How Much Have Record Corporate Profits Contributed to Recent Inflation?

By Andrew Glover, José Mustre-del-Río, and Alice von Ende-Becker

Inflation ended 2021 at a 40-year high and rose further in 2022. Policymakers, politicians, and pundits have considered many possible explanations for this burst of inflation, from transitory supply chain disruptions to "wage-price spirals" to mismatches between demand and supply. However, one potential explanation that has received significant public attention is "greedflation"—that is, the idea that firms are capitalizing on their market power by raising their prices higher and faster than the growth in their production costs. This idea is well captured by Robert Reich's May 17, 2022, testimony to Congress, during which he said, "When corporations are so flush with cash, why are they raising prices? They are not raising prices solely because of the increasing costs of supplies and components and of labor.... Corporations enjoying record profits in a healthy competitive economy would absorb these costs. Why? Because they *can.* And they can because they don't face meaningful competition" (p. 2).

Although higher corporate profits have received attention recently, profits and inflation do not have a direct accounting relationship. However, inflation is directly affected by growth in the *markup*—the ratio between the price a firm charges and the firm's current marginal cost of production. Inflation in a firm's prices is therefore the sum of the growth in the marginal cost of production and the growth in the markup.

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Economic theory posits many ways that markups can change over time. For example, markups could change due to a decrease in the price sensitivity of consumer demand or an increase in monopoly power that arises from reduced competition. However, markups could also rise if current marginal costs become less important for a firm's pricing, either because current firms expect higher costs to replace current inventory as it is sold or because firms expect higher marginal costs in the future and want to smooth out price increases over time rather than raise prices sharply and abruptly. In this article, we estimate the 2021 growth rate of markups and discuss likely contributors to this growth. We find evidence that markup growth was a major contributor to inflation in 2021. Specifically, markups grew by 3.4 percent over the year, whereas inflation, as measured by the price index for Personal Consumption Expenditures (PCE), was 5.8 percent, suggesting that markups could account for more than half of 2021 inflation. Such high markup growth is especially striking given that markup growth contributed almost nothing to inflation in the decade leading up to the COVID-19 pandemic.

Although our estimate suggests that markup growth was a major contributor to annual inflation in 2021, it does not tell us *why* markups grew so rapidly. We present evidence that the timing and cross-industry patterns of markup growth are more consistent with firms raising prices in anticipation of future cost increases, rather than an increase in monopoly power or higher demand. First, the timing of markup growth in 2021, as well as earlier in the pandemic, does not line up neatly with the spike in inflation during the second half of 2021. Instead, the largest growth in markups occurred in 2020 and the first quarter of 2021; in the second half of 2021, markups actually declined. Therefore, inflation cannot be explained by a persistent increase in market power after the pandemic. Second, if monopolists raising prices in the face of higher demand were driving markup growth, we would expect firms with larger increases in current demand to have accordingly larger markups. Instead, markup growth was similar across industries that experienced very different levels of demand (and inflation) in 2021. This finding suggests that an increase in markups may provide policymakers with a signal of future inflationary pressures, especially if it occurs during periods where expectations of near-term future inflation are heightened.

Section I reviews the microeconomic theory of price setting by monopolists while holding constant marginal costs and demand. Section II presents our estimates of markup growth across time and industries. Section III extends the theory of pricing to one where firms must consider future marginal costs when setting current prices and demonstrates how an increase in expected future marginal costs translates to inflation through markup growth in the present followed by negative markup growth in the future.

I. Prices, Costs, and Markups in the Model of Monopolistic Competition

Rising monopoly power among firms has been a popular explanation for the 2021 spike in inflation, buttressed by a coincident rise in corporate profits. To help illustrate the mechanisms through which monopoly power can raise markups, Figure 1 first shows how markups are determined in a standard monopolistic model of price setting holding a firm's marginal costs fixed. The solid blue line shows that consumers' maximum willingness to pay (that is, their demand for the good) declines as they purchase more of a monopolistic firm's product. The dashed blue line shows that the marginal revenue a monopolist receives from each additional sale declines as they increase output. Finally, the solid green line plots the marginal cost of producing each unit sold.[1]

A profit-maximizing monopolist chooses the price that equates marginal revenue to marginal cost, so any change in price would lead to a loss in profits. For example, in Figure 1, if the monopolist sets a unit price equal to \$4, consumers will demand (and purchase) three units. Because the monopolist's production cost is only \$1 per unit, they earn \$3 profit per unit for a total profit of \$9 and a markup equal to 4 (\$4 / \$1 = 4). This price equates marginal revenue to marginal cost and maximizes the monopolist's profit. If the monopolist decides to lower the price to \$3, they would sell four units instead of three, but their profit per unit would fall to \$2 for a total profit of \$8 instead of \$9 and a markup of 3. Similarly, if the monopolist raised the price to \$5, then they would make \$4 profit on each unit but sell only two units at that price for a total profit of \$8 and a markup of 5.

Figures 2 and 3 illustrate how markups and costs jointly determine inflation by showing how the monopolist will increase their price in

Figure 1
Price Setting by a Monopolist

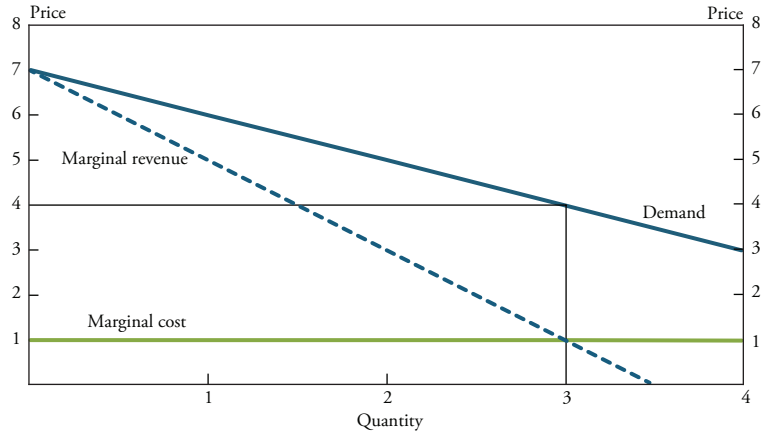
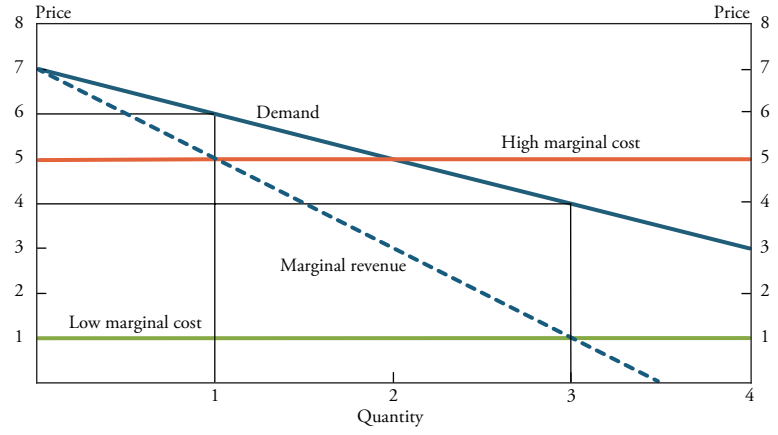
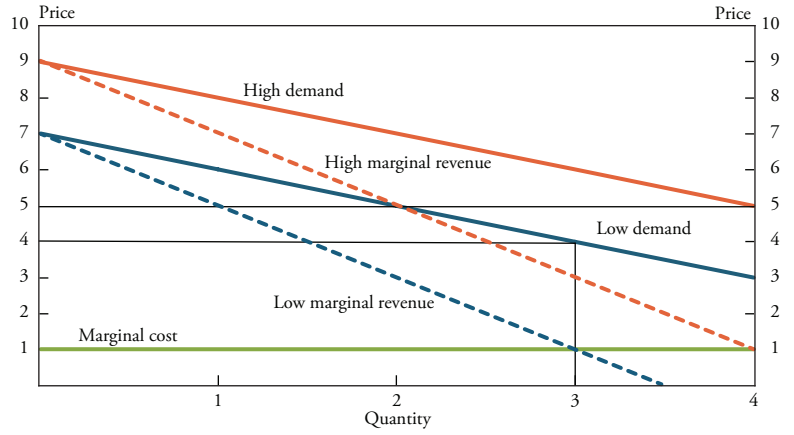


Figure 2
Effect of Higher Marginal Cost on Monopolist Pricing



response to either an increase in the marginal cost or an increase in demand. Figure 2 shows that an increase in the firm's marginal cost from \$1 to \$5—represented by the solid orange line—will raise the unit price by \$2, from \$4 to \$6. In this case, the firm's markup declines from 4 to 1.2 (\$6 / \$5 = 1.2); even though the price level increases, it is driven by the increase in marginal cost and markup growth is actually negative. In contrast, Figure 3 shows that an increase in demand—represented by the solid orange line—causes prices to grow from \$4 to \$5.

Figure 3
Effect of Higher Demand on Monopolist Pricing



In this case, the firm's markup increases from 4 to 5, so the increase in the price level in Figure 3 is entirely due to the firm's markup growing.

In summary, changes in firms' current marginal costs or demand for their products can contribute to inflation as firms adjust their prices to maximize profits. The total change in prices can always be understood as the combined effects of changes in the marginal cost of production and changes in the firm's markup. Our simple model shows that markups may or may not contribute to inflation: when a monopolist's marginal costs increase, markups decline, but when demand for a monopolist's products increases, markups rise.

II. Estimates of Average Markups

Although the figures in the previous section provide simple illustrations of firm markups, measuring the growth rate of these markups in the real economy can be challenging. First, data on a firm's marginal cost of production are not available; instead, we can only observe measures of total costs in nominal values. Second, data collected at the firm level do not report the prices that firms charge or the quantity of goods they produce, but rather their total sales.

To overcome these challenges, we estimate the growth rate in markups by assuming that firms equate their marginal cost to a constant proportion of the production costs that they can control—specifically,

variable costs, which include things like labor and utilities, rather than fixed costs, such as depreciation on previously installed capital. This assumption allows us to proxy a firm's markup growth using the growth in its ratio of sales to variable costs. We estimate markup growth using Compustat data, which consist of quarterly data at the firm level for publicly traded corporations in the United States. These data have been used widely to estimate markups (as in De Loecker, Eeckhout, and Unger 2020) and have two main benefits. First, they allow us to estimate markups at the firm level and then calculate averages at different sectoral levels of aggregation. Second, they include a direct estimate of total variable costs, "cost of goods sold," which is our basis for estimating markups.[2]

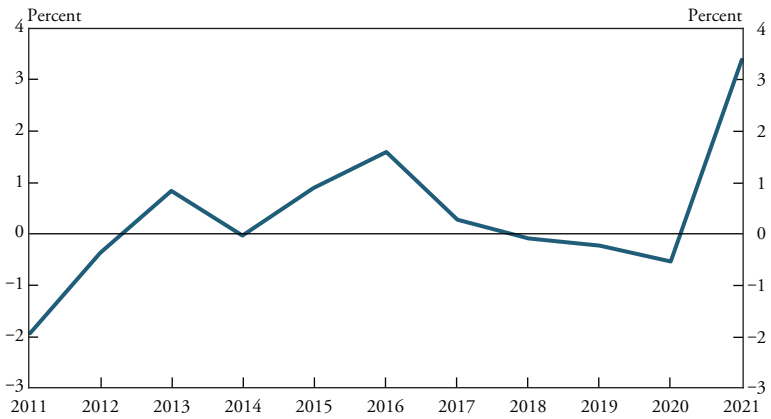
The blue line in Chart 1 plots average markup growth across all firms from 2011 through 2021, weighted by share of total sales. The chart shows that after remaining roughly flat in the decade preceding the pandemic and falling by 0.5 percent in 2020, markups grew by about 3.4 percent in 2021. This is more than half of the 5.8 percent PCE inflation rate, suggesting markup growth played a major role for inflation in 2021.[3] Furthermore, the burst in markup growth seen in 2021 stands in marked contrast to the decade before the pandemic, when marginal cost growth drove inflation and markup growth averaged only 0.42 percent (less than one-third of average PCE inflation over that period).

Looking at the timing of markup growth tells a more nuanced story. Chart 2 shows quarterly markup growth plotted against quarterly PCE inflation. We estimate that quarterly markup growth was highest in 2021:Q1, when it neared 16 percent (annualized), while quarterly inflation was only 4.6 percent. Furthermore, markups fell in the second half of 2021, while inflation accelerated. This suggests that the source of high markup growth in recent years was not a steady increase in monopoly power.

As shown in the previous section, changes in demand can also drive markup growth, even if monopoly power is unchanged. However, if high-frequency changes in demand were generating fluctuations in markup growth, then we would expect industries with higher demand to have both higher inflation and higher markup growth than those with less demand.

Chart 1

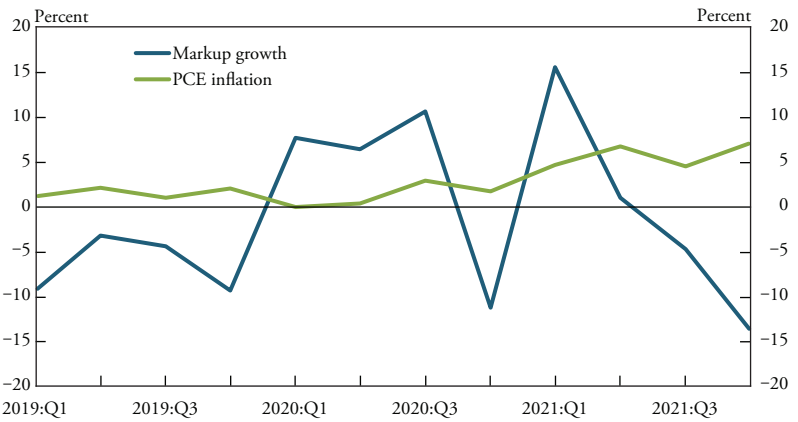
Growth Rate in Markup Estimates



Sources: Compustat and authors' calculations.

Chart 2

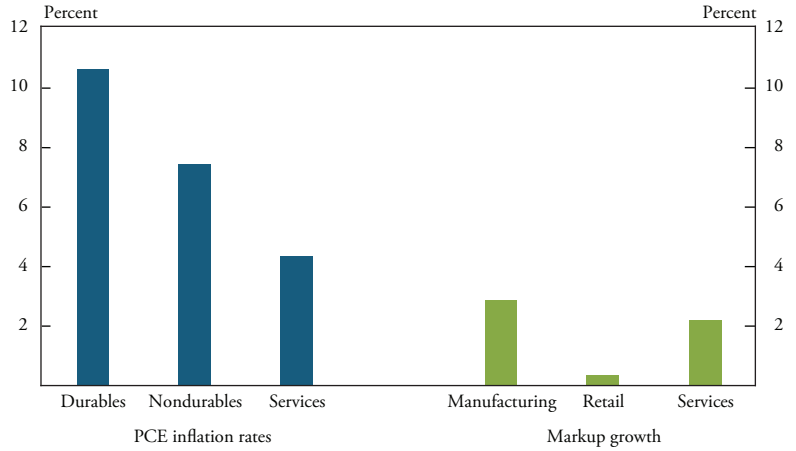
Quarterly Aggregate Markups and PCE Inflation



Sources: Bureau of Economic Analysis (BEA), Compustat, and authors' calculations.

We check for this pattern using the industrial detail of our Compustat markup measure. Goods and services experienced different rates of inflation in 2020 and 2021, as shown in the first three bars in Chart 3. Durable goods inflation spiked sharply to nearly 11 percent, nondurable goods inflation grew by 7.4 percent, and services inflation remained relatively low at 4.3 percent. These differences likely reflect shifts in relative demand in the face of ongoing COVID-19 risk in 2021, as spending on durable goods has a relatively low risk of infection compared with spending

Chart 3
Sectoral Inflation and Markup Estimates



Sources: BEA, Compustat, and authors' calculations.

on services. However, the green bars in Chart 3 show that the pattern for markup growth in roughly comparable industries was much more similar. Markups grew only slightly more in manufacturing (2.90 percent) than in services (2.20 percent), and retail saw the smallest growth in markups (0.33 percent). The similarity of markup growth despite large differences in inflation speaks against a simple demand-based explanation in which markups drove inflation most for industries that experienced the strongest increase in relative demand due to the pandemic.

III. Higher Future Marginal Costs Increase Markups When Pricing Is Dynamic

Although markup growth was high in 2021, the evidence from the previous section casts doubt on the simple explanation of "greedflation," understood as either an increase in monopoly power or firms using existing power to take advantage of high demand. Instead, this evidence may be consistent with an alternative explanation: that firms are raising markups in the present to smooth price increases they expect in the future. Indeed, both the hump shape of aggregate markup growth and similarity in markup growth across industries arise naturally in standard macroeconomic models where firms adjust their prices slowly over time and expect high marginal costs in the near-term future.

To understand how markups can rise in response to an increase in firms' expectations of higher marginal costs in the future, we extend our theory of price setting to one with multiple periods of production and sales as well as "sticky" prices. We consider a firm that has a marginal cost of $1 at the beginning of the year (as in Figure 1) but expects their marginal cost to rise to $5 in the next year (as in Figure 2). However, we assume that this firm will only set its price once for both years, either because it is costly to adjust prices or because consumers dislike frequent price changes. Of course, this illustrative model cannot also generate inflation after markups have fallen, as we see in the data, but we extend it to a longer horizon below.

Figure 4 demonstrates profits as the firm considers prices between $4 (which maximizes profits given a constant marginal cost of $1) and $6 (which maximizes profits given a constant marginal cost of $5). Using either price of $4 or $6 for both periods generates a total profit of $6. However, if the firm sets a price of $5, then profits rise to $8. Effectively, this balances the average of the marginal cost between the two years to the marginal revenue, thereby maximizing total profit. Markups are therefore higher initially—when the marginal cost is $1, firms set a price of $5, leading to a first-year markup of 5 rather than 4. However, markups fall in the second year—when marginal costs rise to $5 and the price remains at $5, then the markup is equal to 1. In other words, the firm just breaks even on the last unit sold in the second year.

Although this simple example illustrates how higher future marginal costs can increase inflation in the present via markups, it is much simpler than the dynamic equilibrium models used by policymakers, which allow firms to engage in many periods of price setting, households to make consumption and labor supply decisions (which determine firms' demand and wage costs), and monetary policy to change interest rates in response to inflation (which affects household spending). Figure 5 demonstrates inflation (blue line) and markup growth (green line) from such a model in which prices, output, and interest rates are all determined jointly in equilibrium following a monetary policy rule that leads the central bank to raise interest rates when inflation rises. In this simulation, firms realize that marginal costs will rise by 10 percent in a year and then shrink slowly, returning to normal after two years. In anticipation, they begin raising prices immediately,

Figure 4

Monopolist Profit from Fixed Price over Two Years

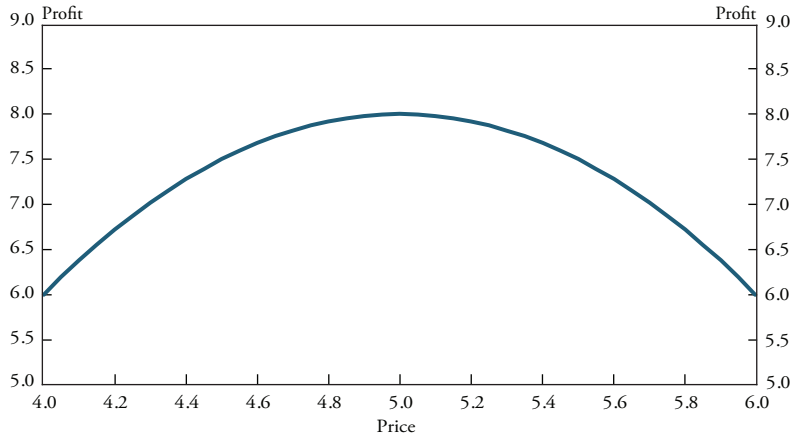
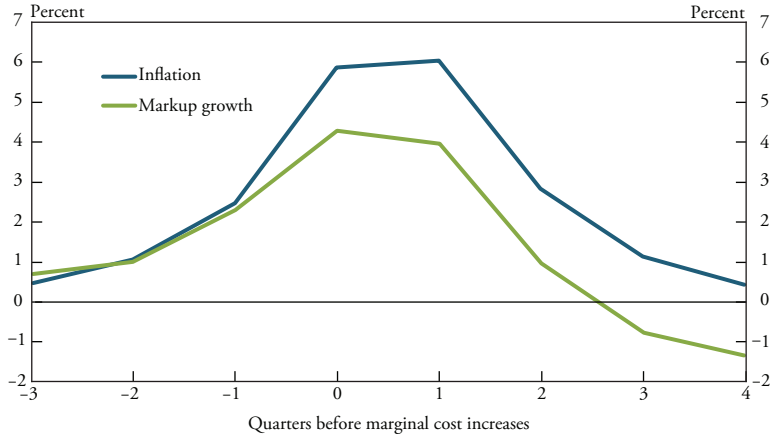


Figure 5

Inflation and Markup Growth from Dynamic Equilibrium Model



which translates into markup growth and inflation. Furthermore, in the model, the increase in inflation elicits an increase in interest rates by the central bank, which in turn lowers employment and reduces marginal costs (through lower real wages). The result is that markup growth initially accounts for more than 100 percent of inflation, which is why the green line is initially above the blue line. Once marginal costs rise, however, inflation is higher than markup growth, and eventually markups begin to shrink. The qualitative pattern of markup

growth's contribution to inflation is remarkably similar to the quarterly pattern of inflation and markup growth in 2021. Furthermore, the initial markup-driven increase in inflation foreshadows the later increase in marginal costs and signals a persistent rise in inflation. Overall, this example's accordance with the quarterly data from 2021 suggests that the large contribution of markups to inflation in 2021 may have been a harbinger of the continued inflation observed in 2022.

Conclusion

As inflation has remained stubbornly high, economists and policymakers have sought to better understand the contribution to price gains from direct increases in marginal costs versus increases in firms' markups. We show that markup growth likely contributed more than 50 percent to inflation in 2021, a substantially higher contribution than during the preceding decade. However, the markup itself is determined by a host of unobservable factors, including changes in demand but also changes in firms' expectations of future marginal costs. The decline in markups during the first half of 2022—even as inflation remained high—is consistent with firms having raised markups during 2021 in anticipation of future cost pressures. Furthermore, the growth in markups was similar across industries with very different relative demand and inflation rates in 2021, which is also consistent with an aggregate increase in expected future marginal costs. We conclude that an increase in markups likely provides a signal that price setters expect persistent increases in their future costs of production.

Endnotes

[1]We use a constant marginal cost for simplicity, but it is not required for our empirical work.

[2]Cost of goods sold is defined by the Internal Revenue Service as "the costs incurred by the corporation in producing the goods or providing the services that generated the corporation's business receipts." While it may sound straightforward that this measure proxies well for variable cost, Traina (2018) argues that one should include other expenses, such as marketing and management costs, as well. We have done our analysis with Traina's alternative measures of variable costs and found similar results for 2020–21.

[3]We say that our estimates suggest that markup growth made a large contribution to PCE inflation because our average markups use different weights than PCE. Specifically, we calculate the average markup in Compustat using each firm's markup weighted by its share of total sales, while the PCE price index weights prices using consumption expenditures.

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