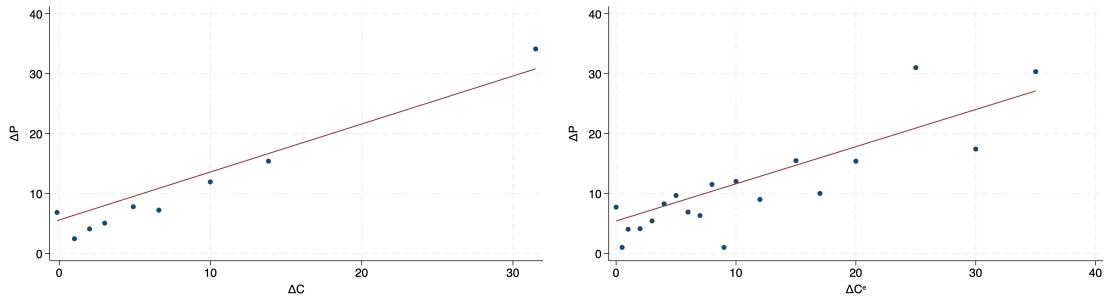
Figure A.3: Firm Characteristics III

(a) Price duration



Notes: The figure displays the distribution of average price durations across firms in the sample.

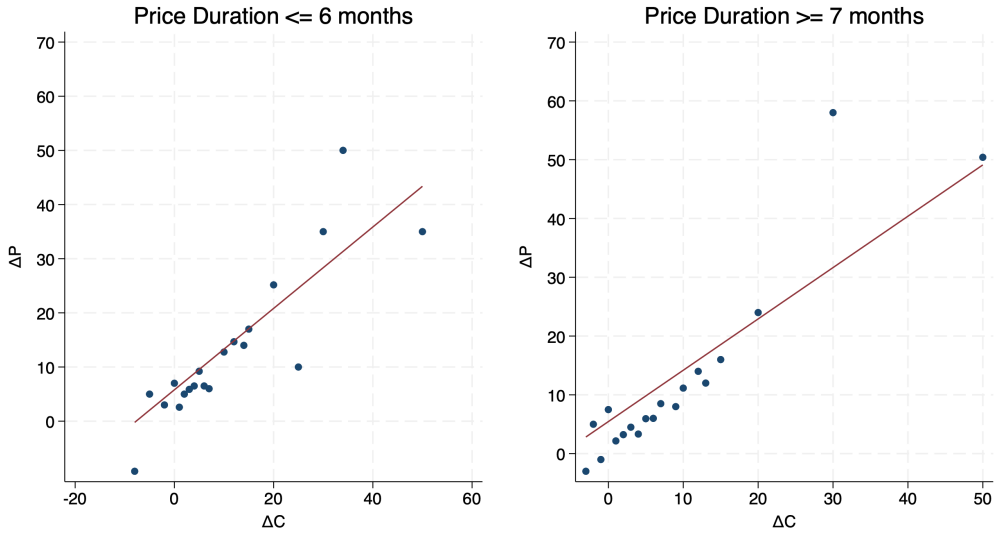
Figure A.4: Relationship between Actual Price Change and (Expected) Cost Changes



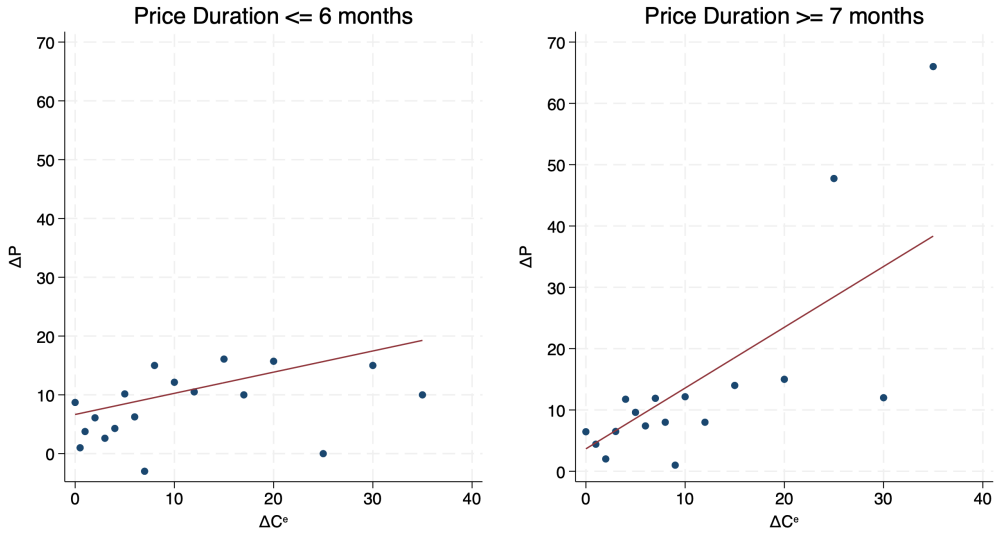
(a) Actual Contemporaneous Cost Changes (b) Expected Future Cost Changes

Note: The figure shows the relation between actual, reported price changes (vertical axis) and realized cost changes since the last price adjustment (left panel) and expected future price changes over the following 12 months (right panel), on the horizontal axis.

Figure A.5: Relationship between Actual Price Change and (Expected) Cost Changes (Split by Typical Price Duration)



(a) Actual Contemporaneous Cost Changes



(b) Expected Future Cost Changes

Note: The figure shows the relation between actual, reported price changes (vertical axis) and realized cost changes since the last price adjustment (upper panels) and expected future price changes over the following 12 months (lower panel), on the horizontal axis. The left panels show the relation for firms with an average reported price duration of 6 months or less, the right panels the for firms with an average reported price duration of 7 months or more.

Table A.3: Price Changes and (Expected) Cost Changes, by Average Price Duration

Panel A) Price duration of 7 Months or more

	(1) OLS	(2) IV	(3) IV First Stages	(4) IV First Stages
	ΔP_i	ΔP_i	ΔC_i	ΔC_i^e
ΔC_i	0.886***	1.017***		
	(0.096)	(0.211)		
ΔC_i^e	-0.045	0.254		
	(0.133)	(0.207)		
Z_{1i}			0.570***	0.130
			(0.097)	(0.091)
Z_{2i}			-0.001	0.602***
			(0.075)	(0.131)
Constant	4.526***	2.528*	1.586***	2.115***
	(1.042)	(1.386)	(0.505)	(0.668)
N	279	278	278	278
R^2	0.314	0.264	0.331	0.406
SW F-stats			26.12	24.73

Panel B) Price duration of 6 Months or less

	(1) OLS	(2) IV	(3) IV First Stages	(4) IV First Stages
	ΔP_i	ΔP_i	ΔC_i	ΔC_i^e
ΔC_i	0.389***	0.340*		
	(0.129)	(0.206)		
ΔC_i^e	0.649***	0.504**		
	(0.129)	(0.198)		
Z_{1i}			0.658***	0.022
			(0.137)	(0.078)
Z_{2i}			-0.081	0.575***
			(0.199)	(0.107)
Constant	3.327***	4.318***	3.236**	3.929***
	(0.689)	(1.460)	(1.629)	(0.770)
N	257	259	259	259
R^2	0.374	0.472	0.121	0.188
SW F-stats			31.12	34.71

Note: Columns (1) and (2) contain OLS and IV regressions of price changes on actual contemporaneous cost changes and expected future cost changes as in equation (9). The instruments used are Z_{1i} defined in equation (10) and Z_{2i} defined in equation (11). Columns (3) and (4) are the first stage regressions from the IV. The two panels are estimated on subsamples defined by firms' reported frequency of price changes. Both OLS and IV estimates are obtained using jackknife procedures that excludes observations that are overly influential to our main coefficients of interest. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.4: Price Changes and (Expected) Cost Changes, by Sector

Panel A) Goods-producing firms

	(1) OLS	(2) IV	(3) IV First Stages	(4)
	ΔP_i	ΔP_i	ΔC_i	ΔC_i^e
ΔC_i	0.962***	0.734***		
	(0.125)	(0.207)		
ΔC_i^e	-0.214	0.122		
	(0.181)	(0.267)		
Z_{1i}			0.662***	0.071
			(0.151)	(0.089)
Z_{2i}			0.003	0.496**
			(0.120)	(0.193)
Constant	6.217***	5.119***	0.823	1.884***
	(0.934)	(1.523)	(0.857)	(0.664)
N	113	110	110	110
R^2	0.459	0.311	0.469	0.411
SW F-stats			16.15	7.60

Panel B) Services-producing firms

	(1) OLS	(2) IV	(3) IV First Stages	(4)
	ΔP_i	ΔP_i	ΔC_i	ΔC_i^e
ΔC_i	0.503***	0.438***		
	(0.105)	(0.169)		
ΔC_i^e	0.350***	0.449***		
	(0.098)	(0.136)		
Z_{1i}			0.545***	0.029
			(0.093)	(0.060)
Z_{2i}			0.004	0.698***
			(0.110)	(0.073)
Constant	3.756***	3.653***	2.696***	3.149***
	(0.676)	(1.046)	(0.999)	(0.564)
N	423	427	427	427
R^2	0.293	0.323	0.126	0.345
SW F-stats			34.62	53.61

Note: Columns (1) and (2) contain OLS and IV regressions of price changes on actual contemporaneous cost changes and expected future cost changes as in equation (9). The instruments used are Z_{1i} defined in equation (10) and Z_{2i} defined in equation (11). Columns (3) and (4) are the first stage regressions from the IV. The two panels are estimated on subsamples of only goods- or services-producing firms. Both OLS and IV estimates are obtained using jackknife procedures that excludes observations that are overly influential to our main coefficients of interest. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.5: Price Changes and (Expected) Cost Changes, by Residual Trade Cost Uncertainty

Panel A) Low Residual Trade Cost Uncertainty

	(1) OLS	(2) IV	(3) IV First Stages	(4)
	ΔP_i	ΔP_i	ΔC_i	ΔC_i^e
ΔC_i	0.657***	0.949***		
	(0.110)	(0.163)		
ΔC_i^e	0.110	-0.036		
	(0.107)	(0.179)		
Z_{1i}			0.585***	0.036
			(0.101)	(0.093)
Z_{2i}			0.033	0.526***
			(0.088)	(0.128)
Constant	4.768***	4.139***	1.659***	3.455***
	(0.800)	(1.225)	(0.475)	(0.598)
N	330	327	327	327
R^2	0.288	0.285	0.242	0.201
SW F-stats			34.50	21.43

Panel B) High Residual Trade Cost Uncertainty

	(1) OLS	(2) IV	(3) IV First Stages	(4)
	ΔP_i	ΔP_i	ΔC_i	ΔC_i^e
ΔC_i	0.449***	0.252		
	(0.153)	(0.423)		
ΔC_i^e	0.532***	0.799**		
	(0.144)	(0.315)		
Z_{1i}			0.454***	0.072
			(0.109)	(0.093)
Z_{2i}			0.158	0.736***
			(0.134)	(0.179)
Constant	2.868***	2.979	1.463*	2.078*
	(0.694)	(1.824)	(0.795)	(1.256)
N	204	205	205	205
R^2	0.291	0.123	0.251	0.348
SW F-stats			11.49	21.73

Note: Low-uncertainty (high-uncertainty) firms in Panel A (Panel B) are below (above) the median of residual trade-related uncertainty (dispersion of trade-attributed cost expectations, residualized with respect to realized trade-related costs and the mean expected trade cost change). Columns (1)–(2) report OLS and 2SLS estimates of (9). Columns (3)–(4) report first stages for ΔC_i and ΔC_i^e. Instruments are Z_{1i} (trade-attributed realized cost change) and Z_{2i} (trade-attributed expected cost change orthogonalized to Z_{1i}). Jackknife procedure as in the baseline; robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.6: Price Changes and (Expected) Cost Changes, by the Time Since Last Price Change Relative to the Average Price Duration

Panel A) Firms whose time since last price change is shorter than their average price duration

	(1) OLS	(2) IV	(3) IV First Stages	(4) IV First Stages
	ΔP_i	ΔP_i	ΔC_i	ΔC_i^e
ΔC_i	0.043	0.673**		
	(0.123)	(0.337)		
ΔC_i^e	0.516***	-0.093		
	(0.162)	(0.320)		
Z_{1i}			0.407***	-0.006
			(0.132)	(0.162)
Z_{2i}			0.109	0.560**
			(0.166)	(0.224)
Constant	5.218***	5.935**	2.770***	4.312***
	(1.485)	(2.417)	(1.020)	(1.324)
N	180	180	180	180
R^2	0.168	0.177	0.137	0.154
SW F-stats			18.90	13.83

Panel B) Firms time since last price change is at least as long as their average price duration

	(1) OLS	(2) IV	(3) IV First Stages	(4) IV First Stages
	ΔP_i	ΔP_i	ΔC_i	ΔC_i^e
ΔC_i	0.727***	0.528***		
	(0.119)	(0.174)		
ΔC_i^e	0.212*	0.572***		
	(0.125)	(0.176)		
Z_{1i}			0.669***	0.081
			(0.128)	(0.061)
Z_{2i}			-0.087	0.667***
			(0.172)	(0.077)
Constant	3.923***	3.555***	2.489*	2.522***
	(0.650)	(1.089)	(1.432)	(0.489)
N	324	324	324	324
R^2	0.348	0.351	0.144	0.349
SW F-stats			29.86	51.15

Note: Panel A (B) estimate our main regressions using the subsample of firms whose ongoing price spells are shorter (the same or longer) than their average price duration. Columns (1)–(2) report OLS and 2SLS estimates of (9). Columns (3)–(4) report first stages for ΔC_i and ΔC_i^e. Instruments are Z_{1i} (trade-attributed realized cost change) and Z_{2i} (trade-attributed expected cost change orthogonalized to Z_{1i}). Jackknife procedure as in the baseline; robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

B Additional estimates

B.1 Baseline estimates without using the jackknife procedure

Table B.1: Price Changes and (Expected) Cost Changes (without jackknife)

	(1) OLS	(2) IV	(3) IV First Stages	(4)
	ΔP_i	ΔP_i	ΔC_i	ΔC_i^e
ΔC_i	0.527***	0.795***		
	(0.137)	(0.304)		
ΔC_i^e	0.160	0.440		
	(0.236)	(0.381)		
Z_{1i}			0.654***	-0.074
			(0.119)	(0.058)
Z_{2i}			-0.074	0.644***
			(0.106)	(0.087)
Constant	5.541***	2.625	2.562***	3.575***
	(1.158)	(2.379)	(0.873)	(0.578)
N	549	549	549	549
R^2	0.202	0.108	0.273	0.275
SW F-stats			55.53	53.46

Note: Columns (1) and (2) contain OLS and IV regressions of price changes on actual contemporaneous cost changes and expected future cost changes as in equation (9). The instruments used are Z_{1i} defined in equation (10) and Z_{2i} defined in equation (11). Columns (3) and (4) are the first stage regressions from the IV. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B.2: Price Changes and (Expected) Cost Changes (with additional controls)

	(1) Avg Price Duration	(2) NAICS2 Industry	(3) Resid. Trade Cost Unc.	(4) Duration Ratio
	ΔP_i	ΔP_i	ΔP_i	ΔP_i
ΔC_i	0.650***	0.757***	0.696***	0.645***
	(0.151)	(0.121)	(0.116)	(0.149)
ΔC_i^e	0.631***	0.329**	0.300**	0.503***
	(0.233)	(0.149)	(0.125)	(0.182)
Constant	0.954	0.081	3.661***	2.465
	(1.014)	(5.586)	(0.910)	(1.776)
N	540	539	540	508
R^2	0.116	0.407	0.381	0.178
SW F-stats ΔC_i	56.59	53.78	58.39	51.02
SW F-stats ΔC_i^e	44.30	106.61	71.78	42.49

Note: Each column contains IV regressions of price changes on actual contemporaneous cost changes and expected future cost changes as in equation (9) but with additional control variables. The instruments used are Z_{1i} defined in equation (10) and Z_{2i} defined in equation (11). In order from left to right, the additional controls are fixed effects for firm-level average price durations, NAICS2 industry fixed effects, the level of residual trade cost uncertainty, and the ratio between the duration of ongoing price spells (i.e., the time since the last price change) and completed price spells (i.e., the average price duration). Estimates are obtained using jackknife procedures that excludes observations that are overly influential to our main coefficients of interest. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

C Survey Appendix

The section lists the main survey questions used in the analysis.

C.1 Price Adjustment Frequency

Q1: Please consider your most important product or service, for a typical customer. On average, how often does the price for this product or service change, and when did it last change?

On average, the price changes every ...	▽ 0 months (1) ... more than 24 months (26)
The last time the price changed was ...	▽ 0 months (1) ... more than 24 months (26)

C.2 Trade policies

Q2: Which of the following trade policies have already meaningfully increased or are expected to meaningfully increase your firm's costs? Please select all that apply.

- ◯ Tariffs on imports from China
- ◯ Tariffs on imports from Canada
- ◯ Tariffs on imports from Mexico
- ◯ Tariffs on imports from the EU
- ◯ Tariffs on imports from other Asian countries
- ◯ Tariffs on steel and aluminum
- ◯ Tariffs on autos and auto parts
- ◯ Ending of the de minimis provision (tariff exemption for low-value packages of $800 or less)
- ◯ Other tariffs or trade policies
- ◯ Non of the above. My costs are not affected by trade policies.

Q3: For how long do you expect new tariffs or trade policies to affect your firms' costs?

▽ Less than 1 month (1) ... more than 4 years (15)

C.3 Pricing Decisions

Q4: Please think of your main product or service and the most recent price change for it. By how much did the price change?

◯ Price increased by ____ %

◯ Price decreased by ____ %

Q5: Now please think back to the most recent time you adjusted your price. We are interested in how your firm's costs have changed between the most recent and previous price adjustments, and how recent trade policy may have contributed to those cost changes. Think about any changes—upward, downward or none—in your firm's costs over this period, and how much of those changes were related to trade policy. Please enter your responses as percentages. Use 0 if there was no change.

	Costs increased by %	No cost change (please write 0)	Costs decreased by %
Change in costs between the most recent *price* adjustment and the previous one	◯ ____	◯ ____	◯ ____
Change in costs between the most recent *price* adjustment and the previous one, **only due to trade policy**	◯ ____	◯ ____	◯ ____

Q6: Now, please continue thinking back to the most recent time you adjusted your price. What were your expectations back then of how costs and prices would change in the future? Please enter your responses as percentages, using negative values for decreases.

	Average change in %	Lowest possible change in %	Highest possible change in %
As of the time you most recently adjusted your price, expected change in *costs* over the following 12 months	◯ ____	◯ ____	◯ ____
As of the time you most recently adjusted your price, expected change in *costs* over the following 12 months, **only due to trade policy**	◯ ____	◯ ____	◯ ____
As of the time you most recently adjusted your price, expected change in *prices* over the following 12 months	◯ ____	◯ ____	◯ ____

Q7: What was the average tariff rate in percent that you paid to US customs, if any, for the goods and services you had imported?

	in January was %	in June was %
Average tariff paid	◯ ____	◯ ____

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D Model Appendix

D.1 General LQ problem (FOC and survival representation)

Consider the problem of choosing the reset price in period t:

$$p_t^* \;=\; \arg\min_{p}\; \mathbb{E}_t\left[\sum_{k=0}^{\tau-1}\beta^k\left(p-p_{t+k}^{\dagger}\right)^2\right],$$

where τ is the random time until the next reset and $\beta\in(0,1)$. Further define the firm's objective $L(p)\equiv\mathbb{E}_t\big[\sum_{k=0}^{\tau-1}\beta^k(p-p_{t+k}^{\dagger})^2\big]$. Differentiating and setting the derivative to zero:

$$\frac{\partial L(p)}{\partial p}=\mathbb{E}_t\left[\sum_{k=0}^{\tau-1}2\,\beta^k\left(p-p_{t+k}^{\dagger}\right)\right]=0$$

Hence,

$$\begin{aligned}\mathbb{E}_t\left[\sum_{k=0}^{\tau-1}\beta^k\,p\right] \;&=\; \mathbb{E}_t\left[\sum_{k=0}^{\tau-1}\beta^k\,p_{t+k}^{\dagger}\right].\\ p_t^* \;&=\; \frac{\mathbb{E}_t\left[\sum_{k=0}^{\tau-1}\beta^k\,p_{t+k}^{\dagger}\right]}{\mathbb{E}_t\left[\sum_{k=0}^{\tau-1}\beta^k\right]}.\end{aligned}$$

Now let $S_k\equiv\Pr_t(\tau>k)$ denote the survival probability. Using

$$\mathbb{E}_t\left[\sum_{k=0}^{\tau-1}\beta^k\right]=\sum_{k\geq0}\beta^k\,S_k,\qquad \mathbb{E}_t\left[\sum_{k=0}^{\tau-1}\beta^k\,p_{t+k}^{\dagger}\right]=\sum_{k\geq0}\beta^k\,S_k\,\mathbb{E}_t p_{t+k}^{\dagger},$$

equation (14) becomes

$$p_t^*=\frac{\sum_{k\geq0}\beta^k\,S_k\,\mathbb{E}_t p_{t+k}^{\dagger}}{\sum_{k\geq0}\beta^k\,S_k}. \tag{14}$$

With $p_{t+k}^{\dagger}=mc_{t+k}$, differentiating (14) with respect to $\mathbb{E}_t mc_{t+j}$ yields the general weight formula

$$\frac{\partial p_t^*}{\partial\,\mathbb{E}_t mc_{t+j}}\;=\;\frac{\beta^j\,S_j}{\sum_{k\geq0}\beta^k\,S_k},\qquad j=0,1,2,\ldots$$

which is used throughout the main text.

Calvo and Taylor. For Calvo pricing, $S_j=\theta^j$, so $\sum_k\beta^k S_k=(1-\beta\theta)^{-1}$ and $w_j=(1-\beta\theta)(\beta\theta)^j$. For Taylor contracts, $S_j=1$ for $j\leq N-1$ and zero thereafter, giving $\sum_k\beta^k S_k=(1-\beta^N)/(1-\beta)$ and $w_j=(1-\beta)\beta^j/(1-\beta^N)$.

Menu-cost environments. Following Alvarez et al. (2022), adjustment behavior can be summarized by a generalized hazard $\lambda(x)$ giving the instantaneous probability of price adjustment as a function of the price gap x. This representation can be

microfounded by a broad class of sticky-price environments, including random menu-cost models and observation-friction models. We impose symmetry and monotonicity in $|x|$, and assume local linearity around the origin or equivalently,

$$\lambda(x) = \lambda_1|x| + o(|x|).$$

We also assume that the price gap evolves as a Gaussian random walk,

$$x_{k+1} = x_k + \varepsilon_{k+1}, \qquad \varepsilon_k \sim \mathcal{N}(0, \sigma^2), \qquad x_0 = 0.$$

Rather than tracking realized path-dependent adjustment risk, we use a first-order mean-field approximation and replace the hazard along a path $\{x_k\}$ with its horizon-by-horizon expectation,

$$\bar{\lambda}_k \equiv \mathbb{E}[\lambda(x_k)].$$

Under the random walk and local linearity,

$$\bar{\lambda}_k \approx \lambda_1 \mathbb{E}|x_k| = \lambda_1 \sqrt{\frac{2}{\pi}} \sigma \sqrt{k}.$$

Then, the implied survival probability up to horizon j is

$$S_j \approx \exp\left(- \sum_{\ell=0}^{j-1} \bar{\lambda}_\ell \right).$$

Since $\sum_{\ell=1}^{j} \sqrt{\ell} = \frac{2}{3} j^{3/2} + O\left(j^{1/2}\right)$, survival decays at a stretched-exponential rate,

$$S_j \simeq e^{-Aj^{3/2}}, \qquad A = \frac{2}{3} \lambda_1 \sigma \sqrt{\frac{2}{\pi}}.$$

Using the general linear–quadratic pricing result, reset prices place weights

$$w_j = \frac{\beta^j S_j}{\sum_{k \geq 0} \beta^k S_k}$$

on expected future marginal costs, yielding the expression in Proposition 4.

D.2 Proof for Corollary 1

Taylor From Proposition 2 weights $w_j = \frac{(1-\beta)\,\beta^j}{1-\beta^N} \forall j \leq N-1.$ and $w_j = 0 \forall j > N-1$ It follows that

$$\frac{\partial w_j}{\partial N} \quad = \quad (1-\beta)\beta^j \frac{\beta^N \ln \beta}{(1-\beta^N)^2}, \qquad j \leq N-1,$$

Due to $\beta < 1$ it follows that $ln(\beta) < 0$ and thus $\frac{\partial w_j}{\partial N} < 0 \forall j \leq N-1$.

Calvo From Proposition 3 weights $w_j = (1-\beta\theta)(\beta\theta)^j \forall j \geq 0$. It follows that

$$\begin{aligned}\frac{\partial w_j}{\partial \theta} &= -\beta(\beta\theta)^j + j(\beta\theta)^{j-1}\beta(1-\beta\theta) \\ &= \beta(\beta\theta)^{j-1}\left[j-(1+j)(\theta\beta)\right].\end{aligned}$$

Thus, $\frac{\partial w_j}{\partial \theta} > 0$ if $\theta^* < j/[(1+j)\beta]$.

D.3 Proof for Corollary 2

Given the random menu-cost microfoundation that rationalizes generalized hazards in Alvarez, Lippi, and Oskolkov (2022), adjustment occurs when a random cost draw ψ falls below the adjustment gain $U(x)$, implying a generalized hazard of the form

$$\lambda(x;\kappa) = G\left(\frac{U(x)}{\kappa}\right),$$

where $\psi_\kappa = \kappa\psi$ with $\psi \sim G$.

For a locally linear adjustment gain $U(x) = u_1|x| + o(|x|)$ implied by small price gaps and with $u_1 > 0$, a first-order expansion around the origin yields

$$\lambda(x;\kappa) = G\left(\frac{u_1(\kappa)}{\kappa}|x| + o(|x|)\right) = g(0)\,\frac{u_1(\kappa)}{\kappa}|x| + o(|x|),$$

so the local slope satisfies

$$\lambda_1(\kappa) = g(0)\,\frac{u_1(\kappa)}{\kappa}.$$

Differentiating,

$$\lambda_1'(\kappa) = g(0)\left(\frac{u_1'(\kappa)}{\kappa} - \frac{u_1(\kappa)}{\kappa^2}\right) = \frac{g(0)}{\kappa^2}\big(\kappa u_1'(\kappa) - u_1(\kappa)\big).$$

In an environment with small and medium price gaps, for small changes in κ, the gain of adjusting does not change much, that is $\frac{dU}{d\kappa} = \frac{dv(x)}{d\kappa} - \frac{dv(0)}{d\kappa} \approx 0$, that is, $u_1'(k) \approx 0$. Therefore,

$$\lambda_1'(\kappa) < 0.$$

Thus higher menu costs reduce adjustment intensity at small and medium price gaps through a lower λ_1.

Under the mean-field and random walk approximation, the horizon-k expected hazard is

$$\bar{\lambda}_k(\kappa) \equiv \mathbb{E}[\lambda(x_k;\kappa)] \approx \lambda_1(\kappa)\mathbb{E}|x_k|.$$

Since $\lambda_1'(\kappa) < 0$ and $\mathbb{E}|x_k| > 0$ for all $k \geq 1$, it then follows that

$$\frac{\partial \bar{\lambda}_k(\kappa)}{\partial \kappa} < 0, \quad k \geq 1.$$

The implied survival profile

$$S_j(\kappa) \approx \exp\left(-\sum_{\ell=0}^{j-1} \bar{\lambda}_\ell(\kappa) \right)$$

therefore satisfies $\partial S_j/\partial \kappa > 0$ for all $j \geq 1$.

How do weights w_j change? First note that

$$w_0(\kappa) = \Big(\sum_{k \geq 0} \beta^k S_k(\kappa) \Big)^{-1},$$

so it follows that $\partial w_0/\partial \kappa < 0$.

Then

$$\frac{\partial}{\partial \kappa} \log S_{j+1}(\kappa) - \frac{\partial}{\partial \kappa} \log S_j(\kappa) = -\frac{\partial \bar{\lambda}_j(\kappa)}{\partial \kappa} \approx -\lambda_1'(\kappa)\, \mathbb{E}|x_j| > 0,$$

so $j \mapsto \partial_\kappa \log S_j(\kappa)$ is strictly increasing. Consequently, since $\sum_{j \geq 0} w_j(\kappa) = 1$, there exists a cutoff $j^\star(\kappa)$ such that

$$\frac{\partial w_j(\kappa)}{\partial \kappa} < 0 \quad \text{for } j < j^\star(\kappa), \qquad \frac{\partial w_j(\kappa)}{\partial \kappa} > 0 \quad \text{for } j > j^\star(\kappa),$$

(with equality at $j = j^\star(\kappa)$ if the cutoff is an integer). In particular, higher menu costs shift mass in $\{w_j\}$ from short horizons to long horizons and lower the contemporaneous weight w_0.