Pricing Off Accounting Costs

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Abstract

When faced with cost changes, firms often report waiting to update prices until inventory acquired at old prices is exhausted. This behavior is at odds with standard models, which treat historical inventory purchase costs as sunk and predict that desired prices should move with current replacement costs. Similar effects of accounting costs on prices appear in other contexts: we show that firms' prices incorporate hedging gains/losses and that firms report passing through changes in fixed costs to prices at similar rates as variable costs. To rationalize these findings, we develop a principal–agent model in which current replacement costs are unverifiable but accounting costs based on realized cash flows are observable. The model integrates several puzzles about pricing: firms' prices incorporate historical input purchase costs and fixed costs, but exhibit a muted response to demand shocks, current replacement costs, and anticipated future costs. Accounting cost pricing means that cost fluctuations take time to propagate along supply chains, as firms work through materials and inventories purchased at pre-shock prices. Compared to sticky-price models, firms are slower to respond to persistent shocks but more responsive to transitory shocks, and forward-looking behavior delays—rather than speeds up—the pass-through of cost increases due to forward buying. In a quantitative input-output model of the U.S. economy, accounting cost pricing can generate substantial delays in the effect of shocks on inflation even without additional price rigidities.

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1 Introduction

> *"A coffee roaster noted that while tariffs on coffee have largely been lifted, selling prices will only go down once the stock of inventory acquired at higher costs has been cleared."*
>
> — Federal Reserve Beige Book, January 2026

Standard economic theory suggests that a firm's marginal cost depends on the current replacement cost of its inputs. When a firm sells a good, the opportunity cost of the sale is the cost of replacing the unit it has just sold. Thus, the optimal price equates marginal revenue with the current replacement cost, regardless of the historical prices at which the firm acquired its inputs or inventory currently on hand. Differences between historical acquisition costs and current replacement costs should generally not affect prices.

In practice, however, firms frequently report that the costs of previously acquired inputs or inventory influence pricing decisions. Table 1 lists several examples from Federal Reserve interviews with business contacts about the price effects of tariffs, published in the Federal Reserve Beige Book over 2025–2026. Accounts that prior inventory costs affect prices are seen across Federal Reserve districts and industries, and the example of a New York coffee roaster waiting to pass along tariff exemptions suggests that this behavior applies to both cost increases and decreases.

Likewise, executives on earnings calls often describe historical purchase costs influencing either their own or competitors' prices. Appendix Table A1 catalogues several examples from retailers like Wayfair, who cites a temporary price disadvantage against competitors carrying pre-tariff inventory, distributors like Global Industrial, who reports "implementing additional pricing actions as inventory affected by tariffs moves through [their] cost of sales," and manufacturers like Boeing, who expects to recoup duties paid on inputs when airplanes using those inputs are shipped. These examples collectively suggest that firms view higher or lower average input costs as enabling higher or lower prices on goods produced with those inputs, despite divergences between those average input costs and the relevant replacement costs at the time of pricing.

Many of these examples come from the recent tariff episode, but we believe the tendency to set prices using accounting measures of cost is more general. In Section 2, we draw on a custom survey of four hundred firm price-setters; a panel of firms asked about price and cost changes by the Federal Reserve Bank of Atlanta; and data on hedging gains/losses and ticket prices for airlines. Across these contexts, we find both survey and empirical evidence that pricing is shaped by factors that affect realized, average costs and limited evidence of price responses to current or forward-looking marginal costs.

In explaining why firms set prices this way, we were struck by some of the impracticalities with setting prices according to replacement costs. John Cochrane's conversation about tariff pass-through with the CEO of a large retailer illustrates these challenges:[1]

> Retailer CEO: All tariff pauses just ended on August 8. . . we all brought in as much previously (lower) tariffed goods before that, and most fall merchandise was here in the spring and early summer. . . so we are still selling goods that didn't have the latest tariff burden. But we are all raising prices slowly and carefully as the tariffed inventory gets sold (remember, accounting wise, we have a cash hit paying tariffs upon receipt, but we have a P&L hit when we sell the tariffed goods). [....]
>
> Cochrane: It's interesting how the accounting treatment of bottom line matters. A pure economist would immediately mark up the current inventory to its opportunity cost[...], not its historical cost, book a windfall profit, and then mark any sales below that value as losses. Business only raise prices when accounting losses force them to do so.

In effect, replacement cost pricing requires that firms value inputs and inventory on hand according to current cost conditions. The same concerns that prevent firms from marking-to-market inventories and most other assets in financial reporting apply to indexing prices to mark-to-market values: quotes of replacement costs may be costly to obtain, easy to manipulate, and difficult to verify or audit. Even if firms only mark-to-market internally for pricing decisions and not externally in financial reporting, fluctuations in replacement costs relative to accounting costs of goods sold would result in volatile accounting performance that would be difficult to justify externally.

Section 3 presents a two-period model that captures this intuition and explains why a firm may engage in *accounting cost pricing*. A principal delegates the operations of a firm to a manager. The firm acquires inventory, and the manager observes the liquidation price for that inventory before choosing a price to set. Since the liquidation price determines the opportunity cost of a sale, in the absence of other frictions, the manager would choose the first-best price that equates marginal revenue to this liquidation price.

However, we posit that the manager may have a private preference for setting a higher or lower price than is optimal. This preference could reflect empire-building motives, a short-termism bias in favor of immediate earnings over longer-term value, an unwillingness to engage in competition, or simply inattention to the optimal price (e.g., Baumol 1959; Bertrand and Mullainathan 2003; Graham et al. 2005). The private

[1] https://www.grumpy-economist.com/p/a-note-on-tariffs-from-the-real-world

preference implies that, when left to his own devices, the manager may choose a price other than the one that maximizes firm value. Moreover, the presence of this private preference means that the manager cannot credibly communicate the liquidation price (which the manager can observe but the principal cannot independently verify) to the principal: regardless of the true liquidation price, the manager would always have an incentive to misreport it in order to justify his desired price.

The principal thus faces a tradeoff when deciding whether and how much to incentivize the manager. On one hand, by penalizing the manager for deviating too far from expected profits, the principal can limit the extent of managerial discretion and reduce the extent to which the manager's private preferences affect pricing. On the other hand, restricting the manager's choices also limits the extent to which he incorporates useful private information about the business—namely, the liquidation value of inventory—into the price. The balance of these two factors determines how high-powered the incentives are that the principal offers to the manager. In turn, the strength of these incentives determine the extent to which the manager engages in *replacement cost pricing*, which indexes to the liquidation price of inventory, versus *accounting cost pricing*, which indexes to the book value of inventory on hand that can be observed by the principal.[2]

The model generates two key comparative statics for the extent of accounting cost pricing, both of which seem consistent with the evidence. First, accounting cost pricing should be more prevalent when firms sell differentiated goods and face shallower demand curves, and less prevalent when firms sell homogeneous, highly substitutable goods. Intuitively, a steep residual demand curve disciplines the extent to which the manager can use discretion in pricing, and the principal need not rely on high-powered incentives to achieve profits close to the first-best. In line with this prediction, we find in surveys that retail gas stations are the sole category of firms that report raising prices immediately when input costs go up, rather than waiting to raise prices until existing inventory is exhausted. Second, accounting cost pricing should diminish if there are external, accurate signals of the current replacement cost available to the principal. This explains why, in our experience, sellers of precious metal jewelry often price to the current market price of precious metal inputs, rather than the historical purchase cost, even when the jewelry they produce is substantially differentiated and faces inelastic demand.

[2]Okun (1981) discusses that firms appear to set prices using historical costs and arrives at an explanation remarkably close to ours. He writes, "The need for objective and systematic measurement forces the cost standard to be backward-looking—or at least sideward- rather than forward-looking. [...] Any attempt to forecast input costs or to put them on a current replacement basis, which necessarily entails a forecast, would add to expenses, introduce a subjective element into cost calculations, and complicate the task of managerial control. Bygones cannot be mere bygones if they are the sole sources of systematic information" (Okun, 1981, p. 156).

Accounting cost pricing offers an explanation for other pricing puzzles, such as why firms report passing through changes in fixed costs to prices and why prices exhibit a muted response to large demand shocks.[3] Both phenomena are forms of the main model result: principal–agent frictions can lead managers to set prices relative to accounting costs, even when those accounting costs reflect information that is irrelevant to the first-best price, and to ignore valuable information that is relevant to the first-best price but difficult for external observers to independently verify. Like fluctuations in replacement costs relative to realized input costs, fluctuations in the gap between average costs and marginal costs are hard to independently verify, and surely any reported split between average and marginal cost could be easily manipulated by insiders. By contrast, demand conditions like current replacement costs may be germane to the optimal price, but especially difficult to verify for external shareholders.

We turn to the dynamics of prices implied by accounting cost pricing in Section 4. Compared to the two-period model, in which the book value of inventory is unambiguous, the accounting cost of goods sold in a dynamic setting depends on input prices that the firm faced in several prior periods and how the firm apportions costs across those prior purchases. We anchor to the inventory valuation methods that firms use in practice when calculating cost of goods sold: most prominently average acquisition cost (AAC), first-in-first-out (FIFO), and last-in-first-out (LIFO). All three methods share the feature that accounting costs reflect realized historical costs rather than current replacement costs, but they differ in the weight they place on recent versus more distant purchases.

It turns out that there is a close connection between price dynamics under accounting cost pricing with these various inventory valuation methods and canonical sticky-price models. For example, price paths under average acquisition cost (AAC) pricing can be replicated by a model of Calvo (1983) rigidities, with an additional assumption that firms perceive future expected costs to be equal to current costs (a condition that Minton and Wheaton (2022) refer to as "myopic expectations"). Likewise, if firms make intermittent input purchases, price paths generated by LIFO pricing can coincide with a model of Taylor (1980) frictions in which firms are similarly myopic about future costs. Of course, the dependence on historical costs in the Calvo and Taylor models comes from the share of firms with stale prices, while in our model comes from the lag between when inputs or inventories are purchased and when final goods using those inputs are sold.

Despite the close connection, price dynamics under accounting cost pricing differ

[3]See Section 2.1 for the pass-through of changes in fixed costs. For the asymmetric response of prices to demand and cost shocks, see e.g., Cagan (1979), Bils and Chang (2000), Fabiani et al. (2006), Gagnon and Lopez-Salido (2020), and Kohler et al. (2026). We discuss this evidence in more detail in Section 3.3.

from the sticky-price models in some key ways. Under accounting cost pricing, prices mechanically depend on historical input costs, in contrast to the forward-looking reset prices in sticky-price models.[4] This means that accounting cost pricing predicts slower adjustment to persistent shocks and more responsiveness to transitory shocks, and further amplifies delays in price adjustment in supply chains. Moreover, while anticipation of future cost changes makes price adjustment more rapid in models with sticky prices, in our model, firms that anticipate future cost increases may stock up in inventories in advance, consequently delaying the pass-through of cost changes into prices. Thus, accounting cost pricing captures the role of forward buying in delaying the pass-through of tariffs in 2025–2026 described in many of the quotes in Table 1.

The last part of the paper, in Section 5, shows that accounting cost pricing can quantitatively generate substantial delays in the pass-through of cost shocks to inflation. We calibrate an input–output model of the U.S. economy with detailed data on industry production lags and inventories. We then consider cost shocks to several industries categorized as having organized exchanges or reference prices (Rauch 1999). For shocks to some industries, delays in the pass-through to consumer price inflation caused by production and inventory lags can be as long or longer than those caused by sticky prices, while for other industries, the pass-through to consumer prices is more immediate.

Related literature. The idea that firms set prices using realized costs, rather than current and anticipated replacement costs, dates back to Gordon (1981). Blinder et al. (1998) find that this theory of cost-based pricing is well-received among firms. Most treatments of cost-based pricing refer to the role of a firm's most recent cost observations in shaping price—for example, because firms are inattentive to or imperfectly observe information that would predict future costs (e.g., Gordon 1990; Mankiw and Reis 2002; Woodford 2003; Minton and Wheaton 2022; Afrouzi et al. 2024)—rather than the idea that more distant historical costs, which affect accounting measures of cost due to production and inventory lags, may affect price. Two exceptions are Okun (1981) (see footnote 2) and Gordon (1981), who notes, "[while] we have assumed that firms compute marginal costs on a replacement-cost basis, [....m]any firms, however, appear to base prices on actual costs paid in the past, so-called 'FIFO' (first-in-first-out) pricing practices."

Our explanation of why firms pass through changes in fixed costs to prices relates to a literature on "full cost pricing," which posits that firms set prices to reflect both variable

[4]The mechanical dependence on historical costs does not imply that prices are independent of expectations. Our model predicts that accounting cost pricing arises from managerial incentives to target a certain accounting profit level. But this target profit level adjusts endogenously to information the principal has about its optimum, such as information about the rate of inflation.

Table 1: Inventories and prices: Examples from the Federal Reserve Beige Book.

District	Date	Quote
Chicago	Apr 2025	Dealers expected strong demand to continue until existing inventories run down and tariffs start to affect pricing.
Boston	June 2025	Manufacturers' prices increased moderately on average, driven by a partial pass-through of tariff-related cost increases. However, some manufacturers held prices fixed, either because they were not exposed to tariffs or because they stockpiled inventories of foreign inputs in advance of tariffs.
Atlanta	June 2025	Some retailers noted they were still working through previously acquired inventories and thus had not raised prices.
Atlanta	July 2025	Several contacts noted they were still working through pre-tariff inventories, thus delaying price adjustments. [. . . .] Many merchants who were still selling off pre-tariff inventories expect demand to erode if, or when, tariff-related price increases are implemented.
Philadelphia	Sep 2025	One contact reported that pre-tariff inventory is almost sold out and that tariffs have begun to cause an increase in new car prices.
San Francisco	Sep 2025	Several contacts across different retail sectors phased in price increases as old inventories were sold and replaced with goods subject to tariffs. Retailers expect additional price increases as this phase-in continues.
Atlanta	Sep 2025	Some contacts reported recent price increases on final products as pre-tariff inventories were depleted. [....] Some retailers expressed concern over further declines in demand in the coming months, as prices may increase after pre-tariff inventories are depleted.
Richmond	Oct 2025	A couple of firms said they expected to raise prices once they worked through their pre-tariff inventory.
National	Jan 2026	Several contacts that initially absorbed tariff-related costs were beginning to pass them on to customers as pre-tariff inventories became depleted or as pressures to preserve margins grew more acute.
New York	Jan 2026	A coffee roaster noted that while tariffs on coffee have largely been lifted, selling prices will only go down once the stock of inventory acquired at higher costs has been cleared.

costs and allocated overhead costs. Surveys of firms report that such full cost pricing strategies are ubiquitous (see e.g., Hall and Hitch 1939; Kaplan et al. 1958; Lanzillotti 1958; Altomonte et al. 2015; Bewley 2025).[5] A distinctive feature of our evidence is that pricing also depends on other sunk costs beyond overhead, such as historical inventory purchase costs and hedging gains and losses. Several alternative models of full cost pricing—such as sales maximization subject to a profitability constraint (Baumol 1959), pricing with a "safety margin" to bound the risk of negative profits (Day et al. 1971; Altomonte et al. 2015), or limit pricing (Modigliani 1958; Bils and Chang 2000)—would not generally predict a dependence on such historical sunk costs.

Finally, an alternative explanation for the behaviors we observe is that firms set prices based on their realized costs out of fairness concerns (Okun 1981; Kahneman et al. 1986; Rotemberg 2005, 2011; Eyster et al. 2021).[6] Fairness and accounting cost pricing share many predictions because the underlying mechanisms are in fact quite similar: in both cases, stakeholders with incomplete information outside the firm aim to assess whether the price chosen by the firm is justified. Our model explains why these pricing behaviors arise even when consumers cannot realistically audit firms' choices—for example, by verifying the inventory a firm holds when costs change.

2 Empirical Evidence

This section shows that firms tend to set prices using accounting costs across a range of contexts. We present evidence from (i) a survey of 400 firm managers about how inventories affect pass-through and how prices respond to changes in fixed costs; (ii) a survey by the Federal Reserve Bank of Atlanta on how expected future cost changes affect prices; and (iii) data on fuel hedging and fares in the airline industry. Across these settings, we find that pricing responds to realized costs (both variable and fixed) as they are recognized as part of the cost of goods sold, and not to current or future replacement costs.

[5]Nubbemeyer (2010) provides a catalog of the survey evidence for full-cost pricing and an excellent account of the debate between full-cost and marginalist theories of pricing. See also Lee (1999) for how full-cost pricing, target returns pricing, and related theories contribute to post-Keynesian economics, and Ellison (2006) for an account of early attempts to model full-cost pricing as a deviation from profit maximization.

[6]Kahneman et al. (1986) present participants with the following scenario, which bears a striking resemblance to our motivating evidence: "A grocery store has several months supply of peanut butter in stock which it has on the shelves and in the storeroom. The owner hears that the wholesale price of peanut butter has increased and immediately raises the price on the current stock of peanut butter." 79 percent of participants judged this behavior as unfair, compared to 21 percent who found it acceptable.

2.1 Costs of Acquired Inventory and Pass-Through of Fixed Costs

Our first set of results comes from a survey of four hundred firms conducted by Raphael Schoenle, who graciously allowed us to add a few questions related to pass-through timing and overhead costs.[7] Survey respondents were contacted in February 2026 and screened on whether their role involved deciding prices or implementing prices decided by others. Appendix Table A2 shows descriptive statistics about the respondents and their firms. About half of the respondents are either business owners/co-owners or general managers, and half are store managers, supervisors, or specifically dedicated to pricing or revenue management. Many of the surveyed businesses are small—42 percent operate in one location and another 32 percent operate in 2–5 locations—but 10 percent of respondents work in businesses that operate in more than twenty locations. The surveyed firms also cover a wide swath of industries (elicited by asking respondents to categorize their business's main product or service), from professional services to grocery to construction.

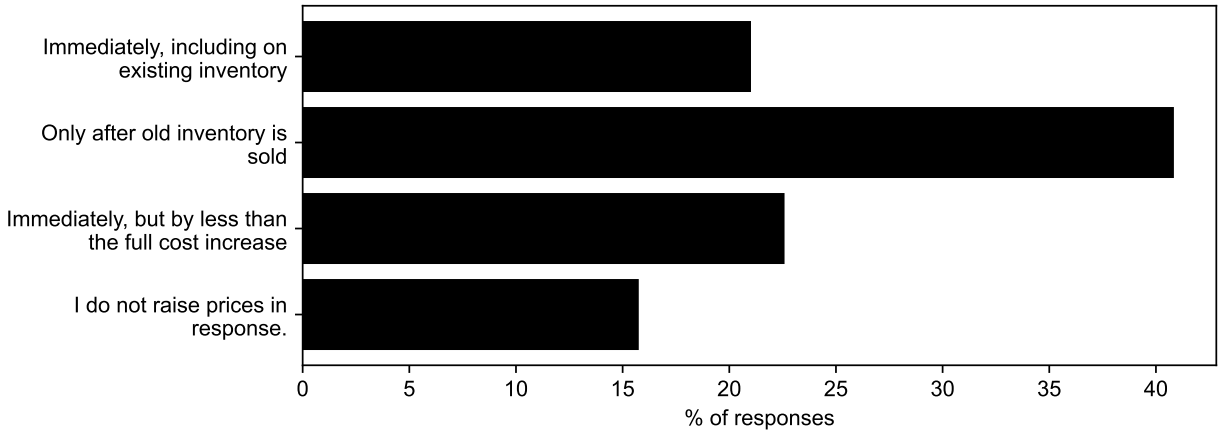
Inventories and pass-through timing. We asked respondents the following scenario: "Suppose your input cost rises today, but you still have inventory bought at lower cost. When do you raise your sales price?" Figure 1 shows that the most common answer among respondents is to wait to increase their price until after the inventory on hand is sold. This behavior is in line with the quotes about managers waiting to increase prices until inventory on hand is exhausted from Table 1 and Appendix Table A1. Only 22 percent of respondents report immediately increasing sales prices in line with replacement costs. A similar share of respondents also report changing their sales price immediately, but adjusting incompletely to the cost increase.[8]

The bottom panel of Figure 1 shows differences in responses by industry. Grocery stores and restaurants are slightly more likely to report waiting to increase prices when holding inventory than firms in personal services, professional services, or building materials and hardware. Across these five industries, however, 35 percent or more of respondents report increasing prices only after old inventory is sold, and fewer than 25 percent of respondents report increasing prices immediately in line with the change in the replacement cost.

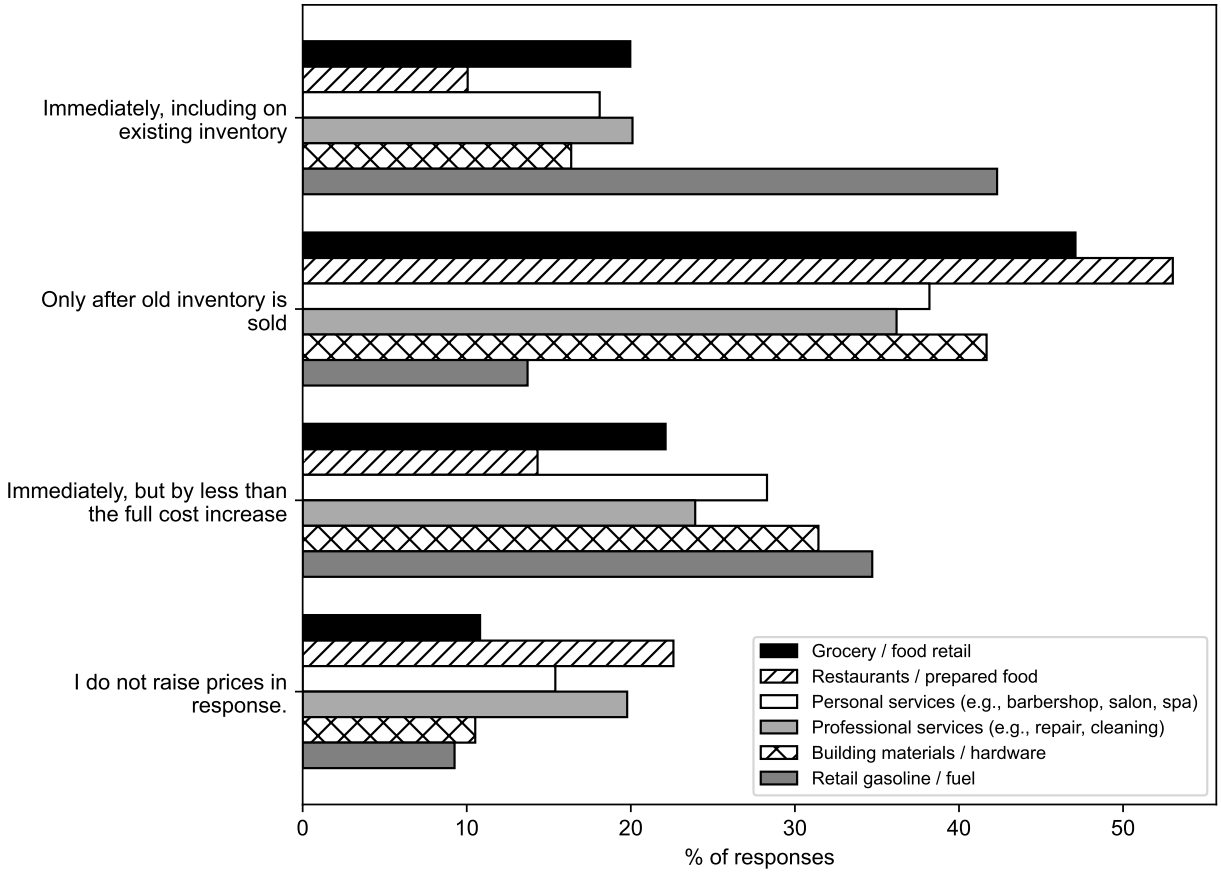
[7] The survey was conducted for Raphael's discussion at the NBER EFG 2026 Winter Meeting (Schoenle 2026). We are grateful to Raphael for conducting this survey and sharing the data with us.

[8] One possible reason for immediate but incomplete price adjustment is that, when firms use average acquisition cost accounting (the most common method alongside FIFO), changes in current purchase costs of inputs immediately affect the blended average cost of merchandise. Through the lens of our model in Sections 3–4, one could map the first three responses in Figure 1 to replacement cost or LIFO pricing, FIFO pricing, and average acquisition cost pricing. Of course, there could be alternative explanations for why firms adjust immediately but incompletely to a cost change—say due to strategic complementarities and respondents expecting that some competitors may not exposed to the cost increase.

Figure 1: Responses to "Suppose your input cost rises today, but you still have inventory bought at lower cost. When do you raise your sales price?"



(a) All respondents.



(b) Respondents, split by industry of main product or service.

Note: Responses from survey of 400 firm price-setters conducted by Schoenle (2026).

The stark exception is retail gas stations. Fewer than 15 percent of respondents from retail gas stations report waiting to increase prices until existing inventory was sold, and more than 40 percent report increasing prices immediately on existing inventory, a mirror image of responses from other industries.

The idea that pass-through of upstream crude prices to downstream gasoline prices is not encumbered by distribution and inventories is also supported by empirical studies of gasoline prices, which find much faster transmission of crude oil prices to downstream prices than physical lags in processing and distribution would suggest (see e.g., Borenstein et al. 1997; Bachmeier and Griffin 2003).[9] We return to the differences between retail gas stations and other types of surveyed firms when developing our model in Section 3. As we will see, the model predicts that industries with homogeneous goods and high visibility into cost fluctuations will tend to see more replacement cost pricing, in line with the survey results in Figure 1.

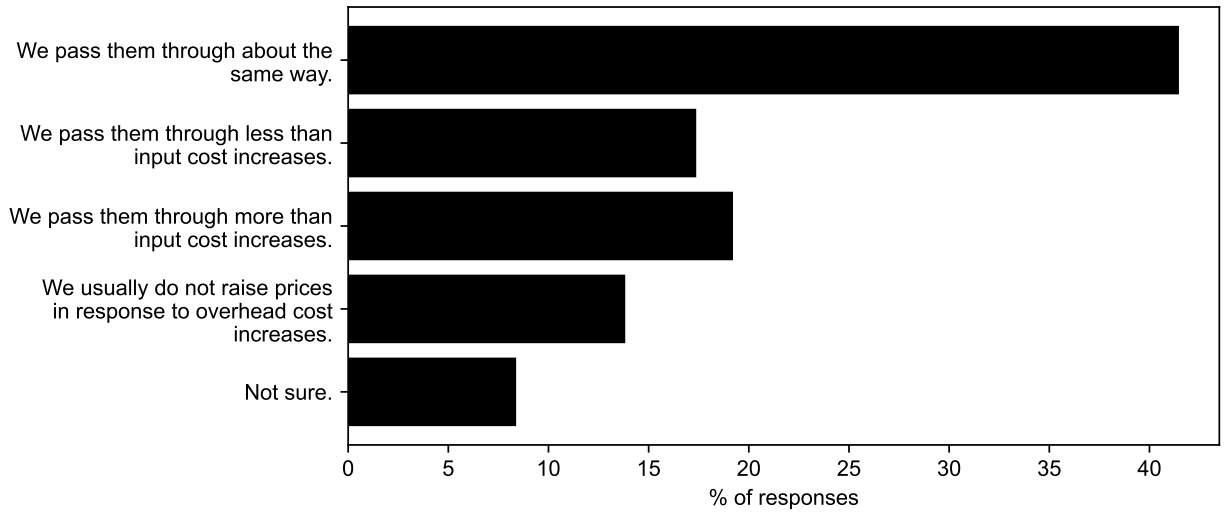
Pass-through of changes in overhead costs. We also asked respondents about whether they pass through changes in overhead costs to prices. Figure 2 reports responses from firms asked to consider how an increase in overhead costs, such as rent, insurance, salaried salary, or equipment leases, would affect their prices. The most common response was that such overhead costs are passed through to prices at a similar rate as changes in variable costs. Fewer than 15 percent of participants said that they do not change prices in response to overhead cost changes.

While at odds with standard theory,[10] the idea that firms report taking fixed costs like overhead—and not just marginal costs—into account when setting prices shows up ubiquitously in surveys and interviews of firm price-setters. For example, Bewley (2025) recently documents widespread use of "fully absorbing cost systems" to set prices by manufacturers of products with non-commodity products. Beyond surveys, empirical studies document an effect of minimum wage changes on retail prices (see e.g., Ashenfelter

[9]Though, even in retail gasoline, some industry experts suggest that that gas stations price to the cost of their last shipment. Jeff Lenard from the National Association of Convenience Stores says, "Two stores [stations] that are virtually next to each other could have entirely different prices because one called in for their next shipment an hour or two before the other one and that absolutely changed their wholesale price." `https://www.wfdd.org/economy/2026-03-10/consumers-concerned-after-iran-war-drives-gas-prices-higher`.

[10]Standard theory suggests firms price according to marginal cost, and entry and exit bring prices in line with average cost. Hall and Hitch (1939) summarize, "The equation of average cost and average revenue, if it occurs at all, is assumed to take place as the result of the entry of new firms where average revenue exceeds average cost, and by the dropping out of old ones where the reverse is the case[...] It is not an equation which any particular entrepreneur attempts to bring about, or indeed one which he desires." (Hall and Hitch, 1939, pp. 13–14).

Figure 2: Responses to "Suppose your overhead costs go up, for example on rent, insurance, salaried staff or equipment leases. How do increases in such overhead costs affect your pricing—compared to increases in per-unit input costs on materials, wholesale goods, shipping per item, or hourly labor per job?"



Note: Responses from survey of 400 firm price-setters conducted by Schoenle (2026).

and Jurajda 2022, Renkin et al. 2022, Pérez 2026), which may constitute pass-through of overhead costs if labor is largely a fixed rather than variable cost.[11]

2.2 Limited Response to Anticipated Future Costs

We next consider whether firms prices' incorporate anticipated future costs. We turn to the Federal Reserve Bank of Atlanta's Business Inflation Expectations (BIE) survey (Meyer and Sheng, 2025). The survey asks 640 executives at firms in the Sixth Federal Reserve District about past, current, and expected business conditions. Of particular interest to us are firms' realized year-over-year cost and price changes and their expectations of future cost changes. In models with sticky prices, firms' optimal prices depend on their expectations about the path of future replacement costs. Thus, firms' price changes should reflect their expected future cost changes, and particularly so if expectations are informative of future cost realizations.

[11]Compared to survey evidence, empirical evidence that firms pass through changes in overhead costs to prices is scant, perhaps because it is difficult to identify shocks to overhead costs that do not affect marginal costs or because overhead costs may be correlated with local conditions that also affect consumer demand. For example, Stroebel and Vavra (2019) document an effect of local land prices to retail prices, but attribute it to changes in consumer price sensitivity rather than rent pass-through.

We estimate the specifications,

$$\text{Price Change}_{it} = \beta\left(\text{Cost Change}_{it}\right) + \gamma\mathbb{E}_t[\text{Cost Change}_{it+12}] + \alpha_i + \delta_t + \varepsilon_{it}, \quad (1)$$

$$\text{Cost Change}_{it+12} = \delta\left(\text{Cost Change}_{it}\right) + \eta\mathbb{E}_t[\text{Cost Change}_{it+12}] + \alpha_i + \delta_t + \omega_{it}. \quad (2)$$

Here, Price Change_{it} and Cost Change_{it} are firm i's reported, realized percentage change in output price and unit cost over the year from $t-12$ to t, reported in month t. The variable $\mathbb{E}_t[\text{Cost Change}_{it+12}]$ is firm i's expected change in unit costs over the next year (i.e., from t to $t+12$). We include firm and time fixed effects to absorb firm- and time-specific factors that may be spuriously correlated with cost and price changes.

The coefficient of interest in specification (1) is γ, which captures the degree to which firms' realized price changes incorporate anticipated future cost changes. Of course, it may not be optimal to incorporate expectations if these expectations are very noisy predictors of future costs; the coefficient η in specification (2) captures whether firms' expectations at t indeed predict realized cost changes over the following year.

The survey differs in how realized and anticipated costs and prices are collected. Past year-over-year unit cost changes are collected via a categorical question, with five options ranging from costs falling by 1 percent or more to costs rising by 5 percent or more. The survey elicits expectations of future cost changes by asking for a probability distribution over the same bins. We take the probability-weighted mean across bins as our measure of cost expectations. Finally, realized price changes are collected using a fill-in field. The fill-in responses have a number of outliers, and so we winsorize the bottom and top 5 percent of responses. Note that price changes have only recently become part of the survey; special questions were added in 2020–2022 before being permanently to the survey in 2024. We use a consistent sample that includes price responses for all results.

Table 2 presents the results from estimating specifications (1)–(2). Column 1 shows that, while current price changes react strongly to realized cost changes, there is no appreciable effect of anticipated future cost changes on realized prices. The same conclusion obtains if we separate out responses on realized cost changes using bins (column 3) or if we additionally include date–sector fixed effects to control for time-varying sectoral factors (columns 2 and 4). In columns 5–6, we find that this is despite the fact that expected cost changes are indeed highly predictive of future, realized cost changes. In other words, firms appear to have information about future cost changes, but do not meaningfully incorporate these expectations into current prices, as most sticky-price models would predict.

Table 2: Price changes do not incorporate firms' expectations of future cost changes.

	Realized Price Change$_t$				*Realized Cost Change*$_{t+12}$	
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbb{E}_t$[Cost Change$_{t+12}$]	−0.082	−0.169	−0.082	−0.171	0.359**	0.298**
	(0.204)	(0.182)	(0.197)	(0.176)	(0.090)	(0.082)
Realized Cost Change$_t$	1.272**	0.979**				
	(0.305)	(0.233)				
Realized Cost Change$_t$ = 0%			4.458**	3.661**	0.131	0.058
			(1.833)	(1.490)	(0.286)	(0.334)
Realized Cost Change$_t$ = 2%			6.622**	5.439**	0.145	0.178
			(2.350)	(1.832)	(0.360)	(0.340)
Realized Cost Change$_t$ = 4%			8.280**	6.627**	−0.103	−0.064
			(2.622)	(2.066)	(0.424)	(0.392)
Realized Cost Change$_t$ = 6%			11.717**	9.184**	−0.254	−0.208
			(3.032)	(2.300)	(0.467)	(0.456)
Firm FEs	Yes	Yes	Yes	Yes	Yes	Yes
Date FEs	Yes		Yes		Yes	
Date-Sector FEs		Yes		Yes		Yes
N	3493	3480	3493	3480	1415	1410
R^2	0.48	0.56	0.49	0.56	0.65	0.73

Note: This table reports results from estimating specifications (1) (columns 1–4) and (2) (columns 5–6). The variable $\mathbb{E}_t$[Cost Change$_{t+12}$] is a weighted mean using respondents' reported probabilities of each bin of cost changes. In columns 1–2, Realized Cost Change$_t$ is the value for the midpoint of the bin. We winsorize fill-in responses for Realized Price Change$_t$ at the five percent level. Standard errors two-way clustered by firm and quarter. * indicates significance at the 10% level, ** at 5%.

2.3 Pass-Through of Hedging Gains and Losses

As an alternative to stocking up on inventory, firms often make forward purchase agreements or use financial instruments to control the future cost of inputs. Like inventory in the stockroom, inputs locked in at a higher or lower historical price affect the average cost that a firm incurs for its purchases, but, as long as the firm buys at the spot price on the margin, do not affect marginal costs. According to standard theory, resulting effects on average costs should be treated as windfall gains and losses and should not affect pricing decisions.

We use the airline industry as a laboratory to study the effects of realized hedging gains and losses on prices. Jet fuel typically accounts for 20–30 percent of airlines' operating expenses, and jet fuel prices are highly volatile. Airlines therefore use hedging to smooth cost fluctuations, though the extent of hedging varies substantially over time and across

airlines.[12] In their financial statements, airlines report fuel expenses inclusive of realized gains and losses from these hedges.[13]

The correct notion of marginal cost in this industry is difficult to assess. Once a flight is scheduled, filling one more seat has a negligible effect on fuel consumption. Since fares adjust frequently up to departure, the marginal cost of filling a seat relevant over most price spells is largely independent of fuel prices. The fact that airline pricing departments incorporate fuel surcharges into prices (Hortaçsu et al. 2024) already suggests a departure from this marginal cost pricing benchmark. Even if the relevant notion of marginal costs includes fuel costs (for example, if pricing is set when capacity decisions are made), fares should depend on the price of fuel on the margin, not the airline's average cost of fuel. We test whether this is the case.

Our analysis builds on Shi et al. (2024), who show that deviations in airlines' average fuel costs affect prices. We further show that the gap between an airline's average realized fuel cost and the jet fuel spot price passes through to ticket prices at a similar rate as the spot price itself. This is consistent with airlines pricing off average realized cost of fuel rather than marginal fuel costs.

Data on airline ticket prices and fuel costs. We use fare data from the Airline Origin and Destination Survey (DB1B), a 10 percent sample of airline tickets collected by the Bureau of Transportation Statistics (BTS). We restrict the sample to nonstop itineraries to maximize comparability across carriers, and keep only tickets for which the operating carrier and ticketing carrier are the same to ensure that fares can be matched to a single carrier's costs. For all analysis that follows, we define a route r as an origin–destination airport pair interacted with an indicator for whether the itinerary is roundtrip. (We find similar results if we instead define a route as an origin–destination pair and control for roundtrip itineraries, or if we drop roundtrip tickets from the same altogether.) We compute fare per mile using the reported fare and route distance and winsorize the top and bottom 2 percent of observations within each route-year.

Data on spot fuel prices and airlines' realized fuel costs come from the Energy Information Administration (EIA) and the BTS, respectively. We use the spot price of kerosene-type jet fuel from the EIA. Airlines' realized fuel costs come from the BTS Air

[12] Airlines primarily use financial derivatives on crude oil and refined products (the latter limit exposure to fluctuations in the crack spread between crude oil and jet fuel). Some airlines have also pursued non-financial hedges, e.g., Delta's acquisition of the Philadelphia-based Trainer Refinery in 2012.

[13] The same goes for fuel costs reported to the Bureau of Transportation Statistics, which we use below. The instructions for F41 reporting (14 CFR 2012 Part 241) direct airlines to report fuel cost using a period average acquisition cost method.

Carrier Financial Reports (Form 41), Schedule P-12(a). We focus on fuel costs for scheduled domestic operations, since these operations correspond most closely to the tickets in the DB1B sample; nonscheduled operations refer to cargo charters and other irregular services. For each carrier i in quarter t, we compute the average fuel cost per gallon as

$$\text{Fuel Cost}_{it} = \frac{\text{Total Scheduled Domestic Fuel Cost}_{it}}{\text{Total Scheduled Domestic Fuel Consumption}_{it}}.$$

Effects of hedging gains/losses on prices. To estimate the effect of airlines' realized fuel costs on fares, we estimate the specification,

$$\begin{aligned}\log(\text{Fare Per Mile}_{sirt}) = \beta \log(\text{Spot Fuel Price}_t) \\ + \gamma \left[\log(\text{Fuel Cost}_{it}) - \log(\text{Spot Fuel Price}_t)\right] + \alpha_{ir} + \varepsilon_{sirt}. \quad (3)\end{aligned}$$

where $\text{Fare Per Mile}_{sirt}$ is the fare per mile for ticket s operated by carrier i on route r in quarter t, Spot Fuel Price_t is the spot price of jet fuel per gallon in quarter t, and Fuel Cost_{it} is the average cost of jet fuel per gallon for carrier i in quarter t. The coefficient β estimates the pass-through of spot jet fuel prices to fares, and the coefficient γ estimates the pass-through of the difference between airlines' realized fuel costs and the spot price to fares. We include carrier–route fixed effects α_{ir} to control for systematic differences in costs and fares across airlines and their routes, so that identification comes from within-carrier variation in fuel costs and within-carrier-route variation in fares over time.

Column 1 of Table 3 finds that the pass-through of both spot fuel prices and the differential between airlines' realized fuel costs and the spot price are both significantly different from zero. Moreover, the estimated elasticities are roughly equal in magnitude, indicating that fares respond just as much to the difference between airlines' realized costs and the spot price as to the jet fuel spot price. We find an elasticity of fares to fuel costs similar to the average share of total fare revenues spent on fuel, which would obtain if airlines exhibited complete pass-through in levels of costs (Sangani 2025).

Column 2 allows for asymmetric responses to positive and negative differences between airlines' realized fuel costs and the spot price. We find that the response to positive and negative differences are similar in magnitude. Shi et al. (2024) provide corroborating evidence of the idea that fuel costs both higher and lower than the average matter for fares, using Southwest's lower-than-spot fuel prices prior to 2007 and Delta's higher-than-spot fuel prices in 2009 as case studies. Thus, like firms' reports for how historical costs of acquired inventory affect prices, prices appear to respond to realized costs whether or not those costs are higher or lower than marginal costs.

Table 3: Effect of airlines' realized fuel costs on prices.

	Log Fare Per Mile$_{sirt}$					
	OLS	OLS	OLS	IV	IV	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Log Spot Fuel Price$_t$	0.133**	0.132**		0.143**	0.132**	
	(0.026)	(0.023)		(0.027)	(0.027)	
Log Fuel Cost$_{it}$ − Log Spot Fuel Price$_t$	0.253**		0.110**	0.440**		0.111**
	(0.105)		(0.041)	(0.069)		(0.052)
×1{Positive}		0.235**			0.212**	
		(0.062)			(0.097)	
×1{Negative}		0.281			0.783**	
		(0.210)			(0.092)	
Route × Carrier (*ir*) FEs	Yes	Yes	Yes	Yes	Yes	Yes
Route × Quarter (*rt*) FEs			Yes			Yes
N (millions)	219.8	219.8	219.8	219.8	219.8	219.8
R^2	0.33	0.33	0.37	0.33	0.33	0.37

Note: In columns 4–6, carrier fixed effects interacted with the log change in the spot fuel price over the past year is used as an instrument for Log Fuel Cost$_{it}$ − Log Spot Fuel Price$_t$. Standard errors two-way clustered by carrier and route. * indicates significance at the 10% level, ** at 5%.

In column 3, we add route–quarter fixed effects, so that identification comes from differences in fares across carriers operating on the same route at the same time. The disadvantage of this specification is that the jet fuel spot prices is collinear with quarter fixed effects, and so we can no longer compare the pass-through of the differential between realized fuel costs and the spot price to the pass-through of the spot price itself. Nevertheless, adding route-quarter fixed effects removes the bias that could arise from time series factors correlated with both fares and the gap between realized costs and spot prices. We continue to find significant effects of airlines' realized fuel costs on fares, with an elasticity of 0.11.

One concern is that changes in airlines' realized fuel costs may be the result of strategic decisions, such as changes in hedging strategy or fuel sourcing, that correlate with fare changes. To address this concern, we exploit the fact that jet fuel spot prices are approximately a random walk. While the extent to which an airline hedges can be determined by endogenous factors, the evolution of the jet fuel price—which determines the ultimate effect of hedges on realized fuel costs—is plausibly exogenous. In columns 4–6, we use carrier fixed effects, which proxy for different tendencies to hedge across airlines, interacted with the change in the jet fuel spot price over the past year as an instrument for the differential between carriers' realized fuel costs and the spot price. Columns 4–6 find

similar or moderately stronger effects of airlines' realized fuel costs with this approach.

A second concern is that, rather than prices responding to realized costs, changes in realized costs or cash-on-hand may lead airlines to change the capacity decisions. Under this story, a correlation between fares and average costs could instead be a consequence of quantity choices, rather than a reflection of pass-through. We explore this possibility by estimating the effect of realized fuel costs on planned and realized quantities. For our measure of planned capacity, we use the total number of seats offered by airline i on route r in month t; for realized quantities, we use the percentage of offered seats ultimately filled, called the "load factor." We take both measures from the BTS T-100 domestic segment data. Appendix Table A3 shows that total seat capacity for the average route indeed falls when an airline's fuel costs rise, though surprisingly the effect reverses sign when we instrument for airlines' realized fuel costs. However, even conditional on changes in the number of seats offered, we find that airlines' load factors fall when their realized fuel costs rise relative to other airlines.

3 A Two-Period Model of Accounting Cost Pricing

This section develops a two-period model of accounting cost pricing. In the model, a principal delegates the operations of a firm to a manager. The principal observes accounting profits and can use a transfer contingent on observed profits to discipline the manager's behavior. In choosing the transfer, the principal balances the benefits of discouraging the manager from taking his own idiosyncratic preferences into account and the costs of ignoring valuable information that the manager (but not the principal) can observe about the business. As the risk of managerial discretion grows large, the principal increasingly penalizes the manager from deviating too sharply from expected profits. This leads the manager to ignore private information about replacement costs and price off accounting costs visible to the principal.

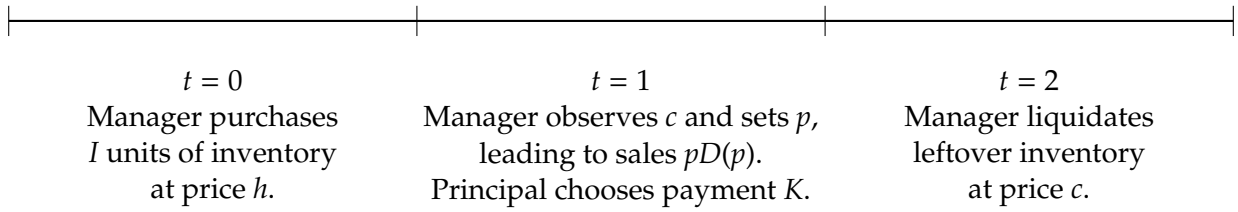
We start with a stripped-down model to build intuition. After deriving the main results, we show that extensions of the model can also rationalize why firms pass through changes in overhead costs to prices but exhibit limited responsiveness to demand shocks.

3.1 Baseline Model

Figure 3 shows the timing of the two-period model. At time $t = 0$, the firm manager purchases I units of inventory at price h. At time $t = 1$, the manager observes the price c at which he can liquidate inventory in the future ($t = 2$). After observing c, the manager

chooses a price p and sells $D(p)$ units of the inventory. The principal can observe the firm's sales, $pD(p)$, and the book value of the goods sold, $hD(p)$, but cannot observe the liquidation price c. She can use sales and costs of goods sold to determine the amount she pays the manager, K. Finally, at time $t = 2$, the manager sells the leftover inventory at the price c.

Figure 3: Two-period model timing.



For simplicity, we assume that the units of inventory I purchased in the first period are sufficiently high that $D(p) < I$ for all values of p, so that the optimal price is not affected by the risk of stockouts. We further assume no discounting. So, the first-best value of the firm is

$$V^{\text{FB}} = \max_{p} \{-hI + pD(p) + c(I - D(p))\}. \tag{4}$$

Notice that the optimal price does not depend on the initial price of inventory h. Instead, the value of the firm is maximized by choosing $p^* = \arg\max_p (p - c)D(p)$, i.e., the price that maximizes profits using the liquidation price c as the measure of the marginal cost. Intuitively, the liquidation price c reflects the opportunity cost of selling one more unit of inventory. The liquidation value in this two-period model is analogous to replacement costs in a dynamic model: in a dynamic setting, the opportunity cost of selling one more unit from inventory is the cost of replacing that unit, while in this two-period model, the opportunity cost of a sale is the price that the firm could earn from liquidating the unsold inventory.

Delegating the pricing decision to the manager can be costly because the manager's goals may not be aligned with the principal. We assume the following manager value function,

$$V^{\text{manager}} = \max_{p} \Big\{ \underbrace{-hI + pD(p) + c(I - D(p))}_{\text{True value}} + \underbrace{(\alpha - 1)p}_{\text{Pricing wedge}} + \underbrace{K(pD(p), hD(p))}_{\text{Incentive payment}} \Big\}. \tag{5}$$

The manager's value function includes the true value of the firm, which is the first bracketed term. But it also includes a private benefit that the manager enjoys from setting the price higher or lower than the optimal level, which is the second term. This

private benefit could reflect a manager's preference for prices that are lower than the value-maximizing level ($\alpha < 1$), for example due to empire-building motives (Baumol 1959), or a preference for higher-than-optimal prices ($\alpha > 1$), for example to avoid intense competition with rivals (Bertrand and Mullainathan 2003). More broadly, the wedge introduced by $\alpha \neq 1$ stands in for any way in which the managerial discretion, inattention, or slack may distort pricing at the expense of the firm's value. We assume that α is the private information of the manager and cannot be observed by the principal.

The third term is a payment K that the principal can make to the manager. Crucially, the principal is limited in what information she can use to determine the payment. She observes accounting quantities, but cannot observe the true opportunity cost of a sale, c. Moreover, since the manager's pricing wedge α is private information, the manager also cannot credibly communicate the liquidation price c to the principal: regardless of the true value of c, the manager would always have an incentive to misreport it in order to justify his desired price. The principal must therefore condition the payment solely on observable accounting quantities—sales $pD(p)$ and the book value of goods sold $hD(p)$.

One may wonder why the principal cannot simply wait until $t = 2$ and condition the payment on the liquidation proceeds, which reveals c to both parties. Our assumption that the contract is tied to short-term accounting performance, rather than the long-run value of decisions, reflects the need to monitor and incentivize managers in a timely manner. Conditioning on $t = 2$ liquidation proceeds requires the manager to commit to a longer-term contract and attribute distant outcomes to current decisions, both of which are likely difficult in practice.

Given the manager's pricing choice, the principal's problem is to design the payment terms, $K(\cdot)$, to maximize expected firm value:

$$V^{\text{principal}} = \max_{K(\cdot)} \mathbb{E}\left[-hI + pD\left(p\right) + c\left(I - D\left(p\right)\right)\right]. \tag{6}$$

The principal faces a trade-off when choosing $K(\cdot)$: higher-powered incentives limit the extent to which the manager will allow their idiosyncratic preferences, captured by α, to erode firm value, but they also lead the manager to disregard their valuable private information about liquidation price c.

To derive closed-form results, we make several parametric assumptions. We assume demand is isoelastic with an elasticity η, i.e., $D(p) = p^{-\eta}$. For the payment function, we assume the principal penalizes the manager for deviating from a target accounting

markup μ, with κ governing the strength of incentives,

$$K\left(pD(p), hD(p)\right) = -\frac{\kappa}{2}\left(\frac{pD(p)}{hD(p)} - \mu\right)^2, \tag{7}$$

We define the replacement cost shock $\varepsilon = c/h$ and log-linearize the model around the point where $h = 1$, $\alpha = 1$, and $\varepsilon = 1$. For any variable x, let $\hat{x}$ denote the log deviation of x from its equilibrium value. We suppose that the variances of $\hat{h}$, $\hat{\alpha}$, and $\hat{\varepsilon}$ are all indexed proportional to a parameter z; all following results use a first-order approximation in z around $z = 0$.

Proposition 1 characterizes the price that the manager would set in the absence of incentives from the principal.

Proposition 1 (Pricing without incentives)**.** *If $\kappa = 0$, then the price set by the manager is*

$$\hat{p} = \hat{c} + \frac{1}{\eta - 1}\left(\frac{\eta}{\eta - 1}\right)^{\eta} \hat{\alpha}.$$

The elasticity of the price to manager preferences $\hat{\alpha}$ is decreasing in the firm's demand elasticity η.

In the absence of incentives, the price set by the manager fully incorporates information about the opportunity cost of selling inventory: changes in the liquidation value c pass through one-for-one to prices.[14] However, the manager's idiosyncratic preferences α also distort prices. The degree to which these preferences distort prices falls as the elasticity of demand η increases. Intuitively, when the elasticity of substitution is high, deviating from the optimal price leads to a more rapid fall-off in firm value. Thus, market forces penalize the manager from diverging too far from the optimum. This mechanism captures the idea that managerial slack is more difficult to sustain in competitive industries (Hart 1983; Giroud and Mueller 2010, 2011).

We now turn to the optimal contract parameters chosen by the principal. To limit the influence of the manager's idiosyncratic preferences on prices, the principal offers a payment that penalizes deviations from a target accounting markup. Proposition 2 characterizes the parameters of this contract.

Proposition 2 (Optimal contract parameters)**.** *Given a payment of the form* (7)*, the contract*

[14] In our analytic results, we use pass-through to refer to the elasticity of prices to costs. Sangani (2025) shows that pass-through tends to be complete in *levels* rather than in logs and characterizes demand curves that predict pass-through in levels, unlike the isoelastic demand curve we posit above. One could assume a semi-log demand curve and derive similar conclusions about the pass-through in levels of accounting versus true marginal costs.

parameters that maximize expected firm value are $\mu^* = \eta/(\eta-1)$ *and*

$$\kappa^* = \frac{1}{\eta}\left(\frac{\eta}{\eta-1}\right)^{\eta}\frac{\sigma_\alpha^2}{\sigma_\varepsilon^2},$$

where $\sigma_\alpha^2 = \mathbb{E}[\hat{\alpha}^2]$ *and* $\sigma_\varepsilon^2 = \mathbb{E}[\hat{\varepsilon}^2]$*. The strength of incentives* κ^* *is decreasing in the firm's demand elasticity* η*, increasing in the variance of manager preferences* σ_α^2*, and decreasing in the variance of the cost shock* σ_ε^2*.*

The optimal accounting markup target $\mu^* = \eta/(\eta-1)$ is the standard monopoly markup that would obtain in the first-best if the liquidation price c coincided with the accounting price h. The optimal strength of the incentive, captured by κ^*, is increasing in the ratio of the variance of the manager's pricing wedge to the variance of cost shocks, $\sigma_\alpha^2/\sigma_\varepsilon^2$. Intuitively, a greater risk of managerial discretion warrants stronger incentives, but incentives should be tempered when costs are volatile and the manager's private information about c is especially valuable. A more competitive market (i.e., a higher elasticity of substitution η) leads to lower-powered incentives, because market forces limit the degree to which the manager prices according to his own idiosyncratic preferences.

Proposition 3 shows how the optimal contract shapes the manager's pricing decision.

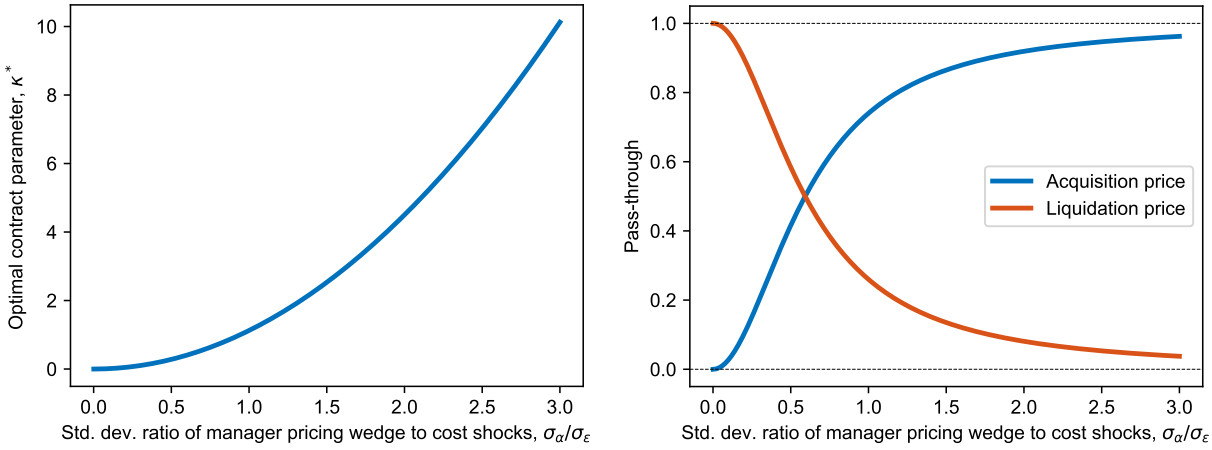
Proposition 3 (Pricing with optimal contract)**.** *If* $\mu = \mu^*$ *and* $\kappa = \kappa^*$*, then the manager sets*

$$\hat{p} = \frac{\omega(\eta)}{\omega(\eta)+\sigma_\alpha^2/\sigma_\varepsilon^2}\left[\hat{c} + \frac{1}{\eta-1}\left(\frac{\eta}{\eta-1}\right)^{\eta}\hat{\alpha}\right] + \frac{\sigma_\alpha^2/\sigma_\varepsilon^2}{\omega(\eta)+\sigma_\alpha^2/\sigma_\varepsilon^2}\hat{h},$$

where $\omega(\eta) = (\eta-1)^2\left(\frac{\eta}{\eta-1}\right)^{-2\eta}$ *is strictly increasing in the demand elasticity* η*. The degree of accounting cost pricing is increasing in the variance of manager preferences* σ_α^2*, decreasing in the variance of the cost shock* σ_ε^2*, and decreasing in* η*.*

Under the optimal contract, the manager's price is a weighted average of two components: the price that the manager would set in the absence of incentives, and the accounting cost at which inventory was acquired. We refer to the former as *replacement cost pricing* and to the latter as *accounting cost pricing*. The weight on accounting costs is increasing in the relative importance of the agency problem, which is captured by the ratio of variances $\sigma_\alpha^2/\sigma_\varepsilon^2$. When managerial discretion is the dominant concern ($\sigma_\alpha^2/\sigma_\varepsilon^2 \to \infty$), the principal forces the manager to price entirely off the historical acquisition cost h. Conversely, when the manager's private information about replacement costs is especially valuable relative to agency concerns ($\sigma_\alpha^2/\sigma_\varepsilon^2 \to 0$), incentives are weak and the manager prices off the true marginal cost as in Proposition 1.

Figure 4: Accounting cost pricing as variance of manager pricing wedge grows.



(a) Optimal contract parameter κ^*.

(b) Replacement vs. accounting cost pricing.

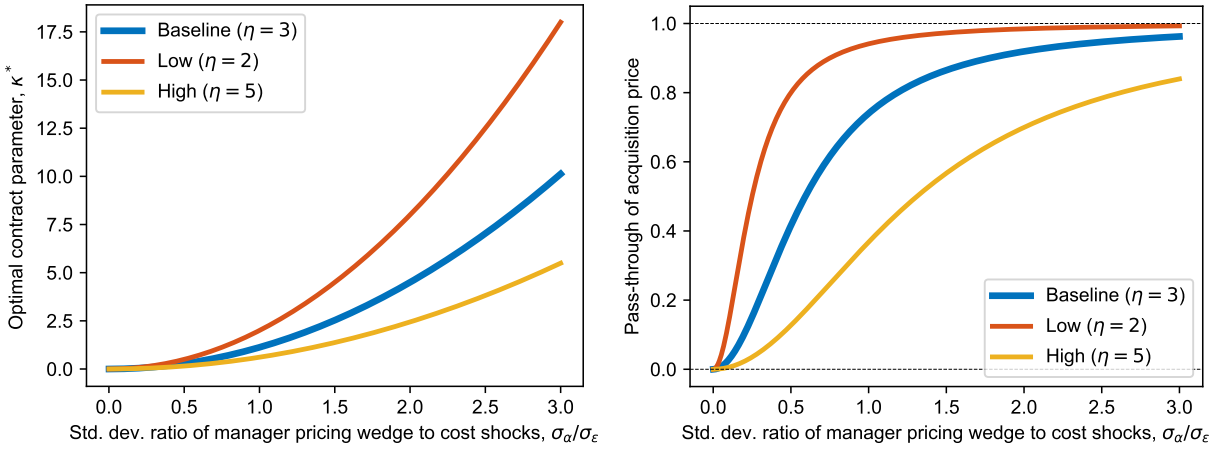
Note: The plots show analytical solutions from a log-linearization around $h = 1$, $\alpha = 1$, and $\varepsilon = 1$, assuming a demand elasticity $\eta = 3$. The left panel shows the contract parameter κ^* that maximizes expected firm value, and the right panel shows the elasticity of prices with respect to the inventory acquisition price and inventory liquidation price.

Figure 4 shows these results under illustrative parameter values. The left panel shows how the optimal contract parameter κ^* changes as the variance of the manager's pricing wedge relative to replacement cost shocks grows larger. The principal chooses higher-powered incentives as the risk of managerial discretion rises. This means that the price set by the manager becomes more responsive to accounting costs and less responsive to the true marginal cost of a sale, shown in the right panel of Figure 4. For the parameters we choose, even a relatively small amount of manager discretion results in a substantial movement toward accounting cost pricing rather than pricing off the true marginal cost.

Proposition 3 shows that the weights put on accounting costs versus true marginal costs are also governed by the demand elasticity η through $\omega(\eta)$. Firms facing more competitive conditions place less weight on accounting costs and more weight on current replacement costs. Market competition already disciplines the manager's choice of price, and does so without introducing the accounting cost distortion embedded in the principal's contract.

We illustrate how the degree of accounting cost pricing depends on the elasticity of demand in Figure 5. Compared to our baseline case where the elasticity of demand $\eta = 3$, lowering the elasticity of demand to $\eta = 2$ leads the principal to make incentives higher-powered and thus leads to more accounting cost pricing. Conversely, when $\eta = 5$, incentives are less strong, and the manager's price is more responsive to true marginal costs.

Figure 5: Accounting cost pricing strengthens when elasticity of demand is low.



(a) Optimal contract parameter κ.

(b) Replacement vs. accounting cost pricing.

Note: The plots show analytical solutions from a log-linearization around $h = 1$, $\alpha = 1$, and $\varepsilon = 1$, under different values for the demand elasticity. The left panel shows the contract parameter κ^* that maximizes expected firm value, and the right panel shows the elasticity of prices with respect to the inventory acquisition price and inventory liquidation price.

While both our parameterization of the model and the specific parameters we choose for the simulation are illustrative, the model provides a useful prediction that accounting cost pricing should be less prevalent in markets where firms sell undifferentiated, highly substitutable goods. In fact, Okun (1981) comes to a similar conclusion to us about the cases where accounting cost pricing are less likely to prevail:

> The reliance of firms on historical costs is evident in many empirical studies of price-cost relations. [....] The exceptions that occur to me arise when processed raw materials are sold on auction markets, as in the case of flour or soybean meal. In those cases, the processed products promptly reflect changes in the (auction-market) prices of the primary products (Okun 1981, pp. 156–175).

Processed goods that are sold on auction markets are relatively homogeneous, making firms' residual demand curves elastic. With little room for discretionary pricing, the need to monitor managers through accounting-based contracts diminishes, and prices naturally track current replacement costs.

3.2 Partial Cost Observability

The central friction is the model is that the agent cannot credibly communicate the cost shock ε to the principal. What if the principal can use external sources, such as the behavior of competitors or market signals, to obtain an independent estimate of current costs? To consider this possibility, suppose that at $t = 1$ there is a public signal of the replacement cost shock, $s \sim \mathcal{N}(\hat{\varepsilon}, 1/\tau)$. The principal can now condition the payment contract on s in addition to the accounting sales and costs from before. We assume the same quadratic penalty form but allow the target accounting markup to depend on s,

$$K = -\frac{\kappa}{2}\left(\frac{pD(p)}{hD(p)} - \mu(s)\right)^2.$$

Proposition 4 characterizes the optimal contract parameters and the price set by the manager given the public signal s with precision τ.

Proposition 4 (Partial cost observability)**.** *The optimal contract uses*

$$\mu^*(s) = \frac{\eta}{\eta - 1}\exp\left(\frac{\tau\sigma_\varepsilon^2}{1 + \tau\sigma_\varepsilon^2}s\right), \qquad \textit{and} \qquad \kappa^* = \frac{1}{\eta}\left(\frac{\eta}{\eta - 1}\right)^\eta \frac{\sigma_\alpha^2}{\sigma_\varepsilon^2}\left(1 + \tau\sigma_\varepsilon^2\right).$$

Given the inventory acquisition price h, liquidation price c, and manager preference α, the expected price set by the manager is

$$\hat{p} = \frac{\omega(\eta) + \tau\sigma_\alpha^2}{\omega(\eta) + \sigma_\alpha^2/\sigma_\varepsilon^2 + \tau\sigma_\alpha^2}\left[\hat{c} + \frac{\omega(\eta)}{\omega(\eta) + \tau\sigma_\alpha^2}\frac{1}{\eta - 1}\left(\frac{\eta}{\eta - 1}\right)^\eta \hat{\alpha}\right] + \frac{\sigma_\alpha^2/\sigma_\varepsilon^2}{\omega(\eta) + \sigma_\alpha^2/\sigma_\varepsilon^2 + \tau\sigma_\alpha^2}\hat{h},$$

where $\omega(\eta)$ is as defined in Proposition 3.

The public signal effectively allows the principal to "mark-to-market" the firm's inventory. The principal's target accounting markup $\mu^*(s)$ reflects the principal's updated estimate of the value of the firm's inventory stock. The greater visibility into the real-time value of inventory also allows the principal to set higher-powered incentives: the optimal choice of κ^* increases with the signal precision τ.

The effect on pricing is twofold. First, the signal-adjusted target $\mu^*(s)$ means that even with high-powered incentives, the manager's price more closely tracks the true replacement cost in expectation. Thus, holding other parameters equal, increasing precision τ increases the weight on the liquidation price and lowers the weight on historical inventory acquisition cost. Second, relative to Proposition 3, we see that the public signal reduces the pass-through of the manager's idiosyncratic preference into prices by a factor

of $\omega(\eta)/\left(\omega(\eta)+\tau\sigma_\alpha^2\right)$. In words, increasing the signal precision crowds out idiosyncratic managerial discretion.

The effect of cost observability on pricing contrasts with the role of product market competition analyzed above. In that case, a more elastic firm demand curve leads to more replacement cost pricing because market forces already discipline the manager, reducing the need for accounting-based incentives. Here, greater cost observability leads to more pricing off replacement costs *because* incentives can be made stronger. Thus, these two mechanisms both lead to greater replacement cost pricing, but with opposite effects on the power of the optimal contract.

Proposition 4 suggests another set of markets where we should tend to find a low degree of accounting cost pricing: markets where the real-time liquidation value of firms' input costs can be readily observed. Retail gasoline stations, which we saw in Section 2 are less likely to price off historical inventory acquisition costs than other firms, fall into this category. Sellers of gold and silver jewelry are another example. Our model explains their tendency to set prices using current gold and silver market prices as coming not from steep demand curves—indeed, jewelry can be quite differentiated, and customers may be quite price-insensitive—but rather from the fact that their inventories can be readily marked-to-market.[15]

3.3 Extensions: Average Cost Pricing and Demand Shocks

The baseline model shows that principal–agent frictions can lead managers to price off accounting costs—even when those accounting costs reflect information that is irrelevant to the first-best price—and to ignore valuable information that is relevant to the first-best price. It is not hard to see how the same forces can lead firms to pass through changes in average cost that do not affect marginal costs (e.g., changes in overhead costs) and to neglect changing market conditions, such as demand shocks, that affect the optimal price but cannot be externally verified. We briefly sketch these extensions.

Average cost pricing. Suppose that selling units of the good at $t = 1$ requires paying a stochastic overhead cost $F = \bar{F} + \nu$ and stochastic variable cost per unit sold w. The realizations of the overhead cost F and variable cost w can be observed by the firm

[15]In fact, from an accounting rule perspective, firms are typically not allowed to mark inventories to a market value above acquisition cost except for goods whose replacement value is directly observable. FASB ARB 43 states, "Only in exceptional cases may inventories properly be stated above cost. For example, precious metals having a fixed monetary value with no substantial cost of marketing may be stated at such monetary value; any other exceptions must be justifiable by inability to determine appropriate approximate costs, immediate marketability at quoted market price, and the characteristic of unit interchangeability."

manager at $t = 1$ but not by the principal. Thus, the principal observes total accounting costs at $t = 1$, which are equal to $(h + w) D(p) + F$, but cannot disentangle the portion of costs that is due to variable costs from the portion due to fixed costs. (The presence of the stochastic variable cost w also prevents the principal from using other information, such as the change in the book value of inventory, to back out the realization of the fixed cost.)

Notice that the manager cannot credibly communicate the realization of F to the principal, just as the replacement cost shock ε could not be credibly communicated. From the principal's perspective, a higher realization of F and thus a lower ratio of sales to accounting costs could just as well be due to the manager preferring a lower-than-optimal markup ($\alpha < 1$). In order to disincentivize discretion, the principal may use the accounting markup net of fixed costs, $\mu = pD(p)/\left[(h + w)D(p) + F - \bar{F}\right]$ to monitor the manager, which should equal $\eta/(\eta - 1)$ in the absence of shocks. In doing so, however, the principal makes the transfer payment depend on the realization of overhead costs $\nu = F - \bar{F}$. One can show that the manager consequently passes through innovations in overhead costs to prices at the same rate as he passes through changes in accounting costs. This is despite the fact that, if left alone, the manager's chosen price would ignore the fixed cost altogether.

In standard models, the coincidence of prices and average costs occurs because free entry brings prices and volumes down to the level where expected profits net of fixed costs are zero, not because firms deliberately pass through fixed costs to prices. Yet, as we saw in Figure 2, the vast majority of firms report passing through changes in fixed costs to prices. Our model rationalizes the pass-through of fixed costs as managers responding optimally to target accounting markups.[16]

Pass-through of demand *vs.* cost shocks. In the same way that incentives from the principal can cause the manager to neglect valuable information about replacement costs, so too can these incentives lead the manager to ignore other valuable information, such as demand shocks. Suppose for example that the elasticity of demand η is stochastic. Low realizations of η mean that consumer demand is unusually inelastic, leading to a higher first-best price, while high realizations of η lower the first-best price.

The inability for the external principal to verify the state of demand frustrates the manager's ability to incorporate this information into prices. Just like fluctuations in the replacement cost, the manager cannot credibly report the realization of the demand elasticity to the principal, and thus he under-responds to this information relative to the

[16]This explanation is also consistent with how managers justify average cost pricing: "An overwhelming majority of the entrepreneurs thought that a price based on full average cost (including a conventional allowance for profit) was the 'right' price, the one which 'ought' to be charged." (Hall and Hitch, 1939, p. 19). In our model, this is indeed the price that external owners of the firm expect the manager to charge.

first-best. (For this example, it is important to specify the model so that the principal cannot back the demand elasticity out by observing both the price level p and sales $pD(p)$.)

The idea that firms underreact to demand shocks relative to cost shocks has a long history of empirical support. Cagan (1979) reports that, "Empirical studies have long found that short-run shifts in demand have small and often insignificant effects [on prices]." More recently, the asymmetric response of prices to costs relative to demand is documented both in surveys (e.g., Fabiani et al. 2006; Kohler et al. 2026) and empirically (e.g., Bils and Chang 2000). Studies exploiting local demand and cost shocks likewise find small responses of prices to large local demand shocks (e.g., Arcidiacono et al. 2020; Gagnon and Lopez-Salido 2020) but large responses to local cost shocks (Butters et al. 2022).

4 Price Dynamics

This section explores how accounting cost pricing affects price dynamics. We focus on the limit case where firms price solely off accounting costs (i.e., $\kappa \to \infty$). Since the prior section shows that managers choose a weighted average of accounting cost- and replacement cost-based prices, price dynamics for intermediate values of κ would simply be a weighted average of the price dynamics we derive here and the current replacement cost.

We first discuss how we model the evolution of accounting costs and inventory stocks. Then, we characterize the dynamics of prices based on accounting costs and compare the results to standard models with sticky prices.

4.1 Inventory Valuation and Dynamics of Accounting Costs

To characterize price dynamics, we need to take a stance on how firms calculate the accounting cost of goods sold. In the two-period model, the firm purchases inventory once at price h, so the accounting cost per unit is h regardless of whether the firm uses first-in-first-out (FIFO), average acquisition cost (AAC), or last-in-first-out (LIFO) accounting.[17] In a dynamic setting, however, the firm purchases inputs repeatedly, and the valuation method determines how it apportions costs for units that are sold. Under FIFO, the cost of goods sold reflects the price of the oldest inventory in stock; under LIFO, the cost of goods sold reflects the most recent purchase price; and under AAC, the cost of goods sold depends on a blended average of prior acquisition prices. All three methods

[17]The average acquisition cost method is often referred to as "average cost." We use "average acquisition cost" throughout to distinguish between this inventory valuation method and the full cost pricing theory that firms set prices according to average costs (inclusive of fixed costs) rather than marginal costs.

share the feature that accounting costs reflect realized historical costs rather than current replacement costs, but they differ in the weight they place on recent versus prior purchases.

We focus largely on average acquisition cost and FIFO accounting, because these are the predominant methods used by firms that are likely to price off accounting costs. Figure 6a shows that average acquisition cost accounting and FIFO are unconditionally the most common inventory valuation methods used by public firms, together accounting for over 80 percent of inventory-carrying firms in Compustat from 2010–2025. Both methods put more weight on older acquisition costs than LIFO, which instead computes costs using the price of the most recently acquired inventory and thus more closely tracks current replacement costs.[18]

More importantly, average acquisition cost accounting and FIFO are especially prevalent in the industries where our model suggests accounting cost pricing is likely to matter. Figure 6b shows the fraction of inventories in the 2017 Economic Census valued using LIFO across NAICS-6 industries whose products are primarily traded on organized exchanges, whose products are priced relative to reference prices quoted in trade publications, and whose products have administered prices (Rauch 1999). Industries with organized exchanges and reference prices have homogeneous outputs and public signals of cost fluctuations, while industries with administered prices are more likely to have differentiated inputs and outputs. Industries with administered prices—where accounting cost pricing is most likely to matter—tend to use AAC and FIFO more, and LIFO less, than industries with organized exchanges or reference prices.

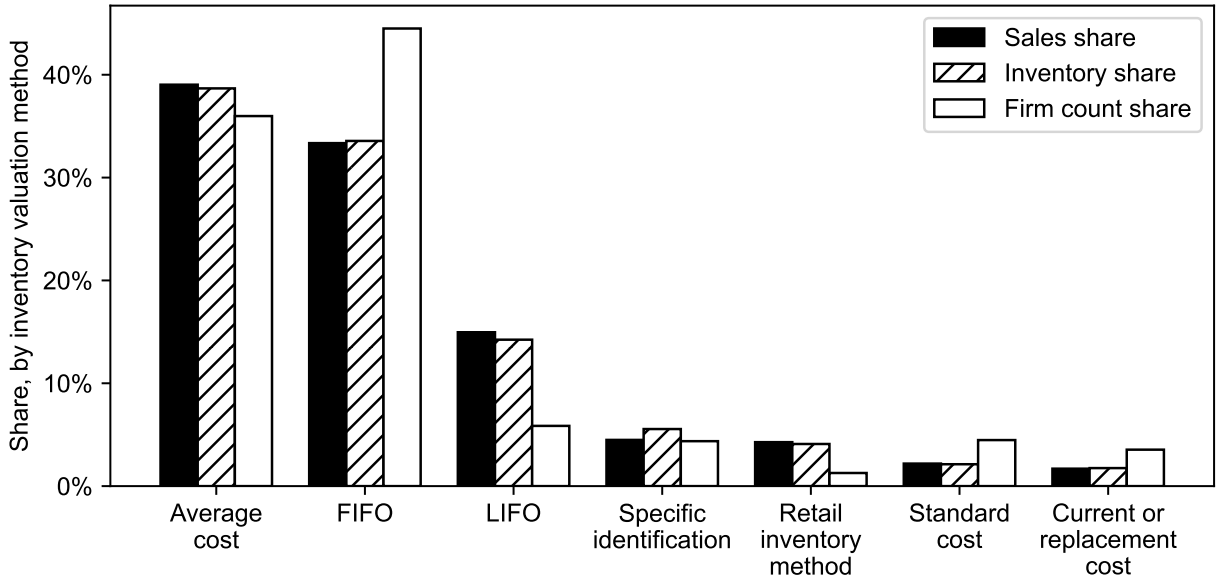
4.2 Price Dynamics Under Average Acquisition Cost Accounting

It turns out the average acquisition cost accounting yields especially tractable price dynamics because, unlike FIFO or LIFO, it does not require keeping track of inventory vintages. The law of motion for inventories is

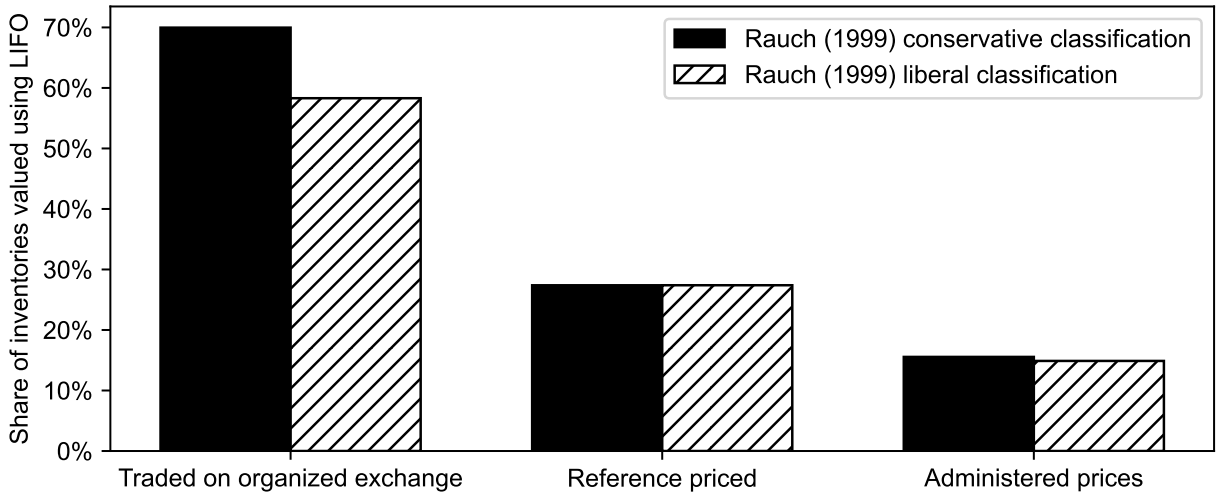
$$I_t = I_{t-1} - D_t + Y_t,$$

[18]The fact that LIFO pricing more closely approximates replacement cost pricing might make it puzzling why so few firms use LIFO, especially given that LIFO also confers a tax advantage when input costs trend upward. Part of the reason is institutional: LIFO is prohibited under International Financial Reporting Standards (see IAS 2 paragraph 25). A further reason is that LIFO can be administratively costly, requiring firms to classify inputs and determine when newly received shipments are sufficiently similar to existing inventory. Using variation in tax benefits from LIFO over time, Ling and Tinkelman (2024) estimate that the administrative and compliance costs of LIFO accounting average more than 0.35% of costs of goods sold for public firms.

Figure 6: Prevalence of inventory valuation methods.



(a) Inventory valuation methods for public firms, 2010–2025.



(b) Share of inventories in 2017 Economic Census valued using LIFO, by Rauch (1999) classification.

Note: The top panel shows the share of Compustat firms with each inventory valuation method (`INVVAL`) over the period 2010–2025. We exclude firms whose inventory valuation methods are recorded as "No inventory" (44.1% of observations), as "Not reported" (5.5% of observations), or are missing (<0.1% of observations). The bottom panel shows the fraction of inventories in the 2017 Economic Census priced using LIFO accounting, split by the most common Rauch (1999) categorization of products within the NAICS-6 industry code. The 2017 Economic Census covers inventory valuation methods for the mining (NAICS 21), manufacturing (NAICS 31–33), and wholesale trade (NAICS 42) sectors. We match Rauch (1999) categorizations to 258 NAICS-6 industries covering 41.6% percent of inventories in these sectors.

where I_t is the inventory stock at the end of period t, D_t is the number of units sold at t, and Y_t are purchases of new units of inventory at t.

Under AAC accounting, the accounting value of inventories at the end of period t is calculated as

$$h_t I_t = (I_{t-1} - D_t)\, h_{t-1} + Y_t c_t. \tag{8}$$

That is, the accounting cost per unit of inventory h_t is a weighted average of the prior period accounting cost h_{t-1} and the current replacement cost c_t. The weights are the shares of leftover inventory from the prior period and new purchases in the final inventory stock, respectively. We maintain the assumption of isoelastic demand from Section 3, so that under AAC pricing, the output price is $p_t = (\eta/(\eta-1))\, h_t$.

We log-linearize around a steady state where the cost of inventory is fixed at c^{ss}. We denote the steady-state ratio of per-period demand to inventories by $\delta = D^{ss}/I^{ss}$. We refer to δ as the *shipment-inventory ratio* to differentiate it from sales-inventory ratios reported by statistical agencies; the sales-inventory ratio measures the ratio of sales to the book value of inventory, so in steady state is instead $\delta\eta/(\eta-1)$. As in Section 3, we use $\hat{x}_t$ to denote the log-deviation of any variable x_t from its steady state value, $\log x_t - \log x^{ss}$.

Log-linearizing (8) and using $\hat{p}_t = \hat{h}_t$ shows that prices follow the recursive equation,

$$\hat{p}_t = (1-\delta)\hat{p}_{t-1} + \delta \hat{c}_t. \tag{9}$$

The weights on the current replacement cost $\hat{c}_t$ and the last-period price $\hat{p}_{t-1}$ depend on the rate at which inventory is depleted. When turnover is high, the selling price largely reflects the current replacement cost. When turnover is low, the average unit acquired spends a long time in inventory before being sold, and prices are more reflective of historical costs.

The recursive formulation in (9) is reminiscent of the law of motion for prices under the Calvo (1983) model of sticky prices. We formalize the relationship between the price dynamics under AAC pricing and Calvo in Proposition 5.

Proposition 5 (AAC pricing *vs.* Calvo)**.** *Given a path of costs $\{\hat{c}_t\}_{t=-\infty}^{\infty}$, the path of prices under AAC pricing and replacement cost pricing with Calvo frictions are*

$$\hat{p}_t^{AAC} = \delta \sum_{k=0}^{\infty} (1-\delta)^k\, \hat{c}_{t-k},$$

$$\hat{p}_t^{Calvo} = \theta \sum_{k=0}^{\infty} (1-\theta)^k\, \hat{c}_{t-k} + \underbrace{\theta\,[1-\beta\,(1-\theta)] \sum_{k=0}^{\infty}\sum_{s=0}^{\infty} \beta^s\,(1-\theta)^{k+s}\, \mathbb{E}_{t-k}\,[\hat{c}_{t+s-k} - \hat{c}_{t-k}]}_{\text{Due to forward-looking reset prices}},$$

where δ is the steady-state shipment-inventory ratio, θ is the fraction of firms able to reset their prices each period under Calvo, and β is the discount factor. The paths of prices under both models coincide if $\delta = \theta$ and either $\beta = 0$ or $\mathbb{E}_t[\hat{c}_{t+s}] = \hat{c}_t$ for all periods t and forecast horizons s.

Both AAC pricing and Calvo frictions lead to prices with geometrically decaying weights on historical prices, though the forces determining the speed of decay are different. Under Calvo frictions, the decay rate is determined by the share of firms θ that are unable to change their prices each period and are left with stale prices reflecting historical costs. Under AAC pricing, prices are flexible but depend on historical costs because the average unit spends $1/\delta$ periods in inventory before being sold.

Compared to AAC pricing, prices under Calvo frictions have an extra term that reflects how firms expect future replacement costs to differ from current costs. This forward-looking term drives a wedge between the Calvo and AAC price paths unless firms do not care about the future (i.e., $\beta = 0$) or firms' expectations of future costs are equal to current costs. The latter condition could obtain if costs follow a martingale or if behavioral firms exhibit what Minton and Wheaton (2022) term myopic expectations. Minton and Wheaton (2022) estimate that "complete myopia" is necessary to match the dynamics of pass-through for most commodities through the input-output network.

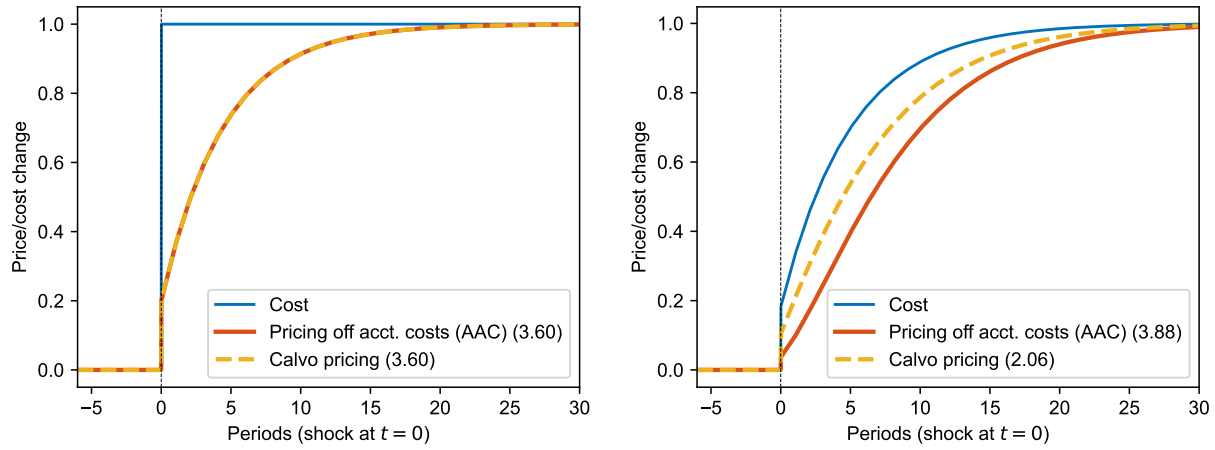
We use a few illustrative examples to highlight three ways in which AAC pricing leads to different predictions than Calvo frictions: (i) accounting cost pricing generates more sluggish pass-through of slow-moving shocks, (ii) it amplifies the degree to which supply chains slow down price responses, and (iii) compared to Calvo, accounting cost pricing generates greater responsiveness to transitory shocks.

Example 1 (Sluggish response to slow-moving shocks)**.** Calvo prices respond more quickly to a cost shock that unfolds over time, because firms increase their prices in anticipation of future cost changes, unlike firms with AAC pricing. To illustrate this, suppose there is an unanticipated shock to costs at time $t = 0$, with $\hat{c}_t = 1 - \rho^{t+1}$ for $t \geq 0$. The parameter ρ describes how slow-moving the shock is: when $\rho = 0$, costs jump to $\hat{c}_0 = 1$ immediately, while when $\rho > 0$ the cost shock gradually increases to one over time. Applying Proposition 5 yields the following price paths for $t \geq 0$,

$$\hat{p}_t^{\text{AAC}} = 1 - (1-\delta)^{t+1} - \delta\rho\left[\frac{(1-\delta)^{t+1} - \rho^{t+1}}{(1-\delta) - \rho}\right],$$
$$\hat{p}_t^{\text{Calvo}} = 1 - (1-\theta)^{t+1} - \theta\rho\left[\frac{(1-\theta)^{t+1} - \rho^{t+1}}{(1-\theta) - \rho}\right]\left[1 - \frac{(1-\rho)\beta(1-\theta)}{1-\rho\beta(1-\theta)}\right],$$

When $\delta = \theta$, $\hat{p}_t^{\text{Calvo}} \geq \hat{p}_t^{\text{AAC}}$ for all $t \geq 0$, with the inequality holding strictly when $\rho > 0$

Figure 7: Price response to immediate *vs.* slow-moving cost shocks.



(a) Immediate shock.

(b) Slow-moving shock.

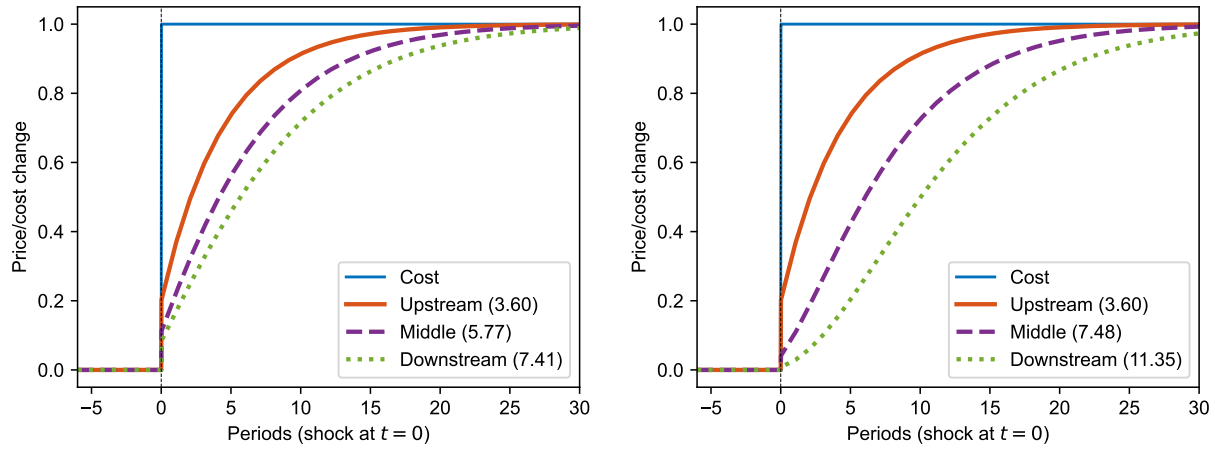
Note: The Calvo model uses $\beta = (0.96)^{1/12}$ and $\theta = 0.2$, and the pricing off accounting costs model uses weighted average acquisition costs with $\delta = 0.2$ (i.e., an inventory-shipments ratio of five). The left panel shows the response to an unanticipated, permanent cost shock ($\rho = 0$) while the right panel shows the response to a unanticipated, slow-moving shock ($\rho = e^{-0.2}$). The numbers in parentheses reflect the sluggish response of prices to costs, $\sum_{t=0}^{\infty}(c_t - p_t)$.

and $\beta > 0$. In words, firms raise their prices more quickly under Calvo frictions, because firms anticipate that future costs are higher than present costs.

Figure 7 plots these price responses. The left panel shows that the responses of prices under Calvo frictions and pricing off accounting costs coincide for an immediate, permanent shock. However, the coincidence fails when anticipated future costs differ from current costs, as in the case of the slow-moving shock shown in the right panel. In that case, prices respond more sluggishly when firms price off accounting costs as higher-priced inventory slowly makes its way through firms' inventory stocks. We calculate the cumulative gap between costs and prices over the path of the shock (embedded in a simple general equilibrium model, this gap would be proportional to cumulative impulse response of the cost shock on output). In the right panel of Figure 7, AAC pricing increases this statistic by over 80 percent relative to Calvo pricing.

Example 2 (Amplified delays in supply chains)**.** Both sticky prices and pricing off accounting costs translate immediate cost shocks into gradual price changes. In supply chains, this means that immediate cost shocks facing an upstream producer can turn into slow-moving cost shocks for their customers, and even slower-moving cost shocks for producers further downstream. Thus, supply chains can further amplify the differences between AAC and Calvo pricing.

Figure 8: Amplification of sluggish price response in supply chains.



(a) Calvo. **(b)** Pricing off accounting costs (AAC).

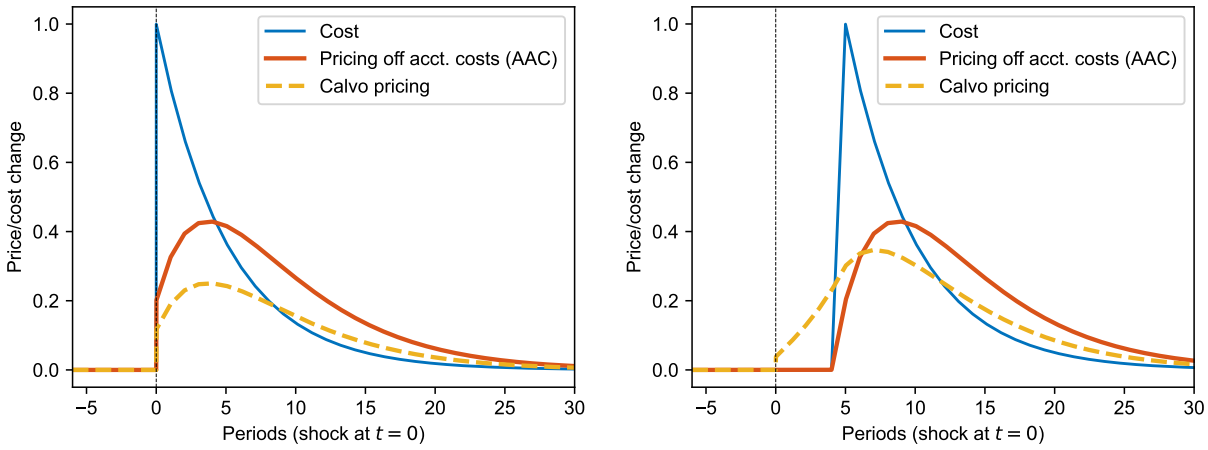
Note: The Calvo model uses $\beta = (0.96)^{1/12}$ and $\theta = 0.2$, and the pricing off accounting costs model uses weighted average acquisition costs with $\delta = 0.2$ (i.e., an inventory-shipments ratio of five). In both panels, the shock to upstream costs in unanticipated before $t = 0$. The numbers in parentheses reflect the sluggish response of prices to costs, $\sum_{t=0}^{\infty}(c_t - p_t)$.

Figure 8 shows the response of prices in a three-firm vertical supply chain to an immediate, permanent cost increase in the most upstream firm's costs. Whether firms price off accounting costs or with Calvo frictions, the first firm in the chain has the same response to the cost shock (assuming $\delta = \theta$). However, the slow-moving cost shock faced by the middle firm in the chain leads to a slower path of price increases when firms price off accounting costs. The same pattern repeats further downstream. The result is that, even though both supply chains face the same cost shock, the cumulative gap between the upstream cost and downstream prices over the path of the shock is more than 50 percent larger under accounting cost pricing.

Example 3 (Greater responsiveness to transitory shocks)**.** The two preceding examples show that prices respond more sluggishly to costs under accounting cost pricing than Calvo. This is because in both examples, current cost increases are correlated with higher future costs. If the opposite is true—for example, in the case of transitory shocks—then accounting cost pricing can instead generate *more* responsiveness than Calvo.

The left panel Figure 9 shows how prices respond to an unanticipated, transitory cost shock that arrives at $t = 0$. Prices under both Calvo frictions and AAC accounting costs rise on impact, but the response is stronger for AAC pricing, because the firms with Calvo frictions incorporate the fact that they expect costs to revert. In fact, in this example, the

Figure 9: Increased responsiveness to transitory shocks.



(a) Unanticipated cost increase at $t = 0$.

(b) News at $t = 0$ about cost increase at $t = 5$.

Note: The Calvo model uses $\beta = (0.96)^{1/12}$ and $\theta = 0.2$, and the pricing off accounting costs model uses weighted average acquisition costs with $\delta = 0.2$ (i.e., an inventory-shipments ratio of five). In the left panel, the path of costs is $\hat{c}_t = e^{-0.2t}$ for $t \geq 0$. In the right panel, the path of costs is $\hat{c}_t = e^{-0.2(t-5)}$ for $t \geq 5$.

price response under AAC pricing is always larger than the pricing response under Calvo, though the peak of both responses are incomplete relative to the size of the initial cost shock.

For an anticipated cost shock, such as the one shown in the right panel of Figure 9, the picture is more complicated. Firms with Calvo pricing are initially more responsive before the shock materializes, because they increase their prices in anticipation of the expected cost increase. But once the shock materializes, the prices under AAC pricing jump and ultimately reach a higher peak response. In fact, while price responses for unanticipated versus anticipated cost shocks differ under Calvo frictions, the price response under AAC pricing is the same whether or not firms anticipate the cost increase; they mechanically increase their price in accordance with the average cost of inventory. The latter accords with our findings of little effect of anticipated future costs on prices in Section 2.

4.3 Price Dynamics Under FIFO and LIFO

Unlike AAC pricing, both FIFO and LIFO require keeping track of which inventory was purchased when, since costs of goods sold are calculated by tallying up unit costs for items in the inventory stock that were either purchased first or most recently. However, if the firm always has enough inventory on hand to satisfy current demand (in steady state,

this corresponds to $\delta < 1$) and if $1/\delta$ is an integer, then

$$\hat{p}_t^{\text{FIFO}} = \hat{h}_t^{\text{FIFO}} = \hat{c}_{t-1/\delta}$$
$$\hat{p}_t^{\text{LIFO}} = \hat{h}_t^{\text{LIFO}} = \hat{c}_t.$$

That is, prices and accounting costs under FIFO depend on the replacement cost lagged by $1/\delta$ periods, and prices and accounting costs under LIFO are given by current replacement costs. In this respect, FIFO pricing introduces a lag exactly equal to the time that units spend in inventory before being sold, and LIFO pricing replicates the path of prices without nominal rigidities.

The fact that pricing under LIFO replicates replacement cost pricing is a byproduct of the assumption that the firm buys new inventory in each period. Okun (1981) notes that, in reality, "[firms] are not in the market for all their inputs at any time" (Okun, 1981, p. 156). One reduced-form way of modeling this idea is to consider an industry that consists of a set of producers, each of whom buy inputs once every $1/\delta$ periods and slowly exhaust those inputs over $1/\delta$ periods.[19] Since firms are only in the market for their inputs once every $1/\delta$ periods, the average price across producers in this "staggered" setting reflects historical costs from the last purchase date. Just as Proposition 5 drew a parallel between AAC pricing and Calvo frictions, Proposition 6 shows a connection between price paths under LIFO pricing with intermittent purchases and Taylor (1980) pricing frictions.

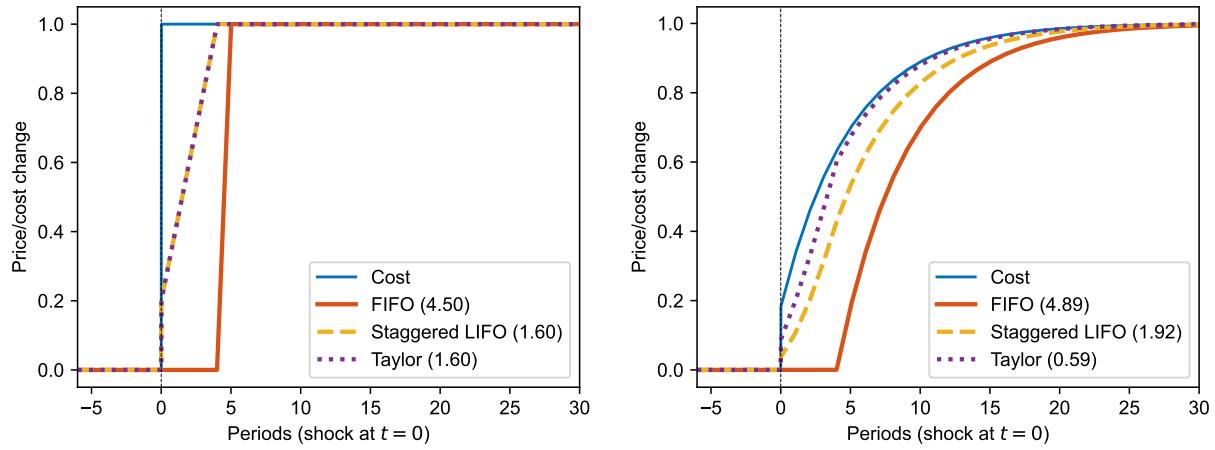
Proposition 6 (LIFO pricing with intermittent purchases *vs.* Taylor)**.** *Given a path of costs* $\{\hat{c}_t\}_{t=-\infty}^{\infty}$*, the path of average prices under LIFO pricing when producers buy inputs every* $1/\delta$ *periods and under replacement cost pricing with Taylor frictions are*

$$\hat{p}_t^{\textit{Staggered LIFO}} = \delta \sum_{k=0}^{1/\delta-1} \hat{c}_{t-k},$$
$$\hat{p}_t^{\textit{Taylor}} = \frac{1}{N}\sum_{k=0}^{N-1} \hat{c}_{t-k} + \underbrace{\frac{1}{N}\frac{1-\beta}{1-\beta^N}\sum_{k=0}^{N-1}\sum_{s=0}^{N-1}\beta^k \mathbb{E}_{t-k}\left[\hat{c}_{t+s-k} - \hat{c}_{t-k}\right]}_{\textit{Due to forward-looking reset prices}},$$

where firms under Taylor pricing reset prices every N *periods and* β *is the discount factor. The paths of prices under both models coincide if* $\delta = 1/N$ *and either* $\beta = 0$ *or* $\mathbb{E}_t[\hat{c}_{t+s}] = \hat{c}_t$ *for all periods* t *and forecast horizons* s*.*

[19] Our use of δ here is a slight abuse of notation, since the average ratio of inventory stock to shipped units in this setting is instead $\delta/2$.

Figure 10: Response to immediate *vs.* slow-moving cost shocks: FIFO, LIFO, and Taylor.



(a) Immediate shock.

(b) Slow-moving shock.

Note: The Taylor model uses $\beta = (0.96)^{1/12}$ and $N = 5$, and all models with pricing off accounting costs use $\delta = 0.2$. The cost shock sequences are the same as Figure 7. In both panels, the cost shock is unanticipated before $t = 0$. The numbers in parentheses reflect the sluggish response of prices to costs, $\sum_{t=0}^{\infty}(c_t - p_t)$.

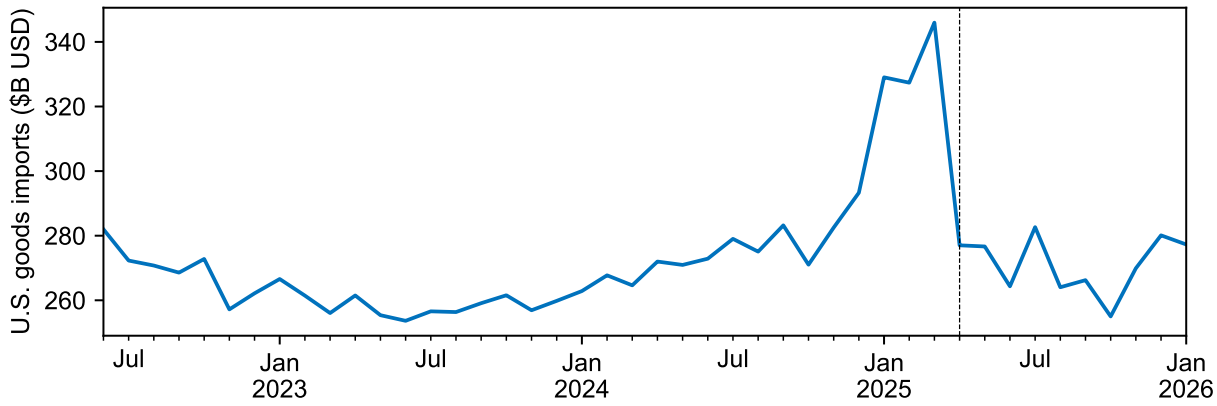
Figure 10 illustrates Proposition 6 in a quantitative example. For an immediate, permanent shock, the paths of average prices under LIFO with intermittent purchases and Taylor pricing coincide, because current costs exactly equal future costs. This is not true when the cost shock unfolds slowly over time: in that case, Taylor frictions predict a faster response of prices, because firms' reset prices incorporate the anticipated higher future costs. Compared to these models, price adjustment is always more delayed under FIFO—the price path lags the cost shock by $1/\delta$ periods—and prices under LIFO pricing with continuous purchases (not shown) coincide with the path of replacement costs.

4.4 Effect of Forward-Looking Purchases on Prices

While accounting cost pricing limits the response of price to future costs, firms can still respond to anticipated cost changes in other ways. They may do so by stocking up on inventory when costs are expected to rise (often referred to as "forward buying") or slowing purchases when costs are expected to fall. Figure 11 shows a sharp increase in imports of goods prior to announcement of tariffs in April 2025, and news coverage of trade around changing tariff rates in 2025–2026 suggests that firms engaged in substantial forward buying when they expected tariffs to increase.[20]

[20]For example, PIIE notes a sharp increase in U.S. imports from many trading partners in early 2025, which they attribute to anticipatory purchases (`https://www.piie.com/blogs/realtime-economics/`

Figure 11: Forward buying of imported goods in the run-up to tariffs.



Note: Monthly imports of all goods from the Bureau of Economic Analysis IDS-0182 trade in goods estimates. The dotted vertical line marks the "Liberation Day" tariff announcements in April 2025.

Interestingly, the AAC pricing equation in (9) shows that firm decisions to stock up on inventories or adjust purchase decisions do not affect prices to a first-order approximation. But a second-order approximation of the average acquisition cost yields,

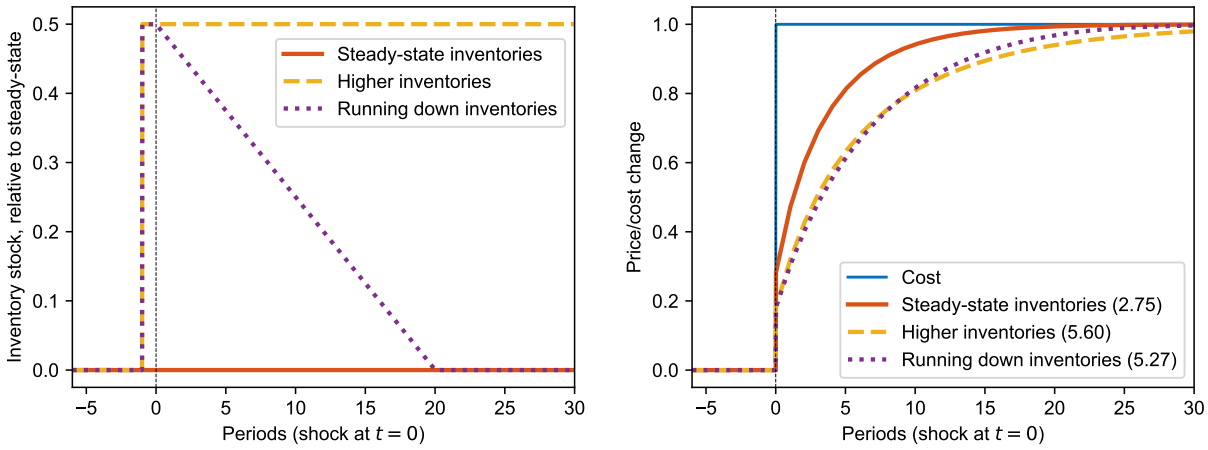
$$\hat{h}_t = \underbrace{(1-\delta)\,\hat{h}_{t-1} + \delta\hat{c}_t}_{\text{As in eq. (9)}} + \underbrace{\frac{1}{2}\delta\,(1-\delta)\left(\hat{c}_t - \hat{h}_{t-1}\right)^2}_{\text{Second-order correction}} + \underbrace{\delta\left(\hat{c}_t - \hat{h}_{t-1}\right)\left(\hat{Y}_t - \hat{I}_t\right)}_{\text{Effect of inventories / purchases}}. \tag{10}$$

The final term reflects the effect of inventories and purchases on accounting costs and thus on prices. If a firm stocks up on inventories when acquisition costs are low, then the combination of $\hat{I}_t > 0$ and $\hat{h}_{t-1} < \hat{c}_t$ depresses the current accounting cost $\hat{h}_t$ and thus the firm's price. (Reducing purchases $\hat{Y}_t < 0$ and depleting existing inventories has a similar effect.) This is precisely the mechanism that many of the quotes in Table 1 and Appendix Table A1 suggest played out during the onset of the tariffs in 2025.

We illustrate the effects of forward buying on the timing of price changes using this second-order approximation in Figure 12. In the figure, costs increase permanently starting at $t = 0$. We consider three scenarios for how inventories evolve in response to the shock. The first scenario assumes inventories remain fixed at the steady-state level. The second scenario assumes the firm stocks up on inventory at $t = -1$, increasing its inventory stock by 50 percent, and keeps the inventory stock permanently higher after the shock.

2025/despite-tariffs-us-merchandise-imports-increased-and-exports-held). In the aftermath of the Supreme Court's ruling on the illegal tariffs, The Wall Street Journal likewise reported, "The Race to Seize on Lower Tariffs Has Businesses Rushing In Shipments" (https://www.wsj.com/economy/trade/tariffs-are-lower-and-businesses-are-racing-to-take-advantage-977bd276).

Figure 12: Forward buying of inventories delays pass-through of cost increases.



(a) Inventory paths.

(b) Pricing off accounting costs (AAC).

Note: The pricing off accounting costs model uses average acquisition costs with $\delta = 0.2$ (i.e., an inventory-shipments ratio of five). The left panel shows three paths for inventories relative to steady-state. The law of motion for purchases is $\hat{Y}_t = (1/\delta)(\hat{I}_t - \hat{I}_{t-1}) + \hat{D}_t$, and we assume that $\hat{D}_t = 0$ for all periods so that the inventory paths come from changes in purchases relative to steady state. The right panel shows the resulting path of prices. The numbers in parentheses reflect the sluggish response of prices to costs, $\sum_{t=0}^{\infty}(c_t - p_t)$.

The third scenario again assumes that the firm stocks up on inventory at $t = -1$, but that it gradually runs down the inventory by cutting back on purchases until the inventory stock returns to its steady-state level. We model each of these scenarios, shown graphically in the left panel of Figure 12, by assuming a path of purchases $\hat{Y}_t$ that yields the desired path of inventories.

The right panel of Figure 12 shows that forward buying substantially delays the pass-through of the cost shock to prices. In the scenario where the firm permanently increases its inventory stock, the delayed pass-through occurs because the firm holds more inventory purchased at pre-shock prices, and thus the weighted average acquisition cost converges more slowly to the new cost. In the scenario where the firm builds up and then gradually runs down its inventory stock, the average acquisition cost of inventory is slower to rise because the firm reduces purchases of new inventory immediately after the shock. Despite the different mechanisms, in both scenarios with forward buying, the cumulative gap between costs and prices over the path of the shock is about twice as large as the gap under the first scenario when the inventory stock is held fixed.

This results highlights a contrast between pricing off accounting costs and sticky prices. In models with sticky prices, sluggish pass-through of anticipated cost increases requires firms to be myopic: firms that are forward-looking will set prices that incorporate expected

future cost increases, speeding up pass-through. Under pricing off accounting costs, the opposite is true (at least for cost increases). Forward-looking firms that expect costs to rise stock up on inventory, and this forward buying delays rather than accelerates pass-through. In other words, forward-looking behavior reinforces delayed price adjustment rather than erasing it.

Thus, we contend that matching the sluggish response of prices to cost increases need not require the type of rationally inattentive firm described by Gordon (1990): "Because the informational problem of trying to anticipate the effect of [a shock on costs] is difficult to formulate and probably impossible to solve, [...] the sensible firm just waits by the mailbox for news of cost increases and then, Okun-like, passes them on as price increases" (Gordon, 1990, p. 1150–1151). In our framework, the sensible firm instead acts upon available information about expected future cost changes, but only raises its price gradually as that inventory is exhausted and replaced at higher cost.

5 Quantitative Analysis

Delays in price adjustment, regardless of whether they are due to price rigidities or accounting cost pricing, accumulate as intermediate goods move downstream toward the consumer. By modeling the full network structure of the economy, we accurately account for this supply-chain amplification.

This section explores the effects of accounting cost pricing in a calibrated, input–output model of the U.S. economy. We extend our results on price dynamics from the previous section to a model with general input–output linkages and calibrate the model using a detailed information on the inventory turnover rates of disaggregated industries. We compare delays in the pass-through of commodity cost shocks to consumer price inflation in the model with accounting cost pricing to a model with sticky prices.

5.1 Shock Propagation in a Network

Following Baqaee and Farhi (2020) and Rubbo (2023), we consider an economy consisting of N industries and a single factor (value-added). A continuum of identical firms in each industry produce varieties of an industry output by combining value-added with intermediate inputs from other industries in a constant returns, neoclassical production function. Each industry's output is a CES aggregate over individual firm varieties. Household consumption is a CES bundle of industry goods. We treat the price of value added as exogenous and log-linearize the model around a zero inflation, perfect foresight steady

state. We denote the steady-state input–output matrix by Ω, where Ω_{ij} is industry i's expenditures on inputs from industry j as a share of total expenditures.

To characterize how cost shocks propagate through this economy, we define a pricing rule, $\mathcal{P}_i : \{\hat{mc}_{it+\tau}\}_{\tau=-\infty}^{\infty} \mapsto \hat{p}_{it}$, as a map from the path of an industry's marginal costs to prices (both log-linearized around their steady state levels). For example, with flexible and competitive pricing, the pricing rule is simply $\hat{p}_{it} = \hat{mc}_{it}$. Each industry's marginal costs in turn depend on the prices of their suppliers. So, we can define an equilibrium as a path of prices that solves the fixed point,

$$\hat{p}_{it} = \mathcal{P}_i\left(\{\hat{mc}_i\left(\hat{\boldsymbol{p}}_{t+\tau}\right)\}_{\tau=-\infty}^{\infty}\right), \qquad \text{for all } i \text{ and } t,$$

where $\hat{\boldsymbol{p}}_t = (\hat{p}_{1t}, ..., \hat{p}_{Nt})$ is the vector of all industry prices at time t and $\hat{mc}_i(\cdot)$ is industry i's marginal cost as a function of contemporaneous industry prices.

Proposition 7 provides equilibrium conditions in the network economy under each pricing rule. These equilibrium conditions also provide a natural way to solve for the path of prices in a calibrated model.

Proposition 7 (Network price dynamics)**.** *Let $\{\hat{\boldsymbol{c}}_t\}_{t=0}^{\infty}$ be a path of exogenous cost shocks, where $\hat{\boldsymbol{c}}_t = (\hat{c}_{1t}, \ldots, \hat{c}_{Nt})$ is the vector of cost shocks to each industry at time t. The following characterize the dynamics of industry prices $\hat{\boldsymbol{p}}_t = (\hat{p}_{1t}, \ldots, \hat{p}_{Nt})$ under different pricing rules.*

1. ***Average acquisition cost (AAC) pricing:*** *Industry prices follow*

$$\hat{\boldsymbol{p}}_t = (I - \Delta\Omega)^{-1}\left[(I - \Delta)\hat{\boldsymbol{p}}_{t-1} + \Delta\hat{\boldsymbol{c}}_t\right],$$

   where $\Delta = \operatorname{diag}(\delta_1, \ldots, \delta_N)$ is a diagonal matrix of industry shipment-inventory ratios.

2. ***FIFO pricing:*** *The price of each industry i follows*

$$\hat{p}_{it} = \sum_j \Omega_{ij}\hat{p}_{j,t-d_i} + \hat{c}_{i,t-d_i},$$

   where $d_i = \lceil \delta_i^{-1} \rceil$ is the inventory turnover time for industry i.

3. ***Calvo pricing:*** *Industry prices follow the second-order difference equation,*

$$\hat{\boldsymbol{p}}_t = \left(I - K\Omega + \beta\left(I - \Theta\right)^2\right)^{-1}\left[\left(I - \Theta\right)\hat{\boldsymbol{p}}_{t-1} + \beta\left(I - \Theta\right)\hat{\boldsymbol{p}}_{t+1} + K\hat{\boldsymbol{c}}_t\right],$$

   where β is the discount factor, $\Theta = \operatorname{diag}(\theta_1, \ldots, \theta_N)$ is a diagonal matrix of industry Calvo adjustment probabilities, and $K = \Theta(I - \beta(I - \Theta))$.

Given the same path of cost shocks $\{\hat{\mathbf{c}}_t\}_{t=0}^{\infty}$, the paths of prices for each industry under AAC pricing and Calvo frictions coincide if $\delta_i = \theta_i$ for all i and $\beta = 0$.

Under AAC pricing, the matrix $(I - \Delta\Omega)^{-1}$ acts as a modified Leontief multiplier: it captures how cost increases propagate through the input-output network, dampened by the fact that downstream firms gradually fold new input prices into their average costs. Under FIFO pricing, a cost shock to an upstream sector cascades downstream at a speed determined by the cumulative inventory holding periods along the supply chain. The longer the chain of production, the longer the aggregate price level takes to absorb the shock. Assuming that firms set prices at the beginning of the period and keep them fixed within the period, the FIFO inventory delays are given by $d_i = \lceil \delta_i^{-1} \rceil$. Finally, under Calvo frictions, because reset prices today depend on expectations of prices tomorrow, the equilibrium condition is on the entire path of prices.

From Proposition 7, it is easy to see that when $\beta = 0$ and $\Delta = \Theta$, the AAC and Calvo price paths coincide. When $\beta = 0$, the relative speeds of pass-through under AAC and Calvo pricing therefore depend on a comparison of Δ and Θ. If inventory delays are smaller than the average length of price spells, then prices adjust faster under AAC pricing, and vice versa. Relative to AAC pricing, FIFO pricing with delays $d_i = \lceil \delta_i^{-1} \rceil$ tends to result in slower price adjustment (though not always). Under AAC, prices react immediately but incompletely to cost shocks, since cost shocks affect the blended average cost of inventories; under FIFO, prices only adjust once the full inventory delay period has passed.

5.2 Calibration

Table 4 describes the data sources that we use to calibrate the model to the U.S. economy. Several of these choices—the use of the Bureau of Economic Analysis (BEA) detail input–output table, the use of industry-level frequencies of price adjustment from Pasten et al. (2020) to discipline Calvo frictions, and the discount factor—are fairly standard (see e.g., Rubbo 2023). We focus below on the unique parameters needed to discipline the models with accounting cost pricing.

Shipment-inventory ratios. We construct average shipment-inventory ratios at the most disaggregated level (up to 6-digit NAICS code) available. We pool multiple data sources to this end. In the retail and wholesale sectors, we use the Census' Monthly Retail Trade and Monthly Wholesale Trade surveys, which report monthly estimates of inventory-sales ratios for each disaggregated industry. We take the 2017 average for each industry, and use

Table 4: Data sources for calibration.

Parameter	Description	Source
Ω	Input–output matrix	BEA 2017 405-industry input-output table
β	Discount factor	$(0.96)^{1/12}$
δ_i	Shipment-inventory ratios	Several sources (see Section 5.2)
d_i	Inventory turnover time	$\lceil \delta_i^{-1} \rceil$
θ_i	Industry Calvo frictions	Pasten et al. (2020)
-	Industry pricing type	Rauch (1999) (see Appendix Table A4)

BEA information on gross margins to adjust the inventory-sales into shipment-inventory ratios. For the manufacturing and mining sectors, we use data on inventory values and shipments for NAICS-6 industries from the 2017 Economic Census. Following Liu and Tsyvinski (2024), we use the Census' Manufacturers' Shipments, Inventories & Orders (M3) survey to add unfulfilled order delays to the inventory delays in manufacturing sectors.[21] These data is not available for the farm, utilities, and construction sectors, so we use sector-level inventory and sales totals from the BEA national income and product accounts (NIPA), assume gross margins are zero, and assume identical shipment-inventory ratios across industries within the sector. We assume the remaining industries (such as services and transportation) hold no inventory. In cases where we use aggregate inventory values, we distribute the total inventory value across industries proportionally to sales to produce constant inventory-to-sales ratios. For any remaining industries (such as services and transportation), we assume they hold no inventory. Appendix Table A4 reports inventory-shipment ratios for all industries.

Categorizing commodity industries. The model in Section 3 predicts that pricing off accounting costs is less prevalent in industries with homogeneous outputs and inputs. To categorize industries, we use Rauch's (1999) commodity categorization. For each SITC-4 product, Rauch (1999) identifies whether the product is sold on an organized exchange, uses reference prices, or has administered prices. We assign each NAICS-6 industry a classification using the modal categorization of SITC-4 in the industry using a crosswalk provided by the NBER, and then map the NAICS-6 industries to BEA industry codes. Appendix Table A4 reports the final classification.

[21] Antràs and Tubdenov (2025) provide an alternative source of inventory to sales ratios in manufacturing. Our measure tend to generate slightly longer lags because they also account for order backlogs.

Correcting for margin industries. The BEA treats industries in wholesale and retail trade as margin industries. This means that the BEA input–output table reflects only inputs used to provide value-added services by the wholesale and retail trade sectors and does not record merchandise sold through wholesale and retail trade as inputs to those industries (sales through the wholesale and retail trade sector are logged directly as sales to the purchasing industry). In the margin industry approach used by the BEA, when a consumer purchases a product, they simultaneously purchase the good from its corresponding manufacturing industry, and a margin service from the trade sectors.

In our framework, the fact that industry goods spend time sitting in the inventories of wholesale distributors or retailers before being delivered to customers can contribute to delays in pass-through. We thus reroute the input–output network to treat industries in wholesale and retail trade like other productive industries. In our corrected input–output table, the trade sector purchases goods from the manufacturer, adds its margin, then resells to consumers at a new price, allowing trade inventories to affect pass-through. We put the accounting cost pricing and sticky pricing models on equal footing by making this correction for all models.

A challenge is that the BEA does not record which goods are sold in which retail/wholesale industry: the BEA's margin tables instead provide provides aggregate retail and wholesale margins on each industry's shipments. We hand-construct a mapping to route products of each productive industry to the appropriate detailed trade sectors. We assume that all purchases of any given industry's goods go through the same wholesale and retail channels, regardless of the purchaser.

5.3 Delayed Pass-Through: Accounting Cost Pricing *vs.* Sticky Prices

We use the calibrated model to explore how delays in the pass-through of commodity shocks to the consumer price index compare under accounting cost pricing (and no other price rigidities) and under sticky prices. In the models with accounting cost pricing, delays in pass-through arise because of production and inventory lags, combined with firms' desires to synchronize price changes with changes in accounting costs, while in the sticky-price models, pass-through is delayed by rigidities.

We simulate an immediate, permanent cost shock to a single industry, and let the prices of downstream goods adjust. We then evaluate how the consumer price index reacts to the shock under different pricing models. Figure 13 plots the results of this exercise when we shock the oil and gas extraction and grain farming industries. Low inventories in oil and gas generate rapid pass-through to consumer prices in the accounting cost pricing

model, while pass-through is substantially slower in the Calvo model. By contrast, large inventories between the grain farming industry and consumers significantly delay pass-through. The AAC model and Calvo models produce remarkably similar price paths, and FIFO pricing slows down pass-through even further. Because grain passes through multiple production stages before reaching the consumer, the strict delays implied by FIFO compound additively down the supply chain, whereas the rolling averages in the AAC model allow a fraction of the cost increases to cascade downstream immediately.

To summarize these delays in pass-through, we calculate the cumulative gap between the cost shock and the change in the consumer price index, normalized to the long-run pass-through of the cost shock to price index. That is, our statistic is $\sum_{t=0}^{\infty}(\hat{p}_{it} - \hat{p}_{\text{CPI},t}/\hat{p}_{\text{CPI},\infty})$, where $\hat{p}_{it}$ is the price of the shocked industry i and $\hat{p}_{\text{CPI},t}$ is the price of the personal consumption expenditures basket, both measured as log-deviations from steady state. Because the consumer price index is more or less exposed to different sectors, this statistic allows us to compare the delays in the pass-through of different industry shocks to the consumer price index on similar terms.[22] Figure 13 reports that the "cumulative pass-through delay" of oil shocks to the consumer price index is much higher for Calvo frictions than either form of accounting cost pricing, while it is higher for both AAC and FIFO pricing than Calvo frictions for shocks to grain farming.

We extend this analysis to other commodity sectors in Table 5. We select commodity industries as those that price on organized exchanges or use reference prices. For the ten industries with the largest long-run pass-through to the consumer price index, Table 5 reports the cumulative pass-through delay to the consumer price index in our model. The extent to which inventory frictions generate delays relative to the Calvo model varies greatly across shock scenarios, stressing the importance of physical supply chain characteristics in generating sluggish pass-through.

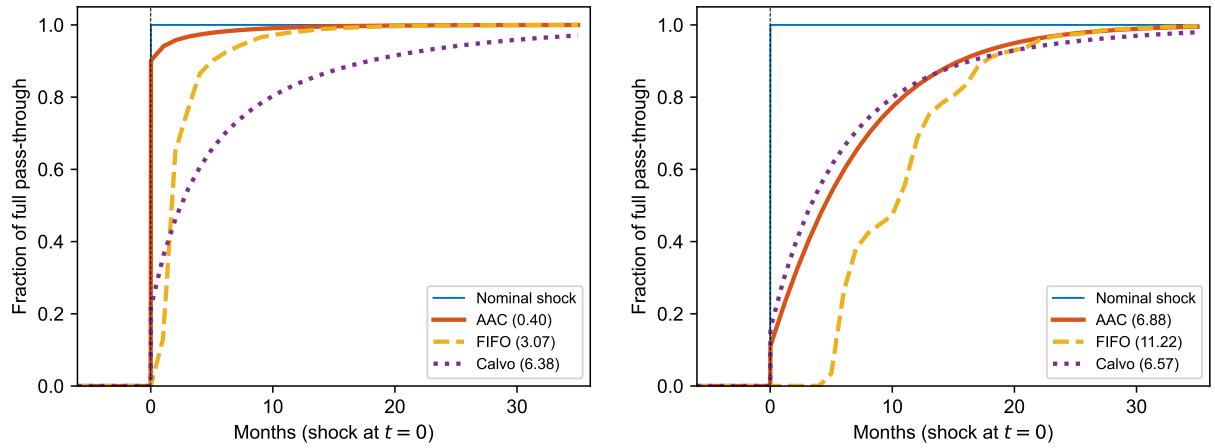
6 Conclusion

Descriptions of pricing, both academic and in popular press, frequently invoke the idea that production lags and inventories delay the pass-through of cost changes to downstream prices. Take, for example, coverage of coffee bean prices in 2025–2026:

> "[...I]ndustry experts estimate it takes at least nine months for raw bean prices to filter through to coffee drinkers, partly due to roasting times and price nego-

[22] One interpretation of this measure is as the mean lag of the adjustment in the consumer price index, since it represents the exact number of months the economy would have to exhibit zero pass-through before jumping instantly to the full long-run response.

Figure 13: Response of consumer price index to industry-level cost shocks.



(a) Oil and gas extraction.

(b) Grain farming.

Note: The left panel plots the response of the consumer price index to a immediate, permanent shock the oil and gas extraction industry (`211000`), and the right panel to the grain farming industry (`1111B0`). In both plots, the response of the consumer price index is normalized relative to the long-run response. The numbers in parentheses are the cumulative pass-through delay, $\sum_{t=0}^{\infty}(\hat{p}_{it} - \hat{p}_{\text{CPI},t}/\hat{p}_{\text{CPI},\infty})$.

Table 5: Delays in adjustment of consumer price index to industry cost shock.

Code	Industry description	Long-run pass-through (%)	Cumulative delay AAC	FIFO	Calvo
221100	Electric power generation, transmission, and distribution	2.53	0.18	1.59	5.64
211000	Oil and gas extraction	1.52	0.40	3.07	6.38
1121A0	Beef cattle ranching & farming, incl. feedlots, dual-purpose ranching & farming	0.89	7.04	11.49	5.75
1111B0	Grain farming	0.78	6.88	11.22	6.57
325190	Other basic organic chemical manufacturing	0.70	0.95	4.07	11.74
311615	Poultry processing	0.64	0.06	1.47	5.48
562000	Waste management and remediation services	0.61	0.18	0.53	18.11
312200	Tobacco manufacturing	0.59	0.21	2.27	8.02
112300	Poultry and egg production	0.47	4.93	7.80	4.83
322210	Paperboard container manufacturing	0.45	0.49	3.19	10.80

Note: The table includes ten industries categorized as organized exchange or reference-priced industries, according to Rauch's (1999) liberal classification. The column "long-run pass-through" reports the long-run elasticity of the consumer price index to the industry's prices. The AAC, FIFO, and Calvo columns report the cumulative pass-through delay, $\sum_{t=0}^{\infty}(\hat{p}_{it} - \hat{p}_{\text{CPI},t}/\hat{p}_{\text{CPI},\infty})$.

> tiations, meaning it could be well into next year before prices retreat. [....] Most industry experts expect a coffee production surplus in the current and upcoming 2025/26 and 2026/27 October to September seasons which should, alongside the tariff removal, soften raw bean prices and eventually feed through to U.S. consumers. But this will take time, analysts say, because U.S. roasters typically hold about two to three months' worth of bean stocks on average and need another two to three months to roast and package their products."[23]

Or Okun (1981) on the timing of price changes:

> The timing patterns observed among wholesale prices according to the stage of fabrication and from wholesale prices to consumer prices confirm the historical elements in costing. Those lags emerge because fabricators and retailers are relying on actual, recent prices of inputs in determining their selling prices. It is reasonably predictable that today's changes in cattle prices will show up on the supermarket counter only after a lag; the butcher does not keep changing price tags in pace with changes in some putative replacement cost.

Motivated by this evidence, we propose a theory of *accounting cost pricing*. In a simple principal–agent model, we argue that these behaviors can arise because of a need to monitor manager decisions. While the incentives used by the principal can limit value-eroding managerial discretion, it also distorts manager pricing decisions to incorporate information about historical input costs and fixed costs that are irrelevant to the optimal price and ignore valuable information about current replacement costs and demand conditions that are germane. Moreover, our model disciplines why we tend to see accounting cost pricing for some firms—like coffee roasters and butchers—but not others, like petroleum refineries and retail gas stations.

Accounting cost pricing can predict similar price dynamics to sticky-price models—though the parameters that discipline delayed adjustment under accounting cost pricing have to do with the lag between when inputs or inventories are purchased and when they are shipped out to consumers, rather than the length of price spells. But the mechanical dependence of prices on historical accounting costs also predicts some key differences in how firms' prices respond to slow-moving persistent and transitory shocks, and how much supply chains can exacerbate delays in price adjustment. In the context of the 2025–2026 tariffs, accounting cost pricing combined with forward buying of inventories can

[23] https://www.reuters.com/world/americas/us-coffee-drinkers-face-higher-prices-even-after-trumps-tariff-reset-2025-12-19/

describe why the pass-through of shocks to prices was slow, even when firms anticipated tariffs well in advance.

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Online Appendix to *Pricing Off Accounting Costs*

(Not for publication)

A Additional Tables and Figures **A2**

A Additional Tables and Figures

Table A1: Inventories and prices: Examples from earnings calls.

District	Date	Quote
Wayfair	Oct 31, 2019	As suppliers communicate pricing decisions to us, our pricing algorithms seek to maintain a balance between factoring in our higher wholesale costs and keeping us market priced. In practice, this [...] means that for a short period of time, inventory-carrying retailers may have a slight cost advantage. This should dissipate over the next couple of quarters as the market rebalances, pre-tariff inventory is depleted and all retailers incur higher wholesale costs reflective of tariffs.
Boeing	Apr 23, 2025	So we have the opportunity for those duties that we pay, those tariffs that we pay, to recover that when we deliver the aircraft. Now, you know, it creates a little bit of a cash flow timing issue that we'll have to work through.
Global Industrial	July 29, 2025	We anticipate implementing additional pricing actions as inventory affected by tariffs moves through our cost of sales. [....] Management of our margin profile remains a key area of focus as we move through the current cycle we have started to see the timing benefit of pre tariff inventory decline. [...O]ur goal is to manage price cost neutral.
Floor and Decor	July 31, 2025	And looking across spectrum of publicly traded, you know, flooring companies and people that sell our category, we feel like we're doing better and we feel like we are taking share. I do think that the independent channels have taken price earlier, quicker because they had to and we're able because the way we turned this is when the benefit of slow turning inventory is beneficial. We were able to hold off and take less price increase.
Oil States International	Oct 31, 2025	Now it is also our belief that everybody has the same supply sources which are generally foreign. We're all experiencing the same thing. But there's also been a build up of inventory as activity is slowed. So I think the industry has to work through the pre-tariff inventory. But then it is my view if the tariffs hold they're going to have to be passed on to customers. It's one of timing.

Newell Brands	Aug 1, 2025	We have identified 10 other categories where we have a relative sourcing advantage versus competition based on country of origin and or where we have existing tariff-free inventory available for incremental promotions. Collectively, we have successfully secured tariff-related relative sourcing advantage or tariff-free inventory wins with over 30 customers across nearly every domestic channel where we go to market. [....] Broadly what we're seeing is that in most categories where everybody is affected by tariffs, pricing is moving up, but it's not moving up at the same on the same timing. We're not seeing generally speaking more aggressive promoted prices. But what we are seeing is in some cases competitors are delaying the date of the price increase because they still have inventory onshore that hasn't been subject to the tariffs. We expect this situation on pricing from a competitive standpoint to really get a lot clearer over the next three to six months as the pre-tariff inventory sort of runs out and the price increases become more visible at retail.
Whirlpool	Oct 28, 2025	So we know there's quite a bit of an inventory overhang. Inventory which was at pre tariff cost. That's an important one. Of course by definition as you go through Q3 and Q4 with the anticipation that import volumes come down, that excess inventory at one point will quote unquote flush through the system, we would expect that to be happening kind of towards the end of Q4. [...] I would expect in 26 to see industry behavior which is more reflective of normal shipment patterns and particularly more important the underlying cost base.
Light & Wonder	Nov 5, 2025	The reality is we've worked through the majority of the pre-tariff inventory at this point and so we will now start to see impacts to that mid to low, sorry, mid to high single digit millions as we go forward. That's something that we and the team are going to continue to look at through the margin enhancement initiatives to see what we can mitigate.
Academy Sports and Outdoors	Dec 9, 2025	The goal was when we first learned these accelerated tariffs is we were looking at it saying, okay, there's a lot of inventory on this side of the water at those pre-accelerated tariff prices. If we can pull those into our warehouses and DCs, that should allow us to be priced at last year's level on a lot of these items going into holiday.

John Deere	Feb 19, 2026	You know, we've seen, you know, competition, you know, as of late, last quarter or two, you know, take some price increase, signal some price increase. The timing of that, we're keeping an eye on, you know, our, many of our competitors still have a lot of inventory in the, in the field. So as those price increases for 2026 start to manifest themselves in transaction price, you know, there's a bit of a lag there that, that, that creates some pressure.

Table A2: Descriptive statistics about firm respondents in Schoenle (2026) survey.

Q: Which best describes your role?		
Answer	Count	Share
Owner / co-owner	106	0.26
General manager	83	0.21
Supervisor	69	0.17
Store manager	46	0.12
Pricing manager / revenue manager	36	0.09
Other	60	0.15
Q: Are you personally involved in deciding the posted price(s) for your main product(s) or service(s)?		
Yes, I decide the prices	260	0.65
Yes, I implement prices decided by others – but have some leeway such as timing or size of changes	140	0.35
Q: What is your main product or service category?		
Professional services (e.g., repair, cleaning)	104	0.26
Grocery / food retail	67	0.17
Personal services (e.g., barbershop, salon, spa)	46	0.12
Building materials / hardware	41	0.10
Restaurants / prepared food	35	0.09
Retail gasoline / fuel	20	0.05
Other	87	0.22
Q: How many locations does your business operate?		
1	170	0.42
2–5	127	0.32
6–20	65	0.16
21+	38	0.10

Table A3: Effect of airlines' fuel costs on planned and realized quantities.

	Log Seats$_{irt}$		*Log Load Factor*$_{irt}$	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Log Fuel Cost$_{it}$	−0.435***	0.515***	−0.023**	−0.115*
	(0.104)	(0.125)	(0.011)	(0.064)
Route × Carrier (*ir*) FEs	Yes	Yes	Yes	Yes
Route × Month (*rt*) FEs	Yes	Yes	Yes	Yes
N (millions)	2.99	2.91	2.92	2.84
R^2	0.93	0.93	0.89	0.89

Note: Columns 2 and 4 use carrier fixed effects interacted with the log change in the spot fuel price over the past year as an instrument for Log Fuel Cost$_{it}$ − Log Spot Fuel Price$_t$. A route is defined as an origin–destination pair and an indicator for whether a ticket is roundtrip. Standard errors two-way clustered by carrier and route. * indicates significance at the 10% level, ** at 5%.

Table A4: Detailed inventory ratios and Rauch (1999) classifications.

Industry	Description	Inv/Shipments Ratio	Rauch (Con)	Rauch (Lib)
1111A0	Oilseed farming	4.73	n	n
1111B0	Grain farming	4.73	w	w
111200	Vegetable and melon farming	4.73	r	r
111300	Fruit and tree nut farming	4.73	w	w
111400	Greenhouse, nursery, and floriculture production	4.73	n	n
111900	Other crop farming	4.73	n	n
112120	Dairy cattle and milk production	4.73	w	w
1121A0	Beef cattle ranching and farming, including feedlots and dual-purpose ranching and farming	4.73	w	w
112300	Poultry and egg production	4.73	w	w
112A00	Animal production, except cattle and poultry and eggs	4.73	n	n
113000	Forestry and logging	4.73	n	n
114000	Fishing, hunting and trapping	4.73	r	r
115000	Support activities for agriculture and forestry	4.73	n	n
211000	Oil and gas extraction	0.13	r	r
212100	Coal mining	0.22	n	n
212230	Copper, nickel, lead, and zinc mining	1.39	r	w
2122A0	Iron, gold, silver, and other metal ore mining	0.06	r	w
212310	Stone mining and quarrying	0.04	n	n
2123A0	Other nonmetallic mineral mining and quarrying	0.40	n	n
213111	Drilling oil and gas wells	0.22	n	n
21311A	Other support activities for mining	1.29	n	n
221100	Electric power generation, transmission, and distribution	0.66	r	r
221200	Natural gas distribution	0.66	n	n
221300	Water, sewage and other systems	0.66	n	n
233210	Health care structures	0.66	n	n
233262	Educational and vocational structures	0.66	n	n
230301	Nonresidential maintenance and repair	0.66	n	n
230302	Residential maintenance and repair	0.66	n	n
2332A0	Office and commercial structures	0.66	n	n
233412	Multifamily residential structures	0.66	n	n
2334A0	Other residential structures	0.66	n	n
233230	Manufacturing structures	0.66	n	n
2332D0	Other nonresidential structures	0.66	n	n
233240	Power and communication structures	0.66	n	n
233411	Single-family residential structures	0.66	n	n
2332C0	Transportation structures and highways and streets	0.66	n	n
321100	Sawmills and wood preservation	1.17	n	n
321200	Veneer, plywood, and engineered wood product manufacturing	0.19	r	r
321910	Millwork	0.47	n	n
3219A0	All other wood product manufacturing	2.58	n	n
327100	Clay product and refractory manufacturing	0.62	n	n
327200	Glass and glass product manufacturing	0.19	n	n
327310	Cement manufacturing	2.00	r	r
327320	Ready-mix concrete manufacturing	0.38	n	n
327330	Concrete pipe, brick, and block manufacturing	1.26	n	n
327390	Other concrete product manufacturing	1.13	n	n
327400	Lime and gypsum product manufacturing	0.36	r	r
327910	Abrasive product manufacturing	1.55	n	n

Continued on next page

Table A4: Detailed inventory ratios and Rauch (1999) classifications.

Industry	Description	Inv/Shipments Ratio	Rauch (Con)	Rauch (Lib)
327991	Cut stone and stone product manufacturing	1.65	n	n
327992	Ground or treated mineral and earth manufacturing	2.09	n	n
327993	Mineral wool manufacturing	1.10	n	n
327999	Miscellaneous nonmetallic mineral products	1.23	n	n
331110	Iron and steel mills and ferroalloy manufacturing	3.59	n	r
331200	Steel product manufacturing from purchased steel	2.79	r	r
331314	Secondary smelting and alloying of aluminum	1.07	r	r
331313	Alumina refining and primary aluminum production	1.47	r	r
33131B	Aluminum product manufacturing from purchased aluminum	0.95	r	r
331410	Nonferrous metal (except aluminum) smelting and refining	1.54	w	w
331420	Copper rolling, drawing, extruding and alloying	1.26	r	r
331490	Nonferrous metal (except copper and aluminum) rolling, drawing, extruding and alloying	1.67	n	n
331510	Ferrous metal foundries	3.41	n	n
331520	Nonferrous metal foundries	0.62	n	n
332114	Custom roll forming	1.72	w	w
33211A	All other forging, stamping, and sintering	0.28	w	w
332119	Metal crown, closure, and other metal stamping (except automotive)	1.59	w	w
332200	Cutlery and handtool manufacturing	0.44	w	w
332310	Plate work and fabricated structural product manufacturing	0.22	w	w
332320	Ornamental and architectural metal products manufacturing	0.36	w	w
332410	Power boiler and heat exchanger manufacturing	1.55	w	w
332420	Metal tank (heavy gauge) manufacturing	1.52	w	w
332430	Metal can, box, and other metal container (light gauge) manufacturing	1.29	w	w
332500	Hardware manufacturing	1.67	w	w
332600	Spring and wire product manufacturing	0.71	w	w
332710	Machine shops	1.59	w	w
332720	Turned product and screw, nut, and bolt manufacturing	1.11	n	n
332800	Coating, engraving, heat treating and allied activities	0.36	w	w
332913	Plumbing fixture fitting and trim manufacturing	1.59	n	n
33291A	Valve and fittings other than plumbing	0.39	n	n
332991	Ball and roller bearing manufacturing	2.42	w	w
332996	Fabricated pipe and pipe fitting manufacturing	2.27	w	w
33299A	Ammunition, arms, ordnance, and accessories manufacturing	3.22	n	n
332999	Other fabricated metal manufacturing	1.69	w	w
333111	Farm machinery and equipment manufacturing	1.70	n	n
333112	Lawn and garden equipment manufacturing	1.63	n	n
333120	Construction machinery manufacturing	5.03	n	n
333130	Mining and oil and gas field machinery manufacturing	5.02	n	n
333242	Semiconductor machinery manufacturing	6.74	n	n
33329A	Other industrial machinery manufacturing	3.57	n	n
333314	Optical instrument and lens manufacturing	5.98	n	n
333316	Photographic and photocopying equipment manufacturing	6.36	n	n
333318	Other commercial and service industry machinery manufacturing	1.75	n	n
333414	Heating equipment (except warm air furnaces) manufacturing	3.51	n	n
333415	Air conditioning, refrigeration, and warm air heating equipment manufacturing	2.82	n	n
333413	Industrial and commercial fan and blower and air purification equipment manufacturing	2.98	n	n

Continued on next page

Table A4: Detailed inventory ratios and Rauch (1999) classifications.

Industry	Description	Inv/Shipments Ratio	Rauch (Con)	Rauch (Lib)
333511	Industrial mold manufacturing	4.58	n	n
333514	Special tool, die, jig, and fixture manufacturing	4.75	n	n
333517	Machine tool manufacturing	6.14	n	n
33351B	Cutting and machine tool accessory, rolling mill, and other metalworking machinery manufacturing	4.38	n	n
333611	Turbine and turbine generator set units manufacturing	3.71	n	n
333612	Speed changer, industrial high-speed drive, and gear manufacturing	2.39	n	n
333613	Mechanical power transmission equipment manufacturing	2.46	n	n
333618	Other engine equipment manufacturing	1.39	n	n
333912	Air and gas compressor manufacturing	2.23	n	n
333914	Measuring, dispensing, and other pumping equipment manufacturing	2.40	n	n
333920	Material handling equipment manufacturing	4.00	n	n
333991	Power-driven handtool manufacturing	2.28	n	n
333993	Packaging machinery manufacturing	1.81	n	n
333994	Industrial process furnace and oven manufacturing	1.79	n	n
33399A	Other general purpose machinery manufacturing	0.35	n	n
33399B	Fluid power process machinery	2.53	n	n
334111	Electronic computer manufacturing	3.09	n	n
334112	Computer storage device manufacturing	1.32	n	n
334118	Computer terminals and other computer peripheral equipment manufacturing	1.24	n	n
334210	Telephone apparatus manufacturing	9.44	n	n
334220	Broadcast and wireless communications equipment	9.42	n	n
334290	Other communications equipment manufacturing	9.20	n	n
334413	Semiconductor and related device manufacturing	1.19	n	n
334418	Printed circuit assembly (electronic assembly) manufacturing	5.45	n	n
33441A	Other electronic component manufacturing	3.58	n	n
334510	Electromedical and electrotherapeutic apparatus manufacturing	4.77	n	n
334511	Search, detection, and navigation instruments manufacturing	13.27	n	n
334512	Automatic environmental control manufacturing	4.68	n	n
334513	Industrial process variable instruments manufacturing	4.49	n	n
334514	Totalizing fluid meter and counting device manufacturing	4.45	n	n
334515	Electricity and signal testing instruments manufacturing	5.00	n	n
334516	Analytical laboratory instrument manufacturing	5.25	n	n
334517	Irradiation apparatus manufacturing	5.18	n	n
33451A	Watch, clock, and other measuring and controlling device manufacturing	5.01	n	n
334300	Audio and video equipment manufacturing	2.48	n	n
334610	Manufacturing and reproducing magnetic and optical media	0.46	n	n
335110	Electric lamp bulb and part manufacturing	3.40	n	n
335120	Lighting fixture manufacturing	1.51	n	n
335210	Small electrical appliance manufacturing	2.28	n	n
335220	Major household appliance manufacturing	1.29	n	n
335311	Power, distribution, and specialty transformer manufacturing	4.35	n	n
335312	Motor and generator manufacturing	4.92	n	n
335313	Switchgear and switchboard apparatus manufacturing	4.01	n	n
335314	Relay and industrial control manufacturing	4.33	n	n
335911	Storage battery manufacturing	2.24	n	r
335912	Primary battery manufacturing	1.65	n	r
335920	Communication and energy wire and cable manufacturing	0.33	n	n

Continued on next page

Table A4: Detailed inventory ratios and Rauch (1999) classifications.

Industry	Description	Inv/Shipments Ratio	Rauch (Con)	Rauch (Lib)
335930	Wiring device manufacturing	0.84	n	n
335991	Carbon and graphite product manufacturing	2.96	n	n
335999	All other miscellaneous electrical equipment and component manufacturing	2.21	n	n
336111	Automobile manufacturing	1.03	n	n
336112	Light truck and utility vehicle manufacturing	0.25	n	n
336120	Heavy duty truck manufacturing	0.74	n	n
336211	Motor vehicle body manufacturing	1.78	n	n
336212	Truck trailer manufacturing	1.23	n	n
336213	Motor home manufacturing	1.81	n	n
336214	Travel trailer and camper manufacturing	0.88	n	n
336310	Motor vehicle gasoline engine and engine parts manufacturing	0.89	n	n
336320	Motor vehicle electrical and electronic equipment manufacturing	1.23	n	n
336350	Motor vehicle transmission and power train parts manufacturing	0.91	n	n
336360	Motor vehicle seating and interior trim manufacturing	0.41	n	n
336370	Motor vehicle metal stamping	0.72	n	n
336390	Other motor vehicle parts manufacturing	0.84	n	n
3363A0	Motor vehicle steering, suspension component (except spring), and brake systems manufacturing	0.94	n	n
336411	Aircraft manufacturing	4.40	n	n
336412	Aircraft engine and engine parts manufacturing	2.01	n	n
336413	Other aircraft parts and auxiliary equipment manufacturing	2.60	n	n
336414	Guided missile and space vehicle manufacturing	2.75	n	n
33641A	Propulsion units and parts for space vehicles and guided missiles	1.01	n	n
336500	Railroad rolling stock manufacturing	2.78	n	n
336611	Ship building and repairing	0.78	n	n
336612	Boat building	1.74	n	n
336991	Motorcycle, bicycle, and parts manufacturing	0.85	n	n
336992	Military armored vehicle, tank, and tank component manufacturing	2.12	n	n
336999	All other transportation equipment manufacturing	1.17	n	n
337110	Wood kitchen cabinet and countertop manufacturing	0.80	n	n
337121	Upholstered household furniture manufacturing	1.27	n	n
337122	Nonupholstered wood household furniture manufacturing	1.94	n	n
337127	Institutional furniture manufacturing	1.49	n	n
33712N	Other household nonupholstered furniture	1.81	n	n
337215	Showcase, partition, shelving, and locker manufacturing	1.43	n	n
33721A	Office furniture and custom architectural woodwork and millwork manufacturing	0.32	n	n
337900	Other furniture related product manufacturing	0.50	n	n
339112	Surgical and medical instrument manufacturing	1.49	n	n
339113	Surgical appliance and supplies manufacturing	1.91	n	n
339114	Dental equipment and supplies manufacturing	1.63	n	n
339115	Ophthalmic goods manufacturing	0.99	n	n
339116	Dental laboratories	0.61	n	n
339910	Jewelry and silverware manufacturing	3.75	n	n
339920	Sporting and athletic goods manufacturing	2.12	n	n
339930	Doll, toy, and game manufacturing	1.45	n	n
339940	Office supplies (except paper) manufacturing	1.66	n	n
339950	Sign manufacturing	1.11	n	n

Continued on next page

Table A4: Detailed inventory ratios and Rauch (1999) classifications.

Industry	Description	Inv/Shipments Ratio	Rauch (Con)	Rauch (Lib)
339990	All other miscellaneous manufacturing	0.38	n	n
311111	Dog and cat food manufacturing	0.64	n	n
311119	Other animal food manufacturing	0.89	n	n
311210	Flour milling and malt manufacturing	0.70	r	r
311221	Wet corn milling	0.75	n	n
311225	Fats and oils refining and blending	1.01	r	r
311224	Soybean and other oilseed processing	0.79	r	r
311230	Breakfast cereal manufacturing	0.36	r	r
311300	Sugar and confectionery product manufacturing	0.35	w	w
311410	Frozen food manufacturing	0.76	r	r
311420	Fruit and vegetable canning, pickling, and drying	2.03	n	r
311513	Cheese manufacturing	1.09	n	n
311514	Dry, condensed, and evaporated dairy product manufacturing	0.53	n	n
31151A	Fluid milk and butter manufacturing	1.19	n	n
311520	Ice cream and frozen dessert manufacturing	1.07	n	n
311615	Poultry processing	0.35	n	r
31161A	Animal (except poultry) slaughtering, rendering, and processing	1.33	n	n
311700	Seafood product preparation and packaging	1.20	r	r
311810	Bread and bakery product manufacturing	0.03	n	n
3118A0	Cookie, cracker, pasta, and tortilla manufacturing	0.79	n	n
311910	Snack food manufacturing	0.97	n	n
311920	Coffee and tea manufacturing	0.74	n	r
311930	Flavoring syrup and concentrate manufacturing	0.53	n	n
311940	Seasoning and dressing manufacturing	0.45	r	w
311990	All other food manufacturing	0.30	n	n
312110	Soft drink and ice manufacturing	0.57	n	n
312120	Breweries	0.56	r	r
312130	Wineries	7.58	n	r
312140	Distilleries	2.82	r	r
312200	Tobacco manufacturing	1.15	r	r
313100	Fiber, yarn, and thread mills	0.95	r	r
313200	Fabric mills	0.56	n	n
313300	Textile and fabric finishing and fabric coating mills	0.91	r	w
314110	Carpet and rug mills	2.07	n	n
314120	Curtain and linen mills	2.16	n	n
314900	Other textile product mills	0.60	n	n
315000	Apparel manufacturing	0.25	n	n
316000	Leather and allied product manufacturing	0.35	n	n
322110	Pulp mills	0.90	r	r
322120	Paper mills	0.89	n	n
322130	Paperboard mills	0.72	n	n
322210	Paperboard container manufacturing	0.61	r	r
322220	Paper bag and coated and treated paper manufacturing	1.35	n	n
322230	Stationery product manufacturing	1.19	n	n
322291	Sanitary paper product manufacturing	0.90	n	n
322299	All other converted paper product manufacturing	1.18	n	n
323110	Printing	0.62	n	n
323120	Support activities for printing	0.62	n	n
324110	Petroleum refineries	0.79	n	n

Continued on next page

Table A4: Detailed inventory ratios and Rauch (1999) classifications.

Industry	Description	Inv/Shipments Ratio	Rauch (Con)	Rauch (Lib)
324121	Asphalt paving mixture and block manufacturing	1.03	n	n
324122	Asphalt shingle and coating materials manufacturing	1.16	n	r
324190	Other petroleum and coal products manufacturing	1.20	n	n
325110	Petrochemical manufacturing	0.60	r	r
325120	Industrial gas manufacturing	0.98	n	n
325130	Synthetic dye and pigment manufacturing	2.33	r	r
325180	Other basic inorganic chemical manufacturing	1.36	r	w
325190	Other basic organic chemical manufacturing	0.15	r	r
325211	Plastics material and resin manufacturing	1.18	n	r
3252A0	Synthetic rubber and artificial and synthetic fibers and filaments manufacturing	0.91	r	r
325411	Medicinal and botanical manufacturing	1.98	n	n
325412	Pharmaceutical preparation manufacturing	1.52	n	n
325413	In-vitro diagnostic substance manufacturing	1.60	n	n
325414	Biological product (except diagnostic) manufacturing	3.56	n	n
325310	Fertilizer manufacturing	0.40	r	r
325320	Pesticide and other agricultural chemical manufacturing	2.15	n	n
325510	Paint and coating manufacturing	1.02	n	n
325520	Adhesive manufacturing	1.28	n	n
325610	Soap and cleaning compound manufacturing	0.45	n	n
325620	Toilet preparation manufacturing	1.12	n	n
325910	Printing ink manufacturing	1.89	n	n
3259A0	All other chemical product and preparation manufacturing	0.12	n	n
326110	Plastics packaging materials and unlaminated film and sheet manufacturing	0.36	r	r
326120	Plastics pipe, pipe fitting, and unlaminated profile shape manufacturing	0.44	n	n
326130	Laminated plastics plate, sheet (except packaging), and shape manufacturing	1.45	n	n
326140	Polystyrene foam product manufacturing	1.11	n	n
326150	Urethane and other foam product (except polystyrene) manufacturing	1.05	n	n
326160	Plastics bottle manufacturing	1.01	n	n
326190	Other plastics product manufacturing	0.06	n	n
326210	Tire manufacturing	0.95	n	n
326220	Rubber and plastics hoses and belting manufacturing	1.55	n	n
326290	Other rubber product manufacturing	0.43	n	n
423100	Motor vehicle and motor vehicle parts and supplies	2.01	n	n
423400	Professional and commercial equipment and supplies	1.57	n	n
423600	Household appliances and electrical and electronic goods	1.45	n	n
423800	Machinery, equipment, and supplies	3.74	n	n
423A00	Other durable goods merchant wholesalers	2.38	n	n
424200	Drugs and druggists' sundries	1.27	n	n
424400	Grocery and related product wholesalers	0.83	n	n
424700	Petroleum and petroleum products	0.50	n	n
424A00	Other nondurable goods merchant wholesalers	1.30	n	n
425000	Wholesale electronic markets and agents and brokers	1.79	n	n
4200ID	Customs duties	1.79	n	n
441000	Motor vehicle and parts dealers	2.74	n	n
445000	Food and beverage stores	1.07	n	n
452000	General merchandise stores	1.84	n	n

Continued on next page

Table A4: Detailed inventory ratios and Rauch (1999) classifications.

Industry	Description	Inv/Shipments Ratio	Rauch (Con)	Rauch (Lib)
444000	Building material and garden equipment and supplies dealers	2.73	n	n
446000	Health and personal care stores	1.65	n	n
447000	Gasoline stations	1.47	n	n
448000	Clothing and clothing accessories stores	6.03	n	n
454000	Nonstore retailers	2.11	n	n
4B0000	All other retail	0.00	n	n
481000	Air transportation	1.44	n	n
482000	Rail transportation	1.44	n	n
483000	Water transportation	1.44	n	n
484000	Truck transportation	0.07	n	n
485000	Transit and ground passenger transportation	1.44	n	n
486000	Pipeline transportation	1.44	n	n
48A000	Scenic and sightseeing transportation and support activities	1.44	n	n
492000	Couriers and messengers	0.00	n	n
493000	Warehousing and storage	0.00	n	n
511110	Newspaper publishers	0.00	n	n
511120	Periodical publishers	0.00	n	n
511130	Book publishers	0.00	n	n
5111A0	Directory, mailing list, and other publishers	0.00	n	n
511200	Software publishers	0.00	n	n
512100	Motion picture and video industries	0.00	n	n
512200	Sound recording industries	0.00	n	n
515100	Radio and television broadcasting	0.00	n	n
515200	Cable and other subscription programming	0.00	n	n
517110	Wired telecommunications carriers	0.00	n	n
517210	Wireless telecommunications carriers (except satellite)	0.00	n	n
517A00	Satellite, telecommunications resellers, and all other telecommunications	0.00	n	n
518200	Data processing, hosting, and related services	0.00	n	n
519130	Internet publishing and broadcasting and Web search portals	0.00	n	n
5191A0	News syndicates, libraries, archives and all other information services	0.00	n	n
522A00	Nondepository credit intermediation and related activities	0.00	n	n
52A000	Monetary authorities and depository credit intermediation	0.00	n	n
523900	Other financial investment activities	0.00	n	n
523A00	Securities and commodity contracts intermediation and brokerage	0.00	n	n
524113	Direct life insurance carriers	0.00	n	n
5241XX	Insurance carriers, except direct life	0.00	n	n
524200	Insurance agencies, brokerages, and related activities	0.00	n	n
525000	Funds, trusts, and other financial vehicles	0.00	n	n
531HSO	Owner-occupied housing	0.00	n	n
531HST	Tenant-occupied housing	0.00	n	n
531ORE	Other real estate	0.00	n	n
532100	Automotive equipment rental and leasing	0.00	n	n
532400	Commercial and industrial machinery and equipment rental and leasing	0.00	n	n
532A00	General and consumer goods rental	0.00	n	n
533000	Lessors of nonfinancial intangible assets	0.00	n	n
541100	Legal services	0.00	n	n
541511	Custom computer programming services	0.00	n	n
541512	Computer systems design services	0.00	n	n
54151A	Other computer related services, including facilities management	0.00	n	n

Continued on next page

Table A4: Detailed inventory ratios and Rauch (1999) classifications.

Industry	Description	Inv/Shipments Ratio	Rauch (Con)	Rauch (Lib)
541200	Accounting, tax preparation, bookkeeping, and payroll services	0.00	n	n
541300	Architectural, engineering, and related services	0.00	n	n
541610	Management consulting services	0.00	n	n
5416A0	Environmental and other technical consulting services	0.00	n	n
541700	Scientific research and development services	0.00	n	n
541800	Advertising, public relations, and related services	0.00	n	n
541400	Specialized design services	0.00	n	n
541920	Photographic services	0.00	n	n
541940	Veterinary services	0.00	n	n
5419A0	All other miscellaneous professional, scientific, and technical services	0.00	n	n
550000	Management of companies and enterprises	0.00	n	n
561300	Employment services	0.00	n	n
561700	Services to buildings and dwellings	0.00	n	n
561100	Office administrative services	0.00	n	n
561200	Facilities support services	0.00	n	n
561400	Business support services	0.00	n	n
561500	Travel arrangement and reservation services	0.00	n	n
561600	Investigation and security services	0.00	n	n
561900	Other support services	0.00	n	n
562000	Waste management and remediation services	0.00	r	w
611100	Elementary and secondary schools	0.00	n	n
611A00	Junior colleges, colleges, universities, and professional schools	0.00	n	n
611B00	Other educational services	0.00	n	n
621100	Offices of physicians	0.00	n	n
621200	Offices of dentists	0.00	n	n
621300	Offices of other health practitioners	0.00	n	n
621400	Outpatient care centers	0.00	n	n
621500	Medical and diagnostic laboratories	0.00	n	n
621600	Home health care services	0.00	n	n
621900	Other ambulatory health care services	0.00	n	n
622000	Hospitals	0.00	n	n
623A00	Nursing and community care facilities	0.00	n	n
623B00	Residential mental health, substance abuse, and other residential care facilities	0.00	n	n
624100	Individual and family services	0.00	n	n
624400	Child day care services	0.00	n	n
624A00	Community food, housing, and other relief services, including vocational rehabilitation services	0.00	n	n
711100	Performing arts companies	0.00	n	n
711200	Spectator sports	0.00	n	n
711500	Independent artists, writers, and performers	0.00	n	n
711A00	Promoters of performing arts and sports and agents for public figures	0.00	n	n
712000	Museums, historical sites, zoos, and parks	0.00	n	n
713100	Amusement parks and arcades	0.00	n	n
713200	Gambling industries (except casino hotels)	0.00	n	n
713900	Other amusement and recreation industries	0.00	n	n
721000	Accommodation	0.00	n	n
722110	Full-service restaurants	0.00	n	n
722211	Limited-service restaurants	0.00	n	n

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Table A4: Detailed inventory ratios and Rauch (1999) classifications.

Industry	Description	Inv/Shipments Ratio	Rauch (Con)	Rauch (Lib)
722A00	All other food and drinking places	0.00	n	n
811100	Automotive repair and maintenance (including car washes)	0.00	n	n
811200	Electronic and precision equipment repair and maintenance	0.00	n	n
811300	Commercial and industrial machinery and equipment repair and maintenance	0.00	n	n
811400	Personal and household goods repair and maintenance	0.00	n	n
812100	Personal care services	0.00	n	n
812200	Death care services	0.00	n	n
812300	Dry-cleaning and laundry services	0.00	n	n
812900	Other personal services	0.00	n	n
813100	Religious organizations	0.00	n	n
813A00	Grantmaking, giving, and social advocacy organizations	0.00	n	n
813B00	Civic, social, professional, and similar organizations	0.00	n	n
814000	Private households	0.00	n	n
S00500	Federal general government (defense)	0.00	n	n
S00600	Federal general government (nondefense)	0.00	n	n
491000	Postal service	0.00	n	n
S00101	Federal electric utilities	0.00	n	n
S00102	Other federal government enterprises	0.00	n	n
GSLGE	State and local government (educational services)	0.00	n	n
GSLGH	State and local government (hospitals and health services)	0.00	n	n
GSLGO	State and local government (other services)	0.00	n	n
S00201	State and local government passenger transit	0.00	n	n
S00202	State and local government electric utilities	0.00	n	n
S00203	Other state and local government enterprises	0.00	n	n
S00401	nan	0.00	n	n
S00402	nan	0.00	n	n
S00300	nan	0.00	n	n
S00900	nan	0.00	n	n