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Estimates of Cost-Price Passthrough from Business Survey Data

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Abstract: We examine businesses' price-setting practices via open-ended interviews and in a quantitative survey module with business contacts from the Federal Reserve Banks of Atlanta, Cleveland, and New York in December 2022 and January 2023. Businesses indicated that their prices were strongly influenced by demand, a desire to maintain steady profit margins, and wages and labor costs. Survey respondents expected reduced growth in costs and prices of about 5 percent on average over the next year. Backward-looking, forward-looking, and hypothetical scenarios reveal average cost-price passthrough of around 60 percent, with meaningful heterogeneity across firms.

JEL classification: D4, E3, L2

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I. Introduction

At the core of the structural models with microeconomic foundations used in much of macroeconomics to analyze inflation and the effects of monetary policy are monopolistically competitive firms that seek to set their prices as a markup over marginal costs. The presence of frictions prevents firms from constantly reoptimizing prices, rendering the pricing problem dynamic, and a panoply of shocks and strategic considerations adds further complexity to the problem. But to what extent do real-world firms' price-setting decisions resemble this highly stylized framework? We follow a long tradition of talking with firms to provide real-world perspectives that can help to inform theoretical models. We apply this approach amid a period of elevated inflation to focus particular attention on estimating passthrough from firms' costs to their prices. Based on the results from a quantitative survey fielded in late 2022 and early 2023, we implement three methodological approaches—utilizing backward-looking responses, forward-looking responses, and hypothetical scenarios—and we consistently estimate a rate of cost-price passthrough of around 60 percent.

Multiple prior studies have focused on aspects of firms' price-setting and wage-setting behavior through surveys and interviews. Hall and Hitch (1939) and Kaplan, Dirlam, and Lanzillotti (1958) provide early examples of this approach. The pioneering work summarized in Blinder et al. (1998) relied on a detailed questionnaire asked of respondents at firms to examine theories underlying price rigidity. A number of studies have since followed this approach for a variety of countries: Hall, Walsh, and Yates (2000); Nakagawa, Hattori, and Takagawa (2000); Apel, Friberg, and Hallsten (2005); Fabiani et al. (2006); and Amirault, Kwan, and Wilkinson (2006) surveyed firms in the United Kingdom, Japan, Sweden, the euro area, and Canada, respectively, to uncover additional facts about pricing behavior, again with an eye toward

explaining the rationale for sticky prices.¹ Greenslade and Parker (2012) is a more recent survey in the United Kingdom with the same approach. Bewley (1999) and Bewley (2007) relied on more open-ended interviews to discuss wage- and price-setting behaviors, respectively.

Our approach took two parts. In the first part, we held open-ended interviews with a select group of top business decision-makers in 2021 to ask about their price-setting behaviors. These interviews did not place a specific emphasis on price rigidity and provided a deeper look at pricing in an unstructured setting. We used findings from these first-stage interviews to inform a second-stage quantitative business survey fielded in late 2022 and early 2023 that focused primarily on two related and timely issues: what factors were most important to firms in setting their prices at that time, and to what extent were firms passing along changes in costs to their prices. While the timing of our study raises the possibility that our results are specific to the pandemic and its aftermath, high inflation readings raised firms' awareness of and focus on prices and costs during this episode, providing a unique opportunity to document passthrough via a survey of well-informed firms.

We sent our quantitative survey to 700 business contacts from the networks of the Federal Reserve Banks of Atlanta, Cleveland, and New York during December 2022 and January 2023. When asked about the key determinants in their price-setting decisions, contacts most often reported that they viewed the strength of demand, maintaining steady profit margins, and wages and labor costs as the most important factors.

To estimate cost-price passthrough in our business survey data, we implemented a unique tripartite approach. We first asked contacts for estimates of changes in costs and prices over the preceding one-year period. We next asked for their expectations for changes in costs and prices

¹ These surveys and similar ones for other countries are discussed in more detail in the handbook chapter by Klenow and Malin (2010).

over the following one-year period. As a snapshot of beliefs and expectations during a period of high inflation, these objects are interesting in their own right: on average, firms believed that cost growth was going to step down from 12.2 percent in 2022 to 5.5 percent in 2023, while mean price growth was expected to step down from 9.5 percent to 5.4 percent over the same time periods. That is, on the surface, the average firm in our sample appeared to have experienced some margin compression in 2022 and expected margins to remain steady in 2023.² These backward- and forward-looking questions allow us to conduct multiple empirical exercises to estimate passthrough based on reported past behavior and expected future behavior. In a third exercise, we implemented an experimental approach that facilitates causal inference by presenting firms with a hypothetical scenario in which cost growth would be 5 percentage points higher than originally expected and then asked them to reconsider how their prices would adjust.

Analyzing the backward-looking responses, the forward-looking responses, and the hypothetical responses, we arrive at an estimate of cost-price passthrough of around 60 percent in all cases. Our estimate is comparable to the empirical estimates of Amiti et al. (forthcoming) for the passthrough of input prices and of Amiti, Itskhoki, and Konings (2019) for own cost shocks. While this estimate is for a representative firm, we document considerable heterogeneity in passthrough at the firm level, with most firms reporting a compression of margins but some reporting passthrough that was greater than one-for-one; i.e., they were expecting to expand margins.

Our unique survey data allow us to relate estimated firm-level passthrough to the most important factors that our firms report considering when setting prices. We highlight two results.

² Glover, Mustre-del-Río, and von Ende-Becker (2023) point to rising profit margins as an important driver of inflation during 2021. Given that the backward-looking questions in our survey would have covered 2022, it is possible that the margin expansion they document could have started to unwind in 2022.

First, firms reporting that their competitors' prices were very important when setting prices showed higher passthrough of cost increases in 2022 than other firms in our sample. During periods of quiescent inflation, strategic complementarities in price-setting can dampen price fluctuations and thereby generate greater fluctuations in output, as inaction by competitors reduces the desire to change one's own prices. But amid the backdrop of high inflation in our sample period, strategic complementarities can instead act to amplify price fluctuations as price followers catch up with price leaders, illustrating the potential for multiple equilibria induced by strategic complementarities, as described in Ball and Romer (1991).³ Second, firms reporting that demand was very important when setting prices implemented higher passthrough of cost changes in 2022 than other firms in our sample. With generally strong demand during our short sample period, firms that were keenly aware of that strength may have felt more comfortable raising prices to a greater extent. But even here, our passthrough estimate is well under unity.

II. Survey Methodology

Our survey methodology followed a two-stage approach: an initial stage of semi-structured (qualitative) interviews followed by a second stage fielding a quantitative survey module embedded as part of several established business surveys.⁴

The results in this paper are part of a larger endeavor to gain a broad understanding of the information, tools, and methods firms use when setting prices. We were inspired, in part, by the

³ Notably, Amiti, Itskhoki, and Konings (2019) argue that strategic complementarities lead firms to respond less to competitors' price changes than to own cost shocks, but the data for that study came from Belgium manufacturers during the low-inflation period 1995-2007. Auer and Schoenle (2016) and Pennings (2017) find a similar role for competition in price setting using US import micro price data during 1992-2007.

⁴ Semi-structured interviews are a blend of open-ended conversational questions and probing follow-ups used extensively by survey practitioners to engage in a deep exploration of participants' experiences and beliefs about a specific topic (see Adams (2015)). For our purposes in this paper, semi-structured interviews are well-suited to designing second-round quantitative survey modules. The detailed semi-structured questionnaire is presented in Appendix A.3.

book *Asking About Prices*, by Blinder et al. (1998), which expanded on Blinder (1991) and Blinder (1994) and attempted to help inform theoretical models of price-stickiness through surveying business decision-makers, as well as by the many surveys of price-setting in other countries listed above. Such surveys of price-setters have a long history in the academic literature, dating at least to Hall and Hitch (1939). The extensive networks of business contacts maintained by the Federal Reserve Banks provide a natural opportunity to collect information on price-setting behavior; e.g., business contacts, who are often surveyed as part of the Beige Book process that occurs prior to each regularly scheduled meeting of the Federal Open Market Committee or are included in regional diffusion indexes or other reconnaissance efforts, have insights into the factors driving prices and costs at the firm level, as well as the general state of the economy.

Our work has an objective similar to that of the earlier studies to learn about firms' price-setting, but the timing of our project provides an explicit focus on the recent high-inflation period. In contrast to the structured interview questions in Blinder et al. (1998) and many of the other recent papers, our two-stage approach allows us to first obtain a deeper look at pricing in an unstructured setting, before incorporating our insights into a quantitative survey module.

II.A. First Stage: Semi-Structured Interviews

Our first-stage approach to the interviews bore more resemblance to Bewley (1999) and Bewley (2007), by focusing on open-ended questions and free-ranging conversations. In constructing and testing the semi-structured questionnaire used in the cognitive interviews, we took care not to impose the typical economist's viewpoint on what matters for price-setting. Rather, we constructed a set of probing questions in a vernacular that businesspeople typically

use, translating it back into the framework of economics ex post. In doing so, we hoped to help bridge the gap between how price-setting works in our canonical macro models and how it works in practice. For example, rather than assume wage growth is a prominent driver of price-setting, we asked a series of open-ended questions that allowed our respondents to expound on their price-setting process before probing whether there was even a connection between changes in the prices they charge and changes in the wages and salaries of their employees.

These first-stage, semi-structured interviews were conducted with a select set of 33 firm decision-makers, primarily chief executive officers (CEOs), chief financial officers (CFOs), and business owners who were business contacts of the Federal Reserve Banks of Atlanta, Cleveland, and New York. All interviewees had intimate knowledge of their businesses' price-setting practices and were willing to spend at least one hour talking with an interview team about pricing. These long-form interviews were conducted from April 2021 through October 2021. The conversations were wide-ranging, and the interview questions were open-ended, to provide a natural flow to the conversations, allowing us to probe deeper into the determinants of price-setting behavior as described by the price-setters themselves.

An in-depth analysis of these rich interviews is beyond the scope of this paper, but we highlight several findings that we view as directly relevant for our second-stage survey. First, firm heterogeneity is vast, and even the specific concepts surrounding “prices” and “costs” that resonate with business decision-makers tend to vary by firm type and industry. For some firms, such as a regional orange juice or milk wholesaler, asking about price and costs entails a focused conversation around a single output and a clear set of inputs. At the other extreme are multi-product retailers with a vast number of differentiated products and associated cost structures, as the following quote makes clear:

“In a typical grocery store, you have somewhere between 35,000 and 40,000 unique SKUs. But of those, there’s maybe 3,000 or 4,000 that really matter. And, when you re-aggregate those over time, and look at the average basket, you can get probably 80-85 percent of somebody’s shop in those items. And, those are the ones we track.” -- CFO of a supermarket chain, June 2021.

We also uncovered examples of firms that both produce goods and provide services or that have a differentiated set of product lines. For contacts from multi-product firms, these examples highlight a particular challenge to those wishing to survey firms about “prices.” Should survey practitioners choose to focus queries on an average, hoping that firms with differentiated product lines are able to contort their responses into a specific question? Conversely, how would the grocer in the above quote respond to a question that attempted to glean information about a “representative” price? We developed a way around this thorny issue by allowing respondents to self-select from two differentiated strategies in deciding how they think about their prices and costs, detailed further below.

Second, capturing the factors that firms deem most important in price-setting can help to explain heterogeneity in passthrough rates. Consider the following anecdotes:

“We had frankly priced ourselves out of the market and we were starting to see volume fall. Despite the fact that commodities and everything else were going up, we actually took that price down because it had gotten too expensive versus the consideration set.” -- Industrial machinery and equipment wholesaler, August 2021.

“We look at what’s been the evolution on labor rates, raw material rates, and so on.... We look at the cost to produce. All that is factored in and then we basically come up with a price based on that.” -- Wood container and pallet manufacturer, August 2021.

“It’s a process of trying to negotiate with the client upfront on a multi-year deal that oftentimes will bring price inflators into it for just standard billing rates, but then we’ll also try to build in some protections against price increases that are unknown this time. So oftentimes, it’s a yearly opportunity to revisit rates but to have that just based on, you know, actual compensation costs that we’re experiencing in the market place.” -- Administrative management and management consulting service, August 2021.

These three excerpts illustrate the diversity with which business decision-makers view the price-setting process and highlight the particular challenges survey practitioners face when constructing questions that attempt to capture all of these potentially disparate factors in order to

more fully understand price-setting behavior. The first quote indicates that the strength of demand plays a central role in price-setting. Despite surging costs, this firm chose to lower prices in the face of flagging demand for its goods. The second quote is an illustration of a cost-based pricing approach. The third quote is an example of how firms navigate contract-based pricing, where the primary determinant is tied directly to the cost of labor. The content of other interviews raised additional factors such as maintaining steady profit margins (i.e., constant markups); competitors' prices; the overall rate of inflation; and supply chain disruptions and shipping bottlenecks, with the latter factors raised in multiple interviews during 2021.

A third key finding is that many top firm decision-makers take a very “firm-centric” view of the world: broad macroeconomic phenomena were often interpreted through the prism of the impact they had on the individual firm or industry. For example, broad inflationary pressure was often framed as rapid increases in the costs of particular key inputs and rising wages at the firm level; or supply chain disruptions could be described as difficulties sourcing a particular component or challenges with transportation. These observations reinforced a need to design survey questions that asked firm contacts about conditions at a micro level and aggregating results to derive a broader “macro” takeaway.

II.B. Second Stage: Quantitative Survey Module

Our semi-structured interviews helped to inform the questionnaire design of our second-stage quantitative survey focused on price-setting practices and cost-price passthrough during a period of high inflation and substantial cost increases. We fielded this quantitative survey module in December 2022 and January 2023 across multiple regional survey and engagement efforts in the Atlanta, Cleveland, and New York Federal Reserve Districts. Specifically, we

embedded the module as part of the Business Inflation Expectations (BIE) Survey in Atlanta and the New York Fed’s Empire State Manufacturing Survey and Business Leaders Survey. We also fielded a stand-alone version of the survey module with the Cleveland Fed’s Beige Book contacts and through the Atlanta Fed’s Regional Economic Information Network (REIN). To eliminate any cross-survey variation attributable to differences in survey administration mode, all responses to our questions were collected through web surveys. All told, we gathered roughly 700 usable responses from a cross-section of firms spanning all major industrial classifications and from a wide range of firm employment sizes.⁵ By coordinating these efforts across three Fed Districts, we minimized biases stemming from any individual regional survey effort.

The module was brief, consisting of nine questions in total that elicited information on firms’ realized (or perceived) past cost growth and price growth, their expected cost growth and price growth, their expectations for aggregate (CPI-based) inflation over the next year, the confidence in their forecasts, a question asking respondents to gauge the importance of a variety of factors influencing pricing decisions, and a hypothetical question gauging how their pricing would react to an increase in costs higher than they had initially expected.⁶

Our experience with the open-ended interviews led us to adopt a differentiated strategy in which the first question posed to respondents was how they generally thought about prices and costs:

*“We would like to learn more about how businesses think about their prices and costs. In these questions, we will ask you to focus on your **most important** good(s), service(s), or product line(s), and to think about your price(s) and the associated costs for those good(s) and/or service(s).*

*If it makes more sense to you, you can focus instead on your **average** prices and costs—across all your good(s), service(s), or product line(s). In what follows we will ask you which concept you prefer to think about.*

⁵ The main results below are presented after controlling for differences in firm employment size and sales revenue levels.

⁶ The full questionnaire is reported in the Appendix.

*Q.0. When thinking about your prices and costs, do you prefer to focus on **average** prices and costs across all of your good(s) or service(s), or on the prices and costs associated with your **most important** good(s) or service(s)?*

*O **average** prices and costs*

*O prices and costs associated with your **most important** good(s) or service(s)*

Depending on the respondent's selected concept, either the "most important" or "average" language was used for the remainder of the survey module. A little less than 60 percent of firms chose to respond to questions about "average" prices and costs, while the remaining more than 40 percent preferred the "most important" variant.⁷ Interestingly, the passthrough estimates presented in our main findings (Section III.C) were similar across both groups, an indication that the specific wording branches we presented to respondents worked well.⁸ We include the questions related to "average" prices and costs in the body of the paper; the corresponding questions using the "most important" language are in the Appendix.

III. Survey Findings

III.A. What Influences Price-Setting?

Our long-form semi-structured interviews informed the remaining questions in our quantitative survey module as well. Based on the interviews, we attempted to span the set of factors influencing price-setting for the majority of firms.⁹ Our quantitative survey asked the following:

⁷ There were very modest differences across the four survey groups (Atlanta BIE, New York Empire State and Business Leaders, Cleveland Beige Book, and Atlanta REIN) in terms of the shares of firms preferring "average" prices and "most important" prices.

⁸ Because the responses were similar between the firms reporting "average" prices and "most important" prices, we pool all responses rather than separate answers based on how the firms chose to think about their prices and costs. If instead we had funneled all firms into either the "most important" or "average" price variant, then we might have increased the cognitive burden for respondents who thought about prices and costs in the alternative branch, potentially negatively affecting the quality and reliability of our estimates through satisficing and increased nonresponses.

⁹ For the sake of exposition, we describe these factors here, connecting the responses from the quantitative survey to quotes from the semi-structured interviews. Crucially, to ensure that respondents were not primed to consider these

Q.6. Currently, when you think about setting the price(s) across all your good(s) or service(s), how important to you are the following factors in making those decisions?

- *Your competitors' prices*
- *The strength of demand for your good(s) and service(s)*
- *Your wages and labor costs (including benefits)*
- *Your nonlabor costs, such as energy prices, materials prices, transportation costs, rent, etc.*
- *Maintaining steady profit margins (for price over costs)*
- *Interest rates, borrowing rates, and the cost of capital*
- *Problems with your supply chains, such as bottlenecks and product shortages*
- *The overall rate of inflation in the U.S. economy, as measured by the Consumer Price Index*
- *Other: [other text box]*

Each respondent was given a Likert-scale response to each sub-question ranging from 1 (“Not very important”) to 5 (“Very important”), and the ordering of the factors in question Q.6 was randomized for each participant to eliminate well-known possible biases associated with the ordering of response options in these types of questions.

Figure 1 plots the share of firms that indicated either a “4” or a “5” on each factor’s scale of importance.¹⁰ Among the most important factors were maintaining steady profit margins (with around 70 percent of firms ranking this factor a “4” or “5”), labor costs (70 percent), and nonlabor costs (55 percent). These results are consistent with prior research (e.g., Lee (1995); Shim and Sudit (1995)) suggesting that most US firms use cost-plus pricing strategies, and with our semi-structured interviews, in which many respondents reported that they have explicit targets for margins or set prices as a fixed markup over costs.¹¹ Just under 60 percent of firms

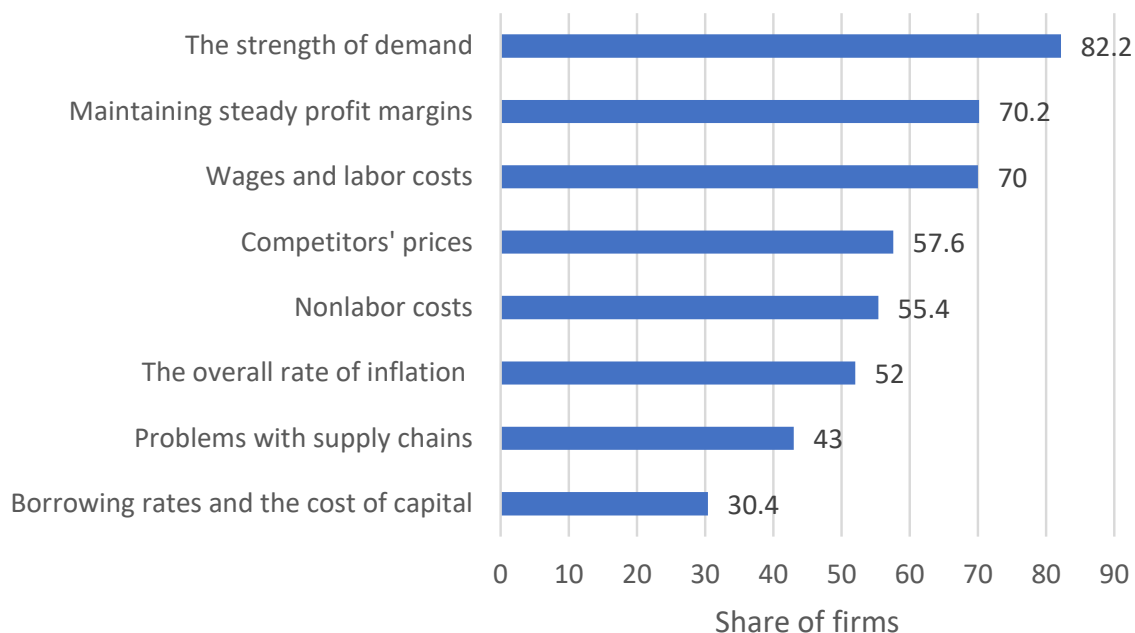
factors when thinking about their costs and prices, this question came after the questions about past cost and price growth and expected cost and price growth in Section III.B. The question numbers (in this case, Q.6) reveal the ordering used in the survey.

¹⁰ These factors are not mutually exclusive: a firm that sets prices as a fixed markup over its labor and nonlabor costs to hit a target profit margin might answer that “maintaining steady profit margins,” “wages and labor costs,” and “nonlabor costs” are all important. This is another reason why it is useful to draw on our long-form cognitive interviews when interpreting these answers.

¹¹ This result is also consistent with the finding for the eurozone in Fabiani et al. (2006) that most firms set prices as a markup over costs.

reported that competitors’ prices were important; again, this is consistent with prior work that finds that a sizable number of firms set prices based on competitors’ prices. However, the most important factor influencing price-setting during our survey period was the strength of demand: just over 80 percent of firms considered this factor very important. A priori, the strength of demand might influence price-setting in various ways, so it is useful to draw on the long-form interviews to interpret these responses.

Figure 1: Top Factors Influencing Pricing Decisions for Firms



Notes: Shares of firms indicating a “4” or “5” on Likert scale of importance. 674 observations.

Source: Federal Reserve Banks of Atlanta, Cleveland, and New York, and REIN.

According to these interviews, the most common connection between the “strength of demand” and price-setting is that before deciding whether to pass through a given increase in costs, a firm will assess what effect this increase in prices will have on sales. In a few cases, firms use explicit estimates of the elasticity of demand. One retailer reported contracting with a third party that uses data on the firm’s prices and sales to estimate the elasticity of demand for the firm’s products; this estimated elasticity fell around 20 percent between 2019 and 2021,

supporting this firm's assessment that it had more ability to pass on cost increases than had been true historically. In other cases, firms assess the effect of pricing on demand in a more judgmental way. An apparel contractor described that when introducing new products, the firm targets an 80 percent gross margin, but redesigns its product to reduce the cost if this target margin implies a price at which the firm thinks it will not be able to sell the product, based on input from its wholesale, retail, and e-commerce teams.

Importantly, in light of our quantitative results on passthrough discussed below, concern for the effects of higher prices on demand can lead firms to deviate from strict cost-plus pricing and tolerate a fall in margins following an increase in costs, giving rise to incomplete passthrough. One equipment manufacturer explicitly stated that it would only increase prices 2.5 percent following a 4 percent increase in the cost of materials and freight: *"We take into account the fact that we do have some margin in there. We're a little concerned quite frankly. We have a lot of pricing power, but there is still a point where... [we] do get to a little bit of pushback.... At the same time right now, frankly the market is understanding that there's a lot of pricing and cost pressure out there. We have reasonably good luck getting them through."*

In other cases, price-setting responds to demand because of capacity constraints. A moving company described how it prices more aggressively (i.e., reduces prices) in one of its submarkets when it has spare capacity and is just "trying to fill up trucks," whereas the company increases prices when capacity is tight. A metals producer reported that *"we do take into account the demand supply situation. And, you know, when the situation is tight on the supply side, we have more pricing power. There are times when we have to bite the bullet and, just in the interest of keeping capacity occupied, take contracts; sign contracts which are not at the pricing that makes us happy."* Finally, some firms act as dealers, adjusting prices in response to demand to

manage production and inventory. A lumber dealer reported: “*Nothing manages an order file like price. So if we’re six weeks out on our truss file, that’s uncomfortably long because we’ll start losing jobs. And we will, you know... you’re able to raise price in order to rein in your order file or, you know—and/or make more money; or if your order file gets short. You know, like ten days or something like that, we’re dropping price to keep the shop busy.*”

Standard flexible-price models predict that a firm’s optimal price depends on marginal cost, shocks to the elasticity of demand, and (except in the special case of monopolistically competitive firms facing constant-elasticity demand) competitors’ prices. At a high level of abstraction, the factors ranked as most important by our survey respondents are consistent with these implications (if we interpret “strength of demand” in terms of elasticity).¹² In particular, the interview responses suggest that firms set variable markups (as in, e.g., Atkeson and Burstein (2008)) in response to demand conditions.

A more striking result is that only about half of respondents indicated that the “overall rate of inflation” was an important factor. In sticky price models, firms set prices as a weighted average of current and expected optimal prices. In the simple New Keynesian model, this means that firms set prices based on their expected nominal marginal costs. If firms form these expectations by combining a forecast of their own real marginal costs and a forecast of aggregate inflation, then beliefs about aggregate inflation should be an important factor affecting pricing. Under this maintained assumption, Werning (2022) shows that standard models typically imply a passthrough of expected to realized inflation of between $\frac{1}{2}$ and 1.

¹² However, the way in which these factors affect pricing, judging by the long-form interviews, differs from theory in interesting ways. For example, while firms set markups and take into account the elasticity of demand, there is no indication that their markups are related to estimates of this elasticity as in a standard Lerner formula.

One way to reconcile the standard New Keynesian model with our survey result from Figure 1—that the overall rate of inflation is only important for half of the firms in our sample—would be to posit that firms form expectations about their own marginal costs directly, without forming beliefs about aggregate inflation.¹³ Indeed, Meyer, Parker, and Sheng (2021), using a similar question design, find that while firms’ expectations about their own unit costs significantly influence their price-setting, only a small share of firms indicate that CPI inflation or expectations about overall inflation are a significant influence on their price-setting—though this share increased somewhat during the pandemic, alongside rising overall inflation rates. Still, this interpretation of the model would imply that beliefs about overall inflation have less influence on actual inflation than is often assumed.

It was also somewhat surprising to us that “problems with supply chains” ranked so low. Throughout 2022, there were still ample anecdotes about supply chain disruptions mentioned in the Federal Reserve’s Beige Book; and the New York Fed’s Global Supply Chain Pressure Index, while off its highs from 2021, was still elevated relative to its pre-pandemic averages. One possible explanation for this result could be that while supply chain pressures may have delayed the arrival of goods, they did not affect firms’ price-setting. Moreover, stockouts had become significantly less common in 2022 than in 2020 in nearly all sectors (see Cavallo and Kryvtsov (2023)). Alternatively, respondents may have factored supply chain issues into nonlabor costs, by incorporating elevated transportation rates, for example.

¹³ Mackowiak and Wiederholt (2009) present a model in which it is optimal for rationally inattentive firms to pay more attention to idiosyncratic conditions, such as their own costs, rather than aggregate conditions, such as CPI inflation, when idiosyncratic conditions are more important or more volatile. However, this might be less plausible in recent years when aggregate inflation has been high and volatile: the year-over-year CPI inflation rate was still around 6½ percent at the time our survey was fielded.

In sum, firms' perceptions of the strength of demand, compensation costs, profit margins, and competitors' pricing came through as top factors influencing pricing decisions for a majority of firms in the recent period, suggesting that a more in-depth investigation of the passthrough of costs to prices, both in realization and expectation over a turbulent time period for inflation, may yield interesting results for policymakers and researchers alike.

III.B. Past and Future Growth in Costs and Prices

Our main objects of interest—estimates of passthrough—are based on the relationship between prices and costs. The survey questionnaire asked respondents not only for their experiences with prices and costs over the past year, but also for their anticipated price and cost changes over the next year. The forward-looking component is of particular interest because it offers insights into a possible reduction or further intensification of cost and price pressures in 2023 compared with 2022.

*Q. 1. Looking back, by about what percent did you change your **average** price(s), across all your good(s) or service(s), over the last 12 months?*

*Q.2. Looking back, by about what percent did your **average** costs, across all your good(s) or service(s), change over the last 12 months?*

*Q.3. Looking ahead, by about what percent do you expect to change your **average** price(s), across all your good(s) or service(s), over the next 12 months?*

*Q.4. Looking ahead, by about what percent do you expect that your **average** costs, across all your good(s) or service(s), will change over the next 12 months?*

We summarize key statistics from the questions in Table 1. The top panels in Figure 2 plot, respectively, the price and cost changes experienced by firms over the last 12 months (primarily 2022). The bottom panel depicts the analogous objects of interest for the next 12 months (primarily 2023).

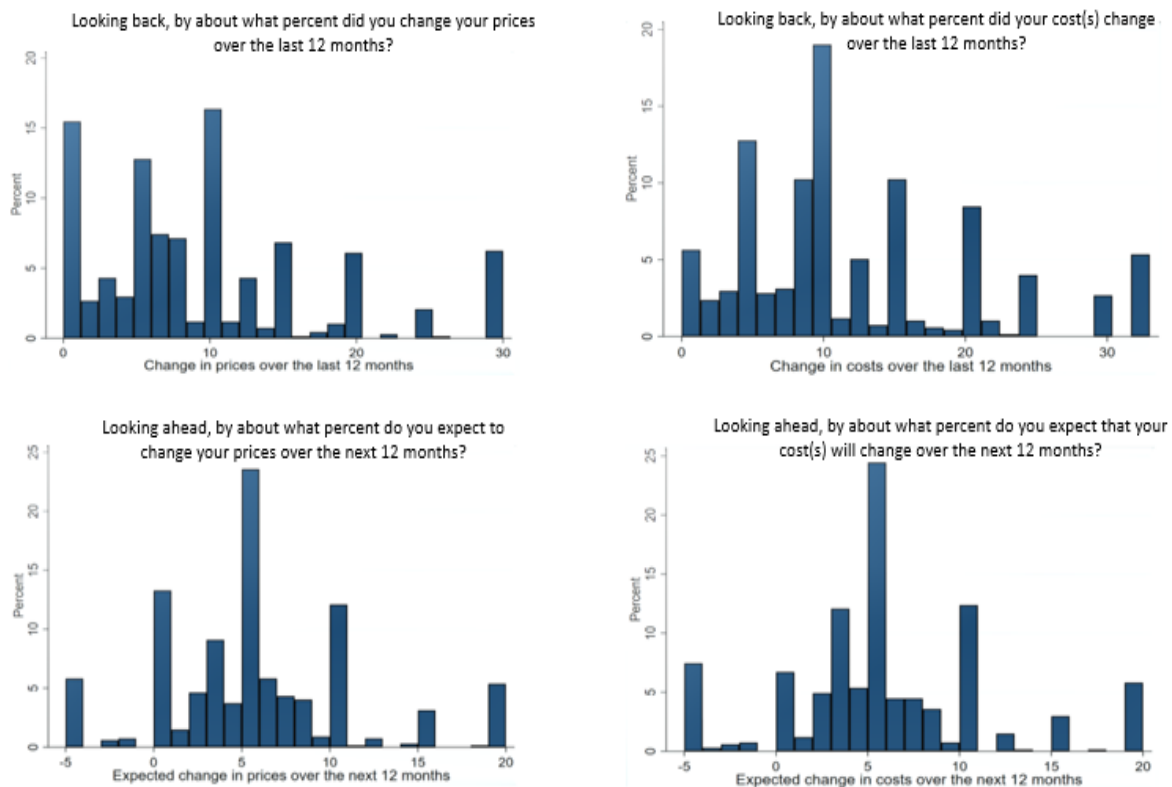
One immediate and important result is that businesses expected lower cost and price pressures for the coming year than they reported (ex post) for the prior year, with the entire

distribution shifting down (leftward). The mean price change moved down from 9.5 percent to 5.4 percent, and the mean cost change moved down from 12.2 percent to 5.5 percent. The modes declined from 10 percent for both costs and prices to 5 percent; the declines in the medians were comparable. While these downward movements are quite large, the readings for the coming year nevertheless remain elevated compared to historical readings.

Table 1: Summary Statistics for Past and Expected Growth of Prices and Costs (%)

| | Previous 12 months | | Next 12 months | |
|--------------------|--------------------|-------|----------------|-------|
| | Prices | Costs | Prices | Costs |
| Mean | 9.5 | 12.2 | 5.4 | 5.5 |
| Median | 8 | 10 | 5 | 5 |
| Mode | 10 | 10 | 5 | 5 |
| Standard deviation | 8 | 8.4 | 5.5 | 5.7 |
| 25th percentile | 4.3 | 6 | 2 | 3 |
| 75th percentile | 12 | 15 | 8 | 8 |
| Minimum | 0 | 0 | -5 | -5 |
| Maximum | 30 | 33 | 20 | 20 |

Figure 2: Histograms of Past and Future Growth of Prices and Costs



Note: The figure presents the distribution of survey respondents' past and expected future price and cost changes. Answers shown are in percent.

There are several other interesting features of the data. The distributions of price changes and cost changes for the same year are broadly similar. The distributions for the previous 12 months are right-skewed, while the distributions of expected changes over the next 12 months are more symmetric. We find substantial binning of price and cost changes at multiples of 5 percent, indicating that some respondents are likely rounding their answers, which is common in such surveys.¹⁴ Whether looking backward or forward, firms were more likely to report zero price changes than zero cost changes. At the individual firm level, despite firms' highly varied experiences in the past year, most firms expected a step down in price growth and cost growth.

III.C. Backward- and Forward-Looking Passthrough Estimates

We use the backward-looking and forward-looking price and cost questions to estimate passthrough in multiple ways.

We begin with the backward-looking price and cost changes. Let $\Delta\%Price_{ifs,t-12}$ denote the percent change in prices over the last 12 months for each firm i of firm size f in sector s . We similarly define $\Delta\%Costs_{ifs,t-12}$ for past cost growth. A simple measure of passthrough is the ratio of these two variables, $PT = \Delta\%Price_{ifs,t-12}/\Delta\%Costs_{ifs,t-12}$, conditional on a non-zero cost change. Table 2 provides the percentage of firms reporting passthrough in different buckets.

Table 2: Distribution of the Ratio of Price Change to Cost Change (%)

| | < 0 | 0 | (0,0.5] | (0.5,1) | 1 | > 1 |
|---------------|-----|------|---------|---------|------|------|
| Backward PT | 0.0 | 11.5 | 12.8 | 29.7 | 28.4 | 17.7 |
| Forward PT | 4.3 | 10.4 | 5.8 | 10.8 | 48.5 | 20.2 |

The first row in the table shows that there is significant heterogeneity in backward-looking passthrough across firms, consistent with the quotes from the semi-structured interviews.

¹⁴ The bunching at certain points is commonly found in the survey literature (see, for example, Manski and Molinari (2010)).

More than a quarter of firms reported that their past increases in costs and prices were equal and hence passthrough for 2022 was exactly 1. About 30 percent of firms reported passthrough that was incomplete but larger than 0.5, suggesting that these firms took a small hit to their markups when costs went up. Roughly one-quarter of firms had passthrough at or below 0.5 or even 0, potentially reflecting extreme price sensitivity or competition. At the other extreme, nearly 20 percent of firms were able to increase their prices more than costs in the recent period, thus increasing their markups.

To investigate the average passthrough in the economy more systematically, we run regressions of the form:

$$\Delta \% Price_{ifs,t-12} = \beta_1 \Delta \% Costs_{ifs,t-12} + \gamma_f + \rho_s + \epsilon_{ifs},$$

where γ_f is a fixed effect for the size group of the firm (1-99 employees, 100-499 employees, or 500+ employees), and ρ_s is a sector fixed effect. Column 1 in Table 3 shows that the average passthrough in our survey is about two-thirds based on firms' perceptions of their past behavior. This average passthrough coefficient is broadly consistent with Amiti et al. (forthcoming), who find passthrough from wages and input costs to producer prices of slightly below 0.6 in the recent period. Similarly, Amiti, Itskhoki, and Konings (2019) find that firms adjust prices with an elasticity of 0.6 in response to own cost shocks.

We can do the same exercises based on firms' forward-looking responses for expected growth of costs and prices. The second row in Table 2 again shows the simplest measure of passthrough as the ratio of the change in prices divided by the change in costs, conditional on a non-zero cost change. We find considerable heterogeneity in expected passthrough, though in general the estimates shift to the right compared with the backward-looking case: almost half of contacts expected price growth to match cost growth in the coming year. Column 2 in Table 3

reports analogous regression results with the forward-looking expectations in place of the backward-looking expectations. Our regression results again indicate an expected passthrough of about two-thirds for the next 12 months, statistically indistinguishable from our earlier average estimate.

Table 3: Passthrough Regression Results

| | (1) | (2) | (3) | (4) | (5) |
|-------------------------|------------|------------|------------|------------|------------|
| VARIABLES | price_t-12 | price_t+12 | price_t+12 | price_t+12 | price_t+12 |
| costs_t+12 | | 0.687*** | 0.631*** | 0.639*** | 0.642*** |
| | | (0.0288) | (0.0309) | (0.0305) | (0.0328) |
| costs_t-12 | 0.662*** | | 0.0178 | | 0.00653 |
| | (0.0279) | | (0.0275) | | (0.0280) |
| price_t-12 | | | 0.103*** | 0.113*** | 0.105*** |
| | | | (0.0275) | (0.0217) | (0.0278) |
| costs_t-12 – price_t-12 | | | | -0.00773 | |
| | | | | (0.0276) | |
| Agg_inf_t+12 | | | | | 0.0591 |
| | | | | | (0.0986) |
| Constant | 1.491*** | 1.692*** | 0.805*** | 0.908*** | 0.541 |
| | (0.412) | (0.227) | (0.294) | (0.287) | (0.553) |
| Observations | 620 | 617 | 614 | 614 | 598 |
| Industry/Firm size FE | Y | Y | Y | Y | Y |
| R-squared | 0.480 | 0.483 | 0.507 | 0.507 | 0.512 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: All variables are winsorized at 5% threshold

In Column 3, we add dynamic elements to the regressions to see whether there are lags in passthrough—i.e., price growth in year t could be influenced by cost growth in year $t-1$ —by relating the anticipated price change over the next 12 months to expected and past cost changes, as well as past price changes. Passthrough could cumulate slowly over time, for example, if firms face strategic complementarities with competitors (see Gopinath and Itskhoki (2010, 2011)). We find little evidence that firms were planning to make up for lagged cost growth, finding a trivially small and statistically insignificant coefficient on that term, but there is some

evidence of inertia in pricing behavior: firms that reported bigger price changes last year expected to have somewhat bigger price changes this year.

In Column 4, we add a control for lagged passthrough, measured as the difference between the percentage change in costs and the percentage change in prices over the last 12 months, based on the idea that firms whose margins became compressed in year $t-1$ might seek to re-establish their desired margins in year t , or if margins that were expanded in year $t-1$ are worn down in year t . The coefficient on this lagged passthrough term is economically and statistically insignificant, and the contemporaneous passthrough coefficient on expected cost changes is nearly unchanged from before.

In Column 5, we control for aggregate inflation expectations. Our survey asked respondents about their expectations for CPI inflation as follows:

Q.7. What do you think will be the inflation rate, as measured by the Consumer Price Index, over the next 12 months?

Our regression finds that aggregate CPI inflation expectations have an insignificant effect on future price growth after controlling for expected cost growth (which could be influenced by aggregate inflation for the reasons described earlier). This finding is in line with work showing that aggregate inflation expectations often do not appear to be playing a key role in firms' pricing decisions (e.g., Coibion, Gorodnichenko, and Kumar (2018)).

Our survey allows us to go beyond the standard passthrough regressions and to analyze passthrough for different groups of firms based on the factors they cite as important when setting prices. Specifically, Table 4 reports results from running four separate regressions of the form:

$$\Delta\%Price_{ifs,t-12} = \beta_1\Delta\%Costs_{ifs,t-12} + \beta_2\Delta\%Costs_{ifs,t-12} \times Group_i + \beta_3Group_i + \gamma_f + \rho_s + \epsilon_{ifs},$$

We run each individual regression based on firms' responses to question Q.6 about the main factors influencing their price-setting for competitors' prices, the strength of demand, wages and

labor costs, and nonlabor costs. The indicator $Group_i$ equals 1 if firm i said that the particular factor was important or very important for its price setting (a score of 4 or 5) and zero otherwise.

Table 4: Passthrough Regressions by Factors That Are Important for Prices

| | Competitors | Demand | Wages | Nonlabor costs |
|--|-------------|------------|----------|----------------|
| $\Delta\%Costs_{ifs,t-12}$ | .5148*** | .4429*** | .6312*** | .6974*** |
| | (.0415) | (.0651) | (.0464) | (.0431) |
| $\Delta\%Costs_{ifs,t-12}$ $\times Group_i$ | .2551*** | .2643*** | .0465 | -.0673 |
| | (.0548) | (.0718) | (.0579) | (.0568) |
| $Group_i$ | -2.7374*** | -2.6967*** | -0.5304 | 1.1265 |
| | (0.8214) | (1.0211) | (0.8851) | (0.8486) |
| Observations | 615 | 618 | 617 | 617 |
| Industry / Size FE | Y | Y | Y | Y |
| R-squared | .5124 | .5055 | .4946 | .4956 |

Notes: Estimates based on reported cost and price growth over the previous 12 months.

Column 1 shows that passthrough significantly increased in the importance that firms attached to competitors' prices for making pricing decisions during 2022. Firms that did not consider competitors' prices to be important (scores of 1-3) had a passthrough of costs to prices of about 0.5. In contrast, firms for which competitors' prices are important (score of 4 or 5) had passthrough of 0.77. This finding could reflect that, with prices rapidly rising in 2022, strategic complementarities may have enabled "follower" firms to pass through a greater share of cost increases after earlier moves by price "leader" firms. This outcome illustrates that in high inflation periods, strategic complementarities in price-setting can amplify price fluctuations as followers catch up with price leaders. Since strategic complementarities are generally thought to dampen price responses in periods of low inflation, they may induce multiple equilibria as described in Ball and Romer (1991).

Column 2 shows that passthrough also increased in the importance of customer demand for price-setting in 2022. When customer demand is important, the passthrough of costs to prices is about 26 percentage points higher than when demand is less relevant. Intuitively, with

generally strong demand during our sample period, firms that were keenly aware of that strength may have felt more comfortable raising prices to a greater extent.

Columns 3 and 4 show that, somewhat surprisingly, passthrough is similar across firms that consider wages and nonlabor costs important for price-setting and those that do not. One reason for this finding could be that, as discussed above, rising costs have been important for the vast majority of firms, especially around the time of our survey, and hence this factor does not differentiate among firms.

III.D. Hypothetical Passthrough Estimates

The passthrough estimates reported above may suffer from various confounding factors. Firms may plan to increase their prices by a certain amount for reasons other than costs, for instance, to respond to competitors' actions or in response to an aggregate demand shock. To get at the notion of passthrough more directly, we devised a hypothetical scenario experiment and embedded it in the survey.¹⁵ In essence, we provided a common shock to our survey respondents' expected cost growth, such that cost growth was now expected to be 5 percentage points higher than they had earlier reported as their baseline expectation, and then we asked firms by what percent they expected to change their prices. By shocking the firms' cost-change expectations by a fixed amount and eliciting their expected price change under that scenario, we aimed to get a clean, arguably causal estimate of the passthrough of costs to prices. Our hypothetical scenario took the following form, including the introductory paragraph:

Next, we would like to ask you what you think that you would do to your price(s) under the following hypothetical scenario. We realize this may be more challenging than asking for the

¹⁵ For a discussion of the use of hypothetical scenarios to generate within-individual variation in the economic environment in order to elicit *conditional* expectations that yield a causal estimate of the impact of shocks, see Fuster and Zafar (2023). Armantier et al. (2022) used hypothetical scenarios to assess the extent to which inflation expectations remain anchored.

forecast you deem most likely. There is no right or wrong answer—we are interested in your views.

*Q.8. Earlier you said that you expect your **average** costs, across all your good(s) or service(s), to change by {Answer:Q.4}% over the next 12 months. Suppose instead that your costs changed by {Answer:Q.4+5}%, that is, cost growth ends up being 5 percentage points higher than expected. Under this scenario, by about what percent would you expect to change your **average** price(s), across all your good(s) or service(s), over the next 12 months?¹⁶*

Figure 3: Difference between Hypothetical Expected Price Change and Baseline Expected Price Change

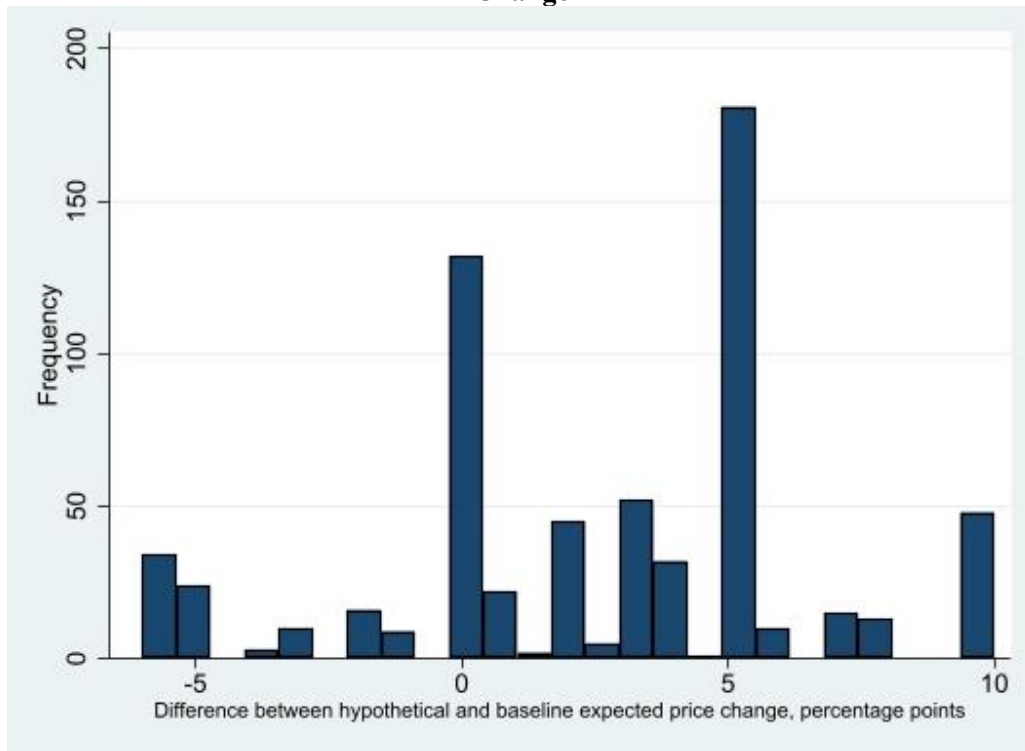


Figure 3 plots the difference between the reported hypothetical expected price changes and the baseline expected price changes, which should be driven by the 5 percentage point higher expected cost growth. Table 5 converts these differences to passthrough measures.¹⁷ Again, we

¹⁶ To make the hypothetical scenario as clear as possible to the survey respondents, we reminded them of their originally reported expectation for cost growth from question Q.4 and then added the hypothetical cost growth shock of 5 percentage points to it, which is one advantage of fielding the survey instrument online.

¹⁷ We translate the percentage point changes into passthrough measures by calculating the difference between respondents' expected price change in the hypothetical (their response to question Q.8) and their "baseline" expected price change (their response to question Q.3), divided by five, that is, the expected price response to the *additional* change in costs (relative to their expectations) under the hypothetical scenario, expressed as a share of that hypothetical cost increase.

find considerable heterogeneity in passthrough at the firm level. The distribution of the hypothetical difference in price changes ranges from -6 to 10 percentage points, with two focal points (20 percent and 28 percent of firms, respectively) at 0 and 5 percentage points, which represent 0 percent and 100 percent passthrough, respectively. We find a meaningful distribution (24 percent of firms) between 0 and 5 percentage points. The interquartile range goes from 0 to 5 percentage points. Some respondents indicate passthrough above 100 percent, reaching up to 200 percent for a difference between the hypothetical and baseline expected price change of 10 percentage points, pointing to some nonlinearity in passthrough. There is also a sizable share of respondents, about 14 percent, for whom the expected response of prices to the hypothetical cost shock is negative.¹⁸

Table 5: Distribution of Hypothetical Expected Passthrough (%)

| | < 0 | 0 | (0,0.5] | (0.5,1) | 1 | > 1 |
|-----------|-------|------|---------|---------|------|-------|
| <i>PT</i> | 14.7 | 20.2 | 11.3 | 13.0 | 27.7 | 13.1 |

The mean (median) expected difference in price responses is 2.5 percentage points (3.0 percentage points), which implies a mean (median) passthrough of 50 percent (60 percent). This result is broadly consistent with the regression results using the backward- and forward-looking questions. Interestingly, respondents who report an expected passthrough of 100 percent (i.e., an expected difference of 5 percentage points in price responses) on average reported a higher increase in prices over the last year (11 percent) than those who reported zero passthrough (9 percent). This difference in passthrough could reflect different demand conditions: firms experiencing more robust demand may have increased prices more last year and may feel better

¹⁸ Note that while we reminded respondents about their original (unconditional) cost growth estimate, we did not remind respondents of their answer to question Q.3, which was their unconditional expected price growth. Some of the extreme passthrough estimates could be caused by reporting error, whereby respondents had trouble understanding the hypothetical or recalling their previous response. However, the fact that the module was short and all questions appeared on the same screen should mitigate this possibility.

able to pass through any additional cost increases without losing sales. We do not find an economically or statistically significant relationship between the size of passthrough and the level of the expected change in costs over the next 12 months. However, passthrough is significantly higher for goods-producing firms and for smaller firms.

Respondents had the option to provide additional comments when completing our survey. Some of these comments shed light on the differences among firms that might explain the wide variation in reported passthrough. Among those reporting zero passthrough, a number of respondents explained that their prices were set at least one year in advance due to long-term contracts. Other respondents commented that their prices were based on what the market will bear or, in a few cases, were fixed by the government. A number of the firms reporting intermediate degrees of passthrough also noted concerns that passing through the whole cost increase to customers would adversely impact sales. In contrast, several respondents reporting 100 percent passthrough simply stated that their price-setting is directly related to cost as a matter of policy.

Our regression-based estimates of backward-looking passthrough were higher for firms that considered either their competitors' prices or the strength of demand "important" or "very important" factors when setting prices. Similarly, we can relate our hypothetical-based estimates of passthrough to the factors that firms consider important. As above, we construct an indicator $Group_i$ that equals one if the firm has responded that a given factor is important or very important for its price-setting (score of 4 or 5) and zero otherwise, and we then run separate regressions for various factors to examine the way in which those factors interact with the hypothetical pricing scenario. The regressions now can take the simple form:

$$\Delta \% Price_{ifs,t+12}^{hypothetical} - \Delta \% Price_{ifs,t+12} = \beta_0 + \beta_1 Group_i + \epsilon_{ifs},$$

where β_0 can be interpreted as average passthrough for respondents who do not consider factor i important, and $\beta_0 + \beta_1$ represents passthrough for those who do consider it important. As shown in Table 6, passthrough is somewhat higher for firms that consider their competitors' prices important, consistent with our regression-based estimates for backward-looking passthrough. Unlike our regression-based backward-looking estimate of passthrough, the hypothetical measure is not significantly related to the importance firms attach to the strength of demand. In line with our earlier findings, there is also no significant relationship between hypothetical passthrough and the importance attached to labor or nonlabor costs.¹⁹

Table 6: Hypothetical Expected Passthrough by Factors That Are Important for Price-Setting

| | Competitors | Demand | Wages | Nonlabor costs |
|--------------------------|-------------|----------|----------|----------------|
| <i>Group_i</i> | .548* | .0462 | -.292 | -.0352 |
| | (.324) | (.407) | (.338) | (.312) |
| <i>Constant</i> | 2.230*** | 2.504*** | 2.746*** | 2.562*** |
| | (.236) | (.369) | (.283) | (.231) |
| Observations | 654 | 654 | 654 | 654 |
| Industry / Size FE | N | N | N | N |
| R-squared | .005 | .000 | .001 | .000 |

IV. Conclusion

As part of a long-running project to talk with firms about their price-setting practices, we used lessons learned from semi-structured open-form interviews to inform a quantitative survey to measure cost-price passthrough. We fielded this survey in December 2022 and January 2023

¹⁹ While not shown in the table, we found greater hypothetical passthrough for firms that considered problems with supply chains to be a very important factor in setting prices, though the coefficient was only significant at the 10 percent level. The coefficient was slightly smaller and no longer statistically significant when including size and sector fixed effects; in part, this may reflect the fact that goods-producing firms report higher passthrough and are more likely to consider supply chains an important factor. The greater passthrough for firms that consider supply chain factors important is interesting because we found in Figure 1 that this set of firms is relatively small. It is possible that these firms were experiencing greater cost pressures in general, and adding yet more cost pressure via our hypothetical exercise could generate an even larger response.

among business contacts from the Federal Reserve Banks of Atlanta, Cleveland, and New York. When asked about the most important factors in their price-setting decisions, contacts most often reported that they viewed the strength of demand, maintaining steady profit margins, and wages and labor costs as the most important factors. Our survey approach allowed us to measure passthrough in three complementary ways: based on reported backward-looking growth in costs and prices; based on expected forward-looking growth in costs and prices; and via a hypothetical scenario posed to business contacts, which allowed us to effectively shock respondents' cost-growth expectations by a common amount and measure how their expected price growth would respond, thereby plausibly identifying the causal passthrough from costs to prices. All three methods produce cost-price passthrough estimates of around 60 percent. While this estimate is for the average passthrough, we document considerable heterogeneity in passthrough at the firm level, with most firms reporting a compression of margins over 2022 but some reporting passthrough that was greater than one-for-one.

Beyond the results we highlight in this paper, we believe the semi-structured interviews that we conducted can be useful for constructing other quantitative surveys and to provide context for the answers coming from both quantitative surveys and empirical exercises. These transcripts provide fertile ground for further study of how firms think about their price-setting process. More generally, this approach could provide a useful road map for developing new surveys, both of businesses and of consumers.

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A. Appendix

A.1. Survey questions using the “most important” language.

Q.1. Looking back, by about what percent did you change the price(s) of your **most important** good(s) or service(s) change over the last 12 months?

Q.2. Looking back, by about what percent did the costs associated with your **most important** good(s) or service(s) change over the last 12 months?

Q.3. Looking ahead, by about what percent do you expect to change that the price(s) of your **most important** good(s) or service(s) will change over the next 12 months?

Q.4. Looking ahead, by about what percent do you expect that the costs associated with your **most important** good(s) or service(s) will change over the next 12 months?

Q.5. How confident are you about the accuracy of your forecasted changes in the price(s) and costs of your **most important** good(s) or service(s) over the next 12 months? {1 to 5 scale, with 1=“Not very confident” and 5=“Very confident”}

Q.6. Currently, when you think about setting the price(s) of your **most important** good(s) or service(s), how important to you are the following factors in making those decisions?

- a. Your competitors’ prices
- b. The strength of demand for your most important good(s) or service(s)
- c. Your wages and labor costs (including benefits)
- d. Your nonlabor costs, such as energy prices, materials prices, transportation costs, rent, etc.
- e. Maintaining steady profit margins (for price over costs)
- f. Interest rates, borrowing rates, and the cost of capital
- g. Problems with your supply chains, such as bottlenecks and product shortages
- h. The overall rate of inflation in the U.S. economy, as measured by the Consumer Price Index
- i. Other: [open-text box]

{For each option, 1 to 5 scale, with 1=“Not very important” and 5=“Very important”}

Q.7. What do you think will be the inflation rate, as measured by the Consumer Price Index, over the next 12 months?

Next, we would like to ask you what you think would happen to your price(s) under the following hypothetical scenario. We realize this may be more challenging than asking for the forecast you deem most likely. There is no right or wrong answer—we are interested in your views.

Q.8. Earlier you said that you expect costs for your **most important** good(s) or service(s) to change by {Answer.Q.4}% over the next 12 months. Suppose instead that your costs changed by

{Answer.Q.4+5}% , that is, cost growth ends up being 5 percentage points higher than expected. Under this scenario, by about what percent would you expect to change by about what percent do you expect that the price(s) of your **most important** good(s) or service(s) would change over the next 12 months?

A.2. Survey Questions Using the “Average” Language

Q.1. Looking back, by about what percent did you change your **average** price(s), across all your good(s) or service(s), over the last 12 months?

Q.2. Looking back, by about what percent did your **average** costs, across all your good(s) or service(s), change over the last 12 months?

Q.3. Looking ahead, by about what percent do you expect to change your **average** price(s), across all your good(s) or service(s), over the next 12 months?

Q.4. Looking ahead, by about what percent do you expect that your **average** costs, across all your good(s) or service(s), will change over the next 12 months?

Q.5. How confident are you about the accuracy of your forecasted changes in your **average** price(s) and costs over the next 12 months? {1 to 5 scale, with 1=“Not very confident” and 5=“Very confident”}

Q.6. Currently, when you think about setting price(s) across all your good(s) or service(s), how important to you are the following factors in making those decisions?

- a. Your competitors’ prices
- b. The strength of demand for your most important good(s) or service(s)
- c. Your wages and labor costs (including benefits)
- d. Your nonlabor costs, such as energy prices, materials prices, transportation costs, rent, etc.
- e. Maintaining steady profit margins (for price over costs)
- f. Interest rates, borrowing rates, and the cost of capital
- g. Problems with your supply chains, such as bottlenecks and product shortages
- h. The overall rate of inflation in the U.S. economy, as measured by the Consumer Price Index
- i. Other: [open-text box]

{For each option, 1 to 5 scale, with 1=“Not very important” and 5=“Very important”}

Q.7. What do you think will be the inflation rate, as measured by the Consumer Price Index, over the next 12 months?

Next, we would like to ask you what you think that you would do to your price(s) under the following hypothetical scenario. We realize this may be more challenging than asking for the forecast you deem most likely. There is no right or wrong answer—we are interested in your views.

Q.8. Earlier you said that you expect your **average** costs, across all your good(s) or service(s), to change by {Answer.Q.4}% over the next 12 months. Suppose instead that your costs changed by {Answer.Q.4+5}%, that is, cost growth ends up being 5 percentage points higher than expected. Under this scenario, by about what percent would you expect to change your **average** price(s), across all your good(s) or service(s), over the next 12 months?

A.3 Semi-Structured Questionnaire

Start of Block: Firm Profile (to be collected prior to interview)

Q1 Firm Profile - Collected in advance of the interview

- ☐ Number of Employees _____
- ☐ Fiscal Year 2019 Total Sales Revenue

- ☐ Job Title _____
- ☐ Range of Products _____
- ☐ 4-digit NAICS _____
- ☐ Tenure of interviewee _____

End of Block: Firm Profile (to be collected prior to interview)

Start of Block: Recording

Q2 We'd like to record this interview to allow each member of our small research team to independently review the transcript rather than a summary. This eliminates any interviewer biases, adding to the overall quality of this study. Would that be ok?

- ☐ Yes
- ☐ No

End of Block: Recording

Start of Block: Opening Statement (to be recorded)

Q3

Thank you for taking the time to speak with us today. With your help and the help of other business leaders, we hope to learn more about how firms function in key areas of interest to monetary policymakers. Your participation will help refine our understanding of firm decision making and contribute to the academic literature on the subject.

We're recording this interview to allow each member of our small research team to independently review the transcript rather than a summary. This eliminates any interviewer biases and adds to the overall quality of this study.

We recognize responses to these questions could vary dramatically from business to business, and there are no "wrong" answers. Most of the questions are open ended, so please feel free to elaborate on any of your responses. We welcome any additional detail you feel may improve our understanding.

For the sake of confidentiality, this recording will be transcribed, but your name and the name of your firm will **not** be included on the transcript. Only the transcript will be shared with the research team.

If at any time you would like to stop the recording, please let us know.

Do you have any questions?

End of Block: Opening Statement (to be recorded)

Start of Block: General Business Cond. - Last Price Set/Changed or Last Price review - Process)

Q4 1. General Business Cond. - Last Price Set/Changed or Last Price review - Process)

Q5 Would you mind providing an overview of your business and your current business conditions?

Q6 How would you assess the level of competition in your industry?

Q7 Are your customers consumers, businesses, and/or institutions?

- ☐ consumers
- ☐ businesses
- ☐ institutions

Carry Forward Selected Choices from "Are your customers consumers, businesses, and/or institutions?"



Q8 Roughly what share of your revenue comes from each group?

- ☐ consumers _____
- ☐ businesses _____
- ☐ institutions _____

Q9 Roughly what share of your domestic revenues are due to foreign sales?

Q10 Roughly what share of your inputs are sourced from abroad?

Q11 What is the last price you set, changed, or reviewed for a potential change?

- ☐ price change
- ☐ set a price
- ☐ price review

Display This Question:

If What is the last price you set, changed, or reviewed for a potential change? = price change

Or What is the last price you set, changed, or reviewed for a potential change? = price review

Q12 How often do you typically change/review this price?

Display This Question:

If What is the last price you set, changed, or reviewed for a potential change? = price change

Or What is the last price you set, changed, or reviewed for a potential change? = price review

Q13 Is that frequency the same for all of your products?

- ☐ yes
- ☐ no

Display This Question:

If Is that frequency the same for all of your products? = no

Q14 Could you describe how it differs among your products/services?

☐

reasons for variation

Q15 Is this the process you follow for most of your products/services?

☐

yes

☐

no

Q16 Could you describe this process?

☐

steps in process

☐

people involved in planning process and nature of involvement

☐

ultimate decision maker

☐

informational inputs (internal reporting, competitors' prices, industry information, macroeconomic data/forecasts)

☐

level(s) at which decision making occurs (global, regional, local)?

☐

has this process changed over time

Q17 Has this process changed over time?

☐

yes

☐

no

Display This Question:

If Has this process changed over time? = yes

Q18 How has the process changed over time?

- ☐ frequency
- ☐ informational inputs
- ☐ people involved
- ☐ locus of decisionmaking

Display This Question:

If Is this the process you follow for most of your products/services? = no

Q19 Do you have a formal or informal price setting process you feel is more representative of how you typically approach price changes/review/setting?

- ☐ yes, for all products/services
- ☐ yes, for some products/services
- ☐ no

Display This Question:

If Do you have a formal or informal price setting process you feel is more representative of how you... = yes, for all products/services

Or Do you have a formal or informal price setting process you feel is more representative of how you... = yes, for some products/services

Q20 Could you tell me more about this process?

- ☐ steps in process
 - ☐ people involved in planning process and nature of involvement
 - ☐ ultimate decision maker
 - ☐ informational inputs (internal reporting, competitors' prices, industry information, macroeconomic data/forecasts)
 - ☐ level(s) at which decision making occurs (global, regional, local)
-

Display This Question:

If Do you have a formal or informal price setting process you feel is more representative of how you... = yes, for all products/services

Or Do you have a formal or informal price setting process you feel is more representative of how you... = yes, for some products/services

Q21 Has this process changed over time?

- ☐ yes
 - ☐ no
-

Display This Question:

If Has this process changed over time? = yes

Q22 How has the process changed over time?

- ☐ frequency
- ☐ informational inputs
- ☐ people involved
- ☐ locus of decisionmaking

End of Block: General Business Cond. - Last Price Set/Changed or Last Price review - Process)

Start of Block: Price variation by customer type - Synchronization - Ties to wages

Q23 2. Price variation by customer type - Synchronization - Ties to wages

Q24 Do you consistently monitor your competitor's prices?

- ☐ Yes
- ☐ No

Display This Question:

If Do you consistently monitor your competitor's prices? = Yes

Q25 Could you tell me more about this?

- ☐ general approach
 - ☐ how often do you check
 - ☐ level of influence competitors' price changes have on the decision to change price
-

Q26 Do you ever lower your prices?

- ☐ yes
- ☐ no

Display This Question:

If Do you ever lower your prices? = yes

Q27 Could you tell me more about this?

- ☐ based on established/new customer
- ☐ based on volume of purchase
- ☐ based on size of firm
- ☐ sales or promotions
- ☐ longer-term price decreases

Q28 Are your price changes synchronized in any way across your products/services?

- ☐ Yes, all are synchronized
- ☐ Yes, some are synchronized
- ☐ No, none are synchronized

Display This Question:

If Are your price changes synchronized in any way across your products/services? = Yes, all are synchronized

Or Are your price changes synchronized in any way across your products/services? = Yes, some are synchronized

Q29 Could you tell me more about this?

Q30 Is there any connection between the changes in the prices you charge and changes in the wages and salaries of your employees or vice versa?

☐ Yes

☐ No

Display This Question:

If Is there any connection between the changes in the prices you charge and changes in the wages and... = Yes

Q31 Could you tell me more about this?

☐

how direct is the connection

End of Block: Price variation by customer type - Synchronization - Ties to wages

Start of Block: Frequency of planning- Planning horizons

Q32 3. Frequency of planning- Planning horizons

Q33 Do you review or change your prices at regular intervals?

☐ Yes

☐ No

Display This Question:

If Do you review or change your prices at regular intervals? = Yes

Q34 Are the time intervals at which you review or change your prices the same for all of your products/services?

☐ Yes

☐ No

Display This Question:

If Are the time intervals at which you review or change your prices the same for all of your product... = Yes

Q35 What are the time intervals over which you review or change your prices?

☐

do the intervals vary by customer type?

Display This Question:

If Are the time intervals at which you review or change your prices the same for all of your product... = No

Q36 Could you tell me more about the variations in the time between price reviews or price changes?

☐

state dependence - do specific events trigger price reviews/changes?

☐

automated in some way?

☐

depend on the customer type?

☐

variation in intervals among products/services?

Display This Question:

If Do you review or change your prices at regular intervals? = No

Q37 How do you decide when to review or change your prices?

☐

triggered by an event

☐

automated in some way?

Q38 When you review your prices, what information do you typically consider?

Q39 Would you say this information relies more on your perceptions of the past or your expectations for the future?

Q40 How far into the future/past do you typically look?

☐

what is time interval?

☐

does period of time vary (if so, why?)

☐

how is this determined?

End of Block: Frequency of planning- Planning horizons

Start of Block: Factors influencing prices - Pass through

Q41 4. Factors influencing prices - Pass through

Q42 What factors have the largest influence on your prices?

☐

same for increases and decreases in prices?

Q43 Have you been experiencing any cost pressures?

☐

yes

☐

no

Display This Question:

If Have you been experiencing any cost pressures? = yes