Monopolies amplify demand shocks

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Abstract

The central point of this note is that the relationship between market power and inflation depends crucially on the source of inflationary shocks. To the extent that inflation is driven by demand shocks, firms with market power are likely to respond by increasing margins, and thereby amplifying the inflationary impact of higher demand. By contrast, imperfectly competitive markets typically display only partial cost pass-through. This analysis is relevant to debates about the role of monopoly power in recent US inflation.

1 Introduction

The recent upsurge in inflation has produced renewed debate about the relationship between imperfect competition and the dynamics of inflation. Biden Administration officials and other Democrats have suggested that monopolies have amplified the effects of supply chain disruptions. For example, in questioning of Federal Reserve Chairman Jerome Powell, Senator Elizabeth Warren asked\footnote{https://www.wsj.com/podcasts/google-news-update/lawmakers-question-powell-on-inflation-job-market/97b53925-9e8d-4cd7-9ade-60722d244160}

So let me ask you, does that increase in profit margins combined with greater market concentration in industry after industry suggest to you that some corporations may be passing along increased costs and at the same time charging more on top of that to fatten their profit margins?

Critics of this view have argued that the size of monopoly and oligopoly markups depends only on the extent of market power. Since there has been no

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evidence of a recent increase in monopoly power, it is argued, there can be no
connection between monopoly power and recent inflation. For example, posting
on Twitter, Summers (2021) asserts that

There is no basis in economics for expecting increases in demand to [cause] systematically larger price increases for monopolies
or oligopolies than competitive industries\(^2\)

and refers to the contrary view as "science denial." With a couple of exceptions, respondents to the FT-IGM survey of macroeconomists \(^3\) were dismissive of

the idea of a link between market power and inflationary shocks.

Little of this discussion has referred to the findings of the theoretical litera-
ture on response to cost and demand shocks in imperfectly competitive indus-
tries, including Cowan (2004), Menezes and Quiggin (2020) and Weyl and
Fabinger (2013). Depending on cost structures and the curvature of demand a
variety of outcomes are possible. However, for the simple case of linear demand
and convex costs, sharp results can be obtained.

This analysis can be undertaken in terms of comparative statics for monopoly,
or for oligopoly under the assumption of Cournot competition. However, more
generality and insight may be gained through the use of the concept of the
strategic equilibrium supply curve. (Klemperer and Meyer, Menezes and Quig-
gin). The strategic industry supply curve is a locus of market equilibria traced
out by additive demand shocks. In the oligopoly case, the strategic supply
curve lies in an envelope bounded by the Bertrand (marginal cost pricing) and
Cournot cases, with the steepness of the curve depending on the competitiveness
of the market.

For many purposes, including those of the current paper, the strategic indus-
try supply curve may be used to generalize the standard Marshallian supply-
demand analysis of competitive markets to the general case of imperfect com-
petition. In particular, in the Marshallian model, price is more responsive, and
quantity less responsive, to additive demand shocks the steeper is the industry
supply curve. The same is true for the more general concept of the strategic
supply curve.

As we will show, the distinction between movements along, and shifts in
the supply curve, familiar from introductory economics courses, applies, in the
usual way, to the strategic industry supply curve. Demand-driven inflation can
be represented by movements along the strategic industry supply curve, while
cost shocks generate shifts in the strategic industry supply curve. For cost
shocks, the steeper the industry supply curve, the smaller the response of price
(commonly referred to as cost pass-through) and (since the demand curve is
unchanged) of quantity.

It follows that, to describe the relative impact of demand and cost shocks,
all that is necessary is to determine whether the industry supply curve is steeper
or flatter under imperfect competition. With linear demand and convex costs,

\(^2\)https://twitter.com/LHSummers/status/1475230229715161088
\(^3\)See https://www.igmchicago.org/surveys/inflation-market-power-and-price-controls/.
Menezes and Quiggin (2020) show that the less competitive the market, the steeper the industry supply curve.

Indeed, Menezes and Quiggin show that, even under conditions of constant marginal cost, where the competitive supply curve is horizontal, the strategic industry supply curve under imperfect competition slopes upwards, indicating that markups increase with demand. Drawing on the analysis of tax incidence presented by Fabinger and Weyl, Menezes and Quiggin analyze cost pass through and derive conditions for partial cost pass-through.

The contribution of this note is to make explicit the implications for inflation in the context of cost and demand shocks. Under the stated conditions, equilibrium markups will increase with demand shocks (contrary to the claim made by Summers) and decrease with cost shocks (contrary to the suggestion made by Warren). The extent to which outcomes differ from those that would be expected under perfect competition depends on the degree of competitiveness of the market.

Since the current bout of inflation has been associated with strong growth in demand, as reflected in Personal Consumption Expenditures, this analysis implies that monopoly power has amplified inflation over the current period.

2 Background

Concerns with market power in macroeconomics are not new. The inflationary upsurge that began, relatively modestly, in the late 1950s, led to the emergence of cost-push models in which inflationary cycles were generated by interactions between powerful unions and monopolistic corporations, rather than as a result of demand ‘pull’. (Samuelson and Solow (1960) discuss this debate).

An important development was the ‘jawboning’ dispute of 1962, when President Kennedy attacked US Steel for raising prices, in contravention of what the Administration understood to be a commitment to restrain prices. The broader idea of ‘cost-push’ inflation, a cycle driven by the market power of labor unions and major corporations, was widely accepted and culminated in the imposition of wage and price controls by the Nixon Administration in 1971.

The failure of wage and price controls to bring inflation under control led to general acceptance of expectations-augmented Philips curve models, such as those of Phelps and Friedman. In these models, demand shocks, generated by expansionary monetary policy, were the driving force behind accelerations in inflation.

These models typically had no explicit role for monopoly power. To the extent that market power was taken into account, it was more commonly seen as a source of price stickiness. For example, Hall (1986) discusses how ‘sluggish’ price responses might exacerbate aggregate output fluctuations. New Keynesian models such as that of Akerlof and Yellen (1985) yielded similar conclusions.

With the advent of successful inflation targeting in the 1990s, concern about inflationary dynamics within the economy faded. The influential Taylor rule

\[4\text{https://www.bea.gov/news/2022/personal-income-and-outlays-december-2021} \]
implied that the rate of inflation was a choice variable for monetary policy. Similarly, from the 1980s onwards, the decline of labor unions and the Chicago revolution in anti-trust led to a diminution of concern about monopoly power in labor and product markets. Thus by the mid-1990s, the relationship between inflation and market power appeared to be a dead issue.

Concerns about market power have gradually re-emerged, as large parts of the emerging information economy were dominated by one or a few early movers. In the case of labor markets, the work of Card and Krueger (1994) focused attention on monopsony power. These concerns were reflected in studies of increasing markups and the decline in the labor share of national income.

However, until 2021, inflation remained quiescent. The impact of monopoly power was discussed in terms of relative prices, most notably real wages, rather than the general price level. It is only with the current upsurge in inflation that the relationship between monopoly and inflation has been raised in public discussion.

Suggestions that inflation may be caused or amplified by monopoly have elicited a mostly sceptical response from macroeconomists. The statement of Summers, quoted above, is similar to the views of most macroeconomists who have responded to this debate. Respondents to the FT-IGM survey of macroeconomists mostly rejected the proposition ‘A significant factor behind today’s higher US inflation is dominant corporations in uncompetitive markets taking advantage of their market power to raise prices in order to increase their profit margins’. Few made any explicit reference to the issue of pass-through. The most notable exceptions were Judith Chevalier who stated ‘Pass-through of both cost shocks and demand shocks clearly differ in industries with vs without market power’ and provided a link to Weyl and Fabinger (2013), Eric Maskin who pointed to evidence of partial cost pass-through, and Christopher Udry who said ‘Market structure obviously interacts with shocks to affect inflation, but unlikely that this is first order now’.5

With the exceptions noted above, most respondents to the FT-IGM survey did not draw on any explicit microeconomic foundations for their responses. In order to provide such foundations, it is necessary to consider formal models of pass-through, such as those of Weyl and Fabinger (2013) and Menezes and Quiggin (2020). In the following section, we present the analysis for the simple case of linear demand and convex costs.

### 3 Model

The results to be presented below can be derived using comparative statics for the standard Cournot oligopoly model. However, a more general analysis, yielding greater insight, can be obtained using the concept of the strategic industry supply curve (Klemperer and Meyer 1989; Menezes and Quiggin 2020).6 Competition in supply functions gives rise to a range of equilibrium concepts

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5 See https://www.igmchicago.org/surveys/inflation-market-power-and-price-controls/.

6 For the monopoly case see also Kripalani et al. (1990)
for oligopoly, including Cournot and Bertrand as special cases.

For many purposes, including those of the current paper, the strategic industry supply curve may be used to generalize the standard Marshallian supply-demand analysis of competitive markets to the general case of imperfect competition. The distinction between movements along, and shifts in the supply curve, familiar from introductory economics courses, works very similarly for the strategic industry supply curve. Demand-driven inflation can be represented by movements along the strategic industry supply curve, while cost shocks generate shifts in the supply curve.

We follow the model of Menezes and Quiggin, and consider a market in which \( N \) identical firms supply a homogeneous product focusing on the case of linear demand, with units normalized so that the slope of the demand curve is equal to 1 and intercept equal to \( \varepsilon \in \mathbb{R}_{++} \) a shock observed by firms before they make their strategic choices regarding output and prices

\[
Q_d = \max(\varepsilon - P, 0)
\]

The corresponding inverse demand function is

\[
P = \max(\varepsilon - Q, 0)
\]

The cost of production is given by a convex function \( c(q) \) the same for all firms. The market clearing condition, for a given shock \( \varepsilon \) is

\[
Q_s = \sum_{n=1}^{N} q_n = \max(\varepsilon - P, 0) = Q_d
\]

We turn now to supply. We assume that, after observing the shock \( \varepsilon \), firms compete in linear supply schedules. That is, for each firm \( n \), the strategy space is given by the set of supply schedules of the form

\[
q_n = \alpha_n + \beta P
\]

where \( \alpha_n \) is the strategic variable for firm \( n \) and \( \beta \in [0, \infty) \) is an exogenous parameter representing the competitiveness of the market, common to all firms.

Menezes and Quiggin (2020) show that the equilibrium quantities and price are given by

\[
\begin{align*}
Q &= \frac{N + N(N - 1)\beta}{N + 1 + N(N - 1)\beta} (\varepsilon - c') \\
P &= \varepsilon - Q \\
&= \frac{1}{N + 1 + N(N - 1)\beta} \varepsilon + \frac{N + N(N - 1)\beta}{N + N(N - 1)\beta + 1} c'
\end{align*}
\]

Menezes and Quiggin (2020) derive the symmetric equilibrium industry supply curve

\[
Q = (P - c') ((N - 1)\beta + 1)
\]

\footnote{Delbono and Lambertini (2018) extend the analysis to the case of differentiated products. See also Klemperer and Meyer (1989).}
which will be upward sloping provided $c$ is convex.
For the case of monopoly, this becomes simply

\[ Q = \frac{1}{2} (\varepsilon - c') \]
\[ P = \frac{1}{2} (\varepsilon + c') \]

which states that half of any cost increase is passed through while half of any demand shock is reflected in increased quantity, with the rest taken as an increase in the monopolist’s margin.

The results are illustrated in Figure 1, which shows strategic supply curves under the assumptions of constant marginal cost and linear demand. The cases illustrated, going from most to least competitive, are Bertrand ($\beta \rightarrow \infty$) which corresponds to competitive pricing, oligopoly with $\beta = 1$, Cournot oligopoly ($\beta = 1$). Demand curves are drawn for two values of the shock $\varepsilon$.

The industry supply curves represent equilibria traced out as $\varepsilon$ varies over its range. Conversely, a demand shock, that is, a change in $\varepsilon$ is represented by a movement along the supply curve.

As can be seen in Figure 1, in the competitive/Bertrand case an increase in demand leads to an increase in quantity but no change in price. This follows directly from the assumption that marginal cost is constant, and the requirement that price equals marginal cost in a competitive market.

The less competitive is the market, the steeper the industry supply curve and the greater the increase in price associated with a given increase in demand.
Now consider an additive increase in cost, illustrated in Figure 2, where, for clarity, only the competitive and monopoly cases are shown. Since the strategic supply curve can always be expressed as a function of $P - c$ all the curves will move upwards by an amount equal to the cost shock. In the competitive case, the equilibrium price will increase by precisely the amount of the cost shock. By contrast, under imperfect competition, part of the cost increase will pass through as an increase in the equilibrium price, and the remainder will be absorbed as a reduction in the equilibrium margin.

The argument here is symmetrical with respect to negative shocks. Monopoly power will amplify the price effect of negative demand shocks and moderate the effect of cost shocks. Putting the same point differently, monopoly power increases price volatility associated with demand shocks and reduces price volatility associated with cost shocks.

Finally, consider the case where both cost and inverse demand increase by the same proportional factor $k$. Hence, the profit associated with any output vector will increase by the same factor $k$. Hence, equilibrium output is unchanged, and the equilibrium price increases by the factor $k$. If these changes are driven by general inflation, the real price and real profit will be unchanged. Statements like those of Summers, cited above, and many of the responses to the FT-IGM survey, may be derived from intuitions based on this case.

The analysis presented here deals with the case of a once-off shock, which should have no effect on expectations. By contrast, in the Phelps-Friedman model, the long-run equilibrium is one in which inflation is fully anticipated and the economy operates at the NAIRU, with output and input prices increasing at the same rate. In this context, market power may distort relative prices and result in a higher NAIRU, but has no effect on the long-term rate of inflation.
3.1 The role of antitrust

The model presented here provides a simple framework for assessing the role of antitrust in reducing market power. Markups will be reduced either by an increase in the number of firms $N$ or by an increase in the competitiveness of market behavior, $\beta$.

Menezes and Quiggin (2012) analyze this issue in more detail. Traditional analysis of anti-trust has focused on the number of competitors. In the case of Cournot–Nash equilibrium, the entry of new competitors always improves welfare, with the extent of the welfare improvement depending solely on the elasticity of market demand.

When the intensity of competition is taken into account, however, the results of a Cournot–Nash analysis may be called into question. On the one hand, we might expect that an increase in the number of competitors $n$ will be associated with an increase in the intensity of competition $\beta$. The idea here is that Cournot oligopoly involves an element of implicit collusion, where it is assumed that competitors will not respond to a higher market price by increasing their own output. The greater the number of firms, the more difficult it will be to sustain implicit collusion.

On the other hand, regulatory measures designed to increase the number of competitors may, in some circumstances, reduce the intensity of competition. Most obviously, restrictions on predatory competition, designed to drive competitors out of business, may also restrict price competition, or facilitate implicit collusion, between incumbent firms.

4 Concluding comments

Despite the long-standing demand for micro foundations in macroeconomic analysis, discussion of the relationship between monopoly power and inflation has proceeded with little reference to the relevant literature on industrial organization.

Models of industry supply under imperfect competition show that the relationship between market power and inflation depends crucially on the source of inflationary shocks. To the extent that inflation is driven by demand shocks, as at present, firms with market power are likely to respond by increasing margins, and thereby amplifying the inflationary impact of higher demand.

References


