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Monopsony in Product Markets: An Economic Analysis

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Abstract

Monopsony in economics refers to a situation where one firm dominates the purchasing of a product in a market. Such Monopsonies are common within the economy, as exemplified by such companies as Spotify which dominate the purchase of streaming music from content creators, or large supermarkets like Tesco and Sainsburys whose purchase of products from suppliers such as milk, butter, or meat account for a large share of total demand for these products. Despite Monopsony being a prevalent feature of product markets, textbook treatment of Monopsony tends to focus on the Monopsony purchase of certain types of labour in factor markets – for example, the role of the NHS as a Monopsony employer of nurses in the UK. While Monopsony is important in labour markets, the case of product markets is also important and exhibits characteristics somewhat different from labour markets. Hence this paper focuses on the impact of Monopsony in product markets alone. It is shown that it is the basic effect of Monopsony to cause the price received by suppliers to be lower than that under competitive market conditions, while price to consumers is generally higher, and there is a deadweight welfare loss from Monopsony to society as a whole.

In **Monopsony** we assume there is ***one buyer*** *who purchases the entire output of a market*. It is the opposite of a Monopoly, where one firm *produces* the entire output of a market. In economics textbooks monopsony is usually covered under the topic of labour markets, where a firm is considered to be the sole Monopsony buyer of a certain kind of labour. The classic model was a company town where all the inhabitants work for the same one employer – but there are many other examples in Monopsony in

labour markets, such as the NHS being the dominant purchaser of doctor and nursing services, or the British state being the monopsony purchaser of teaching services. Yet monopsony is far from confined to labour markets: where large firms like Amazon or Tesco enter the market to buy a product from suppliers their market power shows clear signs of Monopsony as they dominate demand for the product. Equally, the government is a dominant Monopsony purchaser of such products as medical supplies for the NHS or defence equipment manufactured by companies like Rolls Royce. Despite Monopsony being so common in product markets, nearly all textbooks and online resources focus their treatment of Monopsony in the context of labour markets. The essential issues remain the same, but the precise assumptions and processes underlying the outcome of the Monopsony market equilibrium vary, and so here we seek to set out a model of Monopsony applicable to *product* rather than labour markets.

Model One: A Monopsony Firm Selling in a Perfectly Competitive Market

We consider first a case of a Monopsony firm which purchases the entire output of a domestic industry and then sells this output to consumers in a perfectly competitive final product market. An example of this might be a firm purchasing the entire output of wheat produced by hundreds of small wheat farmers in the UK and which then sells this wheat on the world grain market. If we assume that the output of British wheat is very small compared to the global output of wheat, any increase or decrease in British wheat output will have no effect on global wheat prices. The Monopsonist firm therefore faces a perfectly elastic demand curve for wheat and can sell as much as it wishes at the going global price of wheat, which we call Pc. Thus, we are considering the case where a firm is a **Monopsonist** in the *purchasing market* and a **Perfectly Competitive** firm in the final *product market*.

To see the effect of Monopsony in this example, consider first the initial market for wheat in the UK, illustrated in Figure 1.

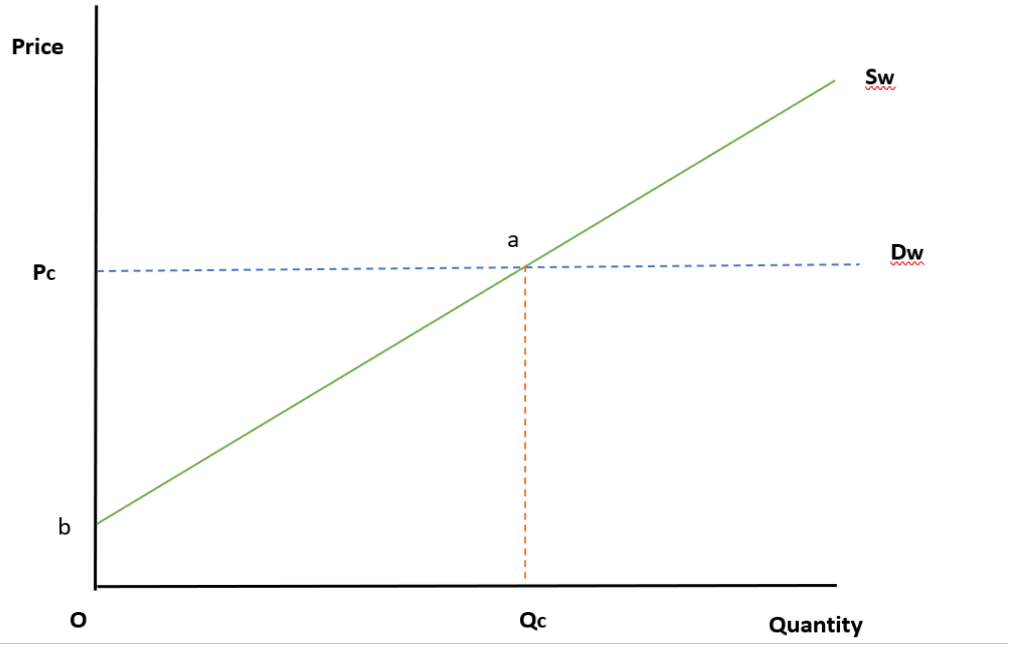

Figure 1. The Competitive Wheat Market

In this diagram, the upward sloping supply line S_W is the supply curve of wheat produced by UK wheat farmers. Pc is the global price of wheat which is set as given for wheat farmers. At this price Pc UK farmers produce Qc of wheat. The **Producer Surplus** enjoyed by those farmers is **Pcab**. The output Q_C is the allocatively efficient output of wheat shown by the fact that the price Pc is equal to the Marginal Cost of cultivating wheat which is represented by the supply line.

Let us now assume that this market is changed by the emergence of a Monopsonist firm which buys up the entire output of UK wheat farmers. It then sells this wheat on the global wheat market. The intervention of the Monopsonist has no effect on the final market for wheat, with the global price of wheat remaining unchanged at Pc. However, the emergence of the Monopsonist buyer of wheat does have a significant impact on the market for UK cultivated wheat.

To see this we need to understand the wheat purchase decision of the Monopsonist. We assume that the Monopsonist wishes to maximise Total Profit Π where profit is the difference between Total Revenue (TR) and Total Cost (TC).

$$\Pi = TR - TC \qquad (1)$$

The Total Revenue of the Monopsonist is the revenue they gain by selling wheat on the global market, and this is equal to the Quantity they sell at the given market price Pc. I.e.

TR = PcQ (2)

The Total Cost of wheat to the Monopsonist is the cost of the wheat they buy from the farmers. As we have seen, the supply curve of wheat produced by UK farmers is a conventional upward sloping one:

Ps = g(Q)

Ps is the supply price of wheat by UK farmers and dPs/dQ is positive. This means that if wheat producers are to be induced to produce more wheat the price of that wheat must rise.

The Total Cost of this wheat to the Monopsonist is:

TC = PsQ (3)

This means that the total amount paid to wheat farmers by the Monopsonist is the price of the wheat Ps multiplied by the quantity of wheat purchased.

What is important to note that is that the Monopsonist is the *only* buyer of UK wheat. The supply curve of wheat to the Monopsonist is the upward sloping supply curve of UK wheat farmers as a whole. *It follows that if the Monopsonist wants to buy more wheat in the UK it must move up the supply line of wheat as a whole; it must, in other words, offer a* ***higher price****.* For remember Ps = g(Q). If the quantity of wheat purchased Q goes up, Ps must go up too.

So what is the cost to the Monopsonist of buying more wheat? To see this we differentiate Total Cost PsQ by Q using the product rule:

$$\frac{dTC}{dQ} = Ps\frac{dQ}{dQ} + Q\frac{dPs}{dQ}$$

$$\frac{dTC}{dQ} = Ps + Q\frac{dPs}{dQ} \quad (4)$$

What this expression shows is the Marginal Cost to the Monopsonist of buying wheat from the farmers. As can be seen, since $Q\frac{dPs}{dQ}$ is positive, the MC of wheat to the firm is greater than the supply price of the wheat Ps.

There are two aspects to this cost. First there is the price the Monopsonist must pay for the given quantity of wheat it buys - which is Ps. But in addition, when the firm buys this extra wheat, *it raises the price of all the wheat it is already buying*. The wheat

it is buying is Q and the extra price it has to pay per unit of Q is dPs/dQ. As can be seen, this is the opposite of the case of the Monopolist: when a Monopolist wishes to sell more output it must lower the price of ALL its output; here when the Monopsonist wishes to buy more output it must raise the price of ALL the output it buys. Thus, the Marginal Cost of buying wheat dTC/dQ *exceeds* the price paid to the wheat farmers, Ps.

The Profit Maximising Purchase of Wheat by the Monopsonist/Competitive Firm

We can now determine the profit maximising amount of UK wheat the Monopsonist will wish to buy from the wheat farmers. As noted, Profit equals Total Revenue – Total Cost. Thus:

$$\Pi = TR - TC = PcQ - PsQ \quad (5)$$

To arrive at the profit maximising quantity of wheat bought by the Monopsonist we differentiate the profit function by Q and set the differential equal to zero. Remember that Pc is given to the firm by the global wheat market so is taken as a fixed value. Thus:

$$\frac{d\Pi}{dQ} = Pc - \left(Ps\frac{dQ}{dQ} + Q\frac{dPs}{dQ}\right) = 0$$

Which simplifies to:

$$\frac{d\Pi}{dQ} = Pc - \left(Ps + Q\frac{dPs}{dQ}\right) = 0 \quad (6)$$

Which we can re-arrange as:

$$Pc = Ps + Q\frac{dPs}{dQ} \quad (7)$$

Pc is the Marginal Revenue of the Monopsonist when **selling** wheat. It is constant and equal to price since all wheat sells in the international market at the global price of Pc. The expression on the right is the Marginal Cost to the Monopsonist of **buying** wheat. It is the expression for MC we derived in equation (4) above.

Thus: the Monopsonist will purchase wheat from farmers to sell on the global wheat market until the MC of buying the wheat equals the MR = Pc it derives from selling the wheat, i.e. MC = MR. We represent this outcome in Figure 2.

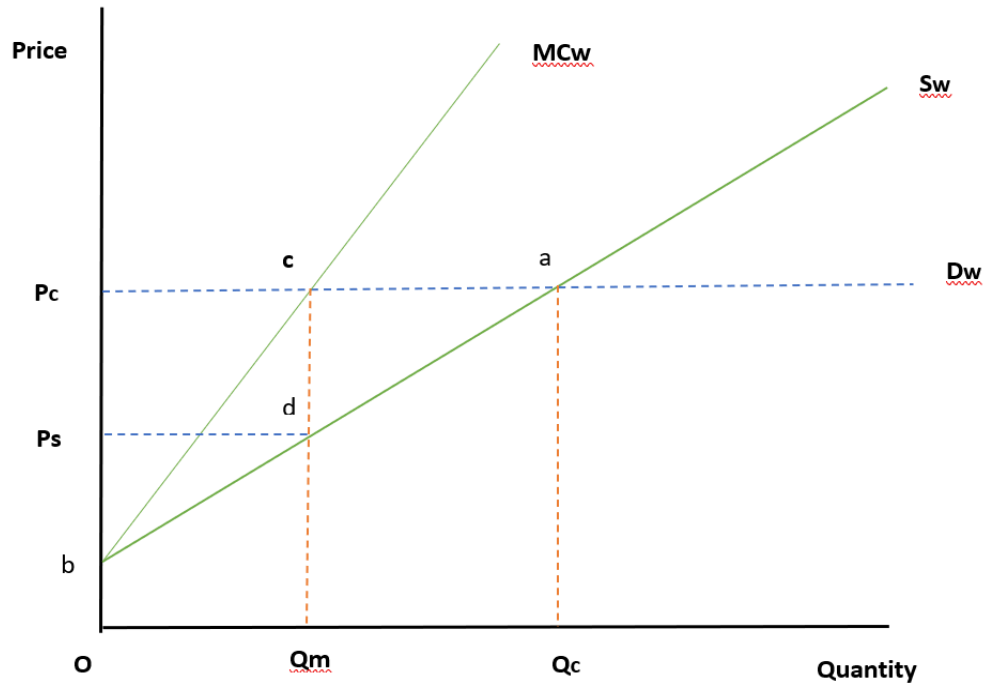

Figure 2. The Monopsonist Wheat Purchase Decision

This diagram shows the UK market for wheat now that there is a Monopsonist buyer of wheat. The global price of wheat remains unchanged at Pc. The supply curve of wheat produced by UK farmers also remains unchanged as Sw. What has changed is the introduction of the new Marginal Cost of wheat line MCw. This is the Marginal Cost of buying wheat for the Monopsonist. It is above the supply of wheat line Sw because, to buy extra wheat from UK farmers, the Monopsonist bids up the price of wheat in the UK as a whole (as was proven in equation (4) above). Equation (7) told us that the Monopsonist will purchase wheat until the Marginal Cost of wheat equals the price at which it is sold, Pc. Thus the Monopsonist will purchase Qm of wheat from British farmers.

Clearly, the effect of introducing a Monopsonist buyer of wheat has caused the amount of UK wheat to be sold to fall from Qc to Qm. Less wheat will be cultivated. At Qm the price of wheat Pc exceeds the Marginal Cost of cultivating wheat (which is Ps) and so the wheat sector is now *allocatively inefficient* and there is a deadweight welfare loss equal to **cad**. At Qm the Total Revenue of the Monopsonist is PcQm (or the rectangle **PccQmO**) while the Monopsonists Total Cost is PsQm (or the rectangle **PsdQmO**). Since TR>TC the Monopsony is making **Super Normal Profit** equal to **PccdPs**. The chief losers from the introduction of Monopsony in the buying of wheat are the UK wheat farmers. They are selling less wheat at a lower price. Where they used to sell wheat to the global market at Pc they are now selling wheat to the Monopsonist at Ps. As a result, the farmers' Producer Surplus has contracted from

Pcab to **Psdb**. This is why Monopsony is usually seen as detrimental to the interests of suppliers.

A Numerical Example

We can illustrate the above results with a simple numerical example.

Suppose the UK supply function of wheat in tons is:

Ps = 20 + 8Q

We assume this wheat is sold on an international wheat market where the given equilibrium Price Pe is £100. This price is fixed and given to the wheat producing farms. Given this price we can calculate how much wheat these firms will wish to produce as follows:

Ps = 20 + 8Q
Ps = Pe = 100.

So:

100 = 20 + 8Q
80 = 8Q
Q = 10

Thus, at an international price of 100, UK wheat farms will wish to produce 10 tons of wheat.

Let us now assume that a Monopsony firm enters the market to buy the entire output of the UK wheat farms.

The Total Revenue of this firm will be:

TR = PeQ

since Pe is still the fixed international price of wheat.

The Total Cost function of the Monopsonist will be:

TC = PsQ

Where Ps is the price that it pays UK wheat farmers for their wheat. Given that:

$Ps = 20 + 8Q$

We can re-write the Total Cost function as:

$TC = (20 + 8Q)Q$
$TC = 20Q + 8Q^2$ (8)

We assume that the Monopsonist wishes to maximise its profits from the buying and selling of wheat. Profit (Π) is the difference between Total Revenue and Total Cost. Thus:

$\Pi = TR - TC$
$\Pi = PeQ - (20Q + 8Q^2)$
$\Pi = (100)Q - (20Q + 8Q^2)$ (9)

To calculate the Monopsony's profit-maximising purchase of wheat we differentiate the profit function by Q and set it equal to zero. Thus:

$\frac{d\Pi}{dQ} = 100 - (20 + 16Q) = 0$ (10)

Which can be re-arranged as:

$100 = 20 + 16Q$ (11)

The 100 on the left hand side is the Marginal Revenue of selling more wheat on the global market – which is identical to its price Pe. The expression on the right is the first differential of the TC function dTC/dQ and is therefore equal to the Marginal Cost of buying wheat from the farmers. Simply, the Monopsony buys wheat from the farmers until the Marginal Cost of buying the wheat equals the Marginal Revenue they derive from selling it. It follows that the profit maximising quantity of wheat purchased is:

$100 = 20 + 16Q$
$80 = 16Q$
$Q = 5$

Thus the Monopsonist will purchase 5 tons of wheat from the farmers – half the amount they previously sold on the open market. It is half because with a linear supply line Ps = 20 + 8Q the Marginal Cost line has a slope double the supply line since MC = 20 +

16Q. We can calculate the price the Monopsonist must pay the farmers for 5 tons of wheat from the supply function:

Ps = 20 + 8Q
Ps = 20 + 8(5)
Ps = 20 + 40 = 60

The effect of introducing a Monopsony purchaser of UK wheat has been to cause the amount of wheat purchased to fall from 10 tons to 5 tons and the price received by wheat farmers to fall from £100 per ton to £60 per ton. The Monopsonist pays farmers £60 a ton for wheat and then sells this wheat on the international market for £100. The Monopsonists Super Normal Profits are equal to:

Π = TR – TC
Π = PeQ – PsQ
Π = 500 – 60(5)
Π = 500 – 300 = £200

Model Two: A Monopsony Firm Selling in a Monopoly Market with Perfect Price Discrimination

So far we have imagined a firm that is a Monopsony in the buying market for a product but a Competitive firm in the selling of that product. This is unrealistic in most cases: if a firm buys the entire output of a product from suppliers it will naturally tend to be a Monopoly seller of that product to final consumers. In other words, a **Monopsony** firm is also likely to be a **Monopoly** firm. We might think of the music streaming service Spotify. Spotify occupies a dominant position as a *buyer* of content from musicians and record companies: in 2021 it paid a total of $7 billion to music suppliers, the largest amount paid by one firm for music rights in history. And Spotify is also the dominant *seller* in the market for digital music, where it accounts (as of 2023) for 30 per cent of all music streamed, more than the second and third largest streaming companies combined.

What is the effect of assuming that a firm is *both* a Monopsonist buyer of products from suppliers and a Monopoly seller of those products on to final consumers?

As an example, we might consider a market for milk. Assume that a large supermarket chain is a **Monopolist** and sells ALL the milk that is sold in the market to milk consumers. Assume, too, that this supermarket is **Monopsonist** in the purchase of milk from dairy farms. We can imagine a situation where there are lots of small dairy

farms, all of which sell their milk to this *one* large purchaser of milk. So: *the supermarket buys the entire supply of milk in the market and then sells this milk on through its stores, where it is a monopoly seller of milk to customers.*

What happens in the market in this case?

First, let us begin with the supermarket as a *Monopoly seller of milk to consumers*. The supermarket faces the downward sloping market demand curve for milk and the price it receives is an inverse function of quantity sold:

$Pd = h(Q)$

Where Pd is the price as which milk is sold in the supermarket. Here $dPd/dQ < 0$ since if the firm seeks to supply more milk to consumers (+dQ) it must lower its price (-dPd). Now the effect on the milk market of making our Monopsony buyer of milk also a Monopoly seller of milk depends upon how we assume the Monopolist behaves. Shortly we will present the conventional case where the Monopolist sets MC = MR in the context of a downward sloping down line. Initially, however, we assume that the Monopolist practises *perfect price discrimination*. What this means is that the supermarket charges each consumer exactly the maximum price they are prepared to pay for the milk. Each consumer therefore pays a different price according to the maximum price they are prepared to pay for milk. This maximum price is represented by the demand line and to sell more milk the supermarket only has to reduce the price of milk to the *last* consumer (leaving previous prices charged to previous consumers unchanged). In short. Each unit of the product (say pints of milk in this case) sells at its own unique price. The effect of this is to make Price and Marginal Revenue the same: the extra revenue from selling one more unit of milk is identical to the price of that last unit of milk. In other words:

$Pd = MR$

This assumption is unrealistic of course. The reason we are making it is to allow us to isolate the effect of being a *Monopsony* on the firm's behaviour by reducing the effect of it being a *Monopoly*.[1] By setting Pd = MR we are removing the usual Monopoly situation of Pd > MR (which we analyse below).

Given that MR=Pd in the milk retail market, the firm's MR function is the Price or Demand function for milk as a whole. This is shown in Figure 3 below.

[1] We are not eliminating it entirely since the firm still faces a downward sloping demand line, which is only true in imperfect competition.

On the other hand, we are assuming that this supermarket is a Monopsony buyer of milk from dairy farms. This firm is in the same position as the Monopsony buyer of wheat we considered before. As in that example, if the supermarket wishes to purchase more milk from farmers it moves up the supply curve for milk, thus raising the supply price of raw milk. And this effect of raising the market price of raw milk means that the Marginal Cost of milk to the supermarket is greater than the price of milk to farmers.

Let us remind ourselves of the formal demonstration of this result.
First, the supply curve of milk produced by UK farmers is a conventional upward sloping one:

$Ps = g(Q)$

Ps is the supply price of milk by UK farmers and dPs/dQ is positive: if milk farmers are to be induced to produce more milk the price of that milk must rise. The Total Cost of this milk to the Monopsonist is:

$TC = PsQ$

This means that the total amount paid to milk farmers by the Monopsonist is the price of the milk Ps multiplied by the quantity of milk purchased.

But, as we have noted, the supply curve of milk to the supermarket is the upward sloping supply curve of milk producers as a whole. Hence, *if the Monopsonist wants to buy more milk in the UK it must move up the supply line of wheat as a whole; it must, in other words, offer a* ***higher price****.* Since Ps = g(Q), if the quantity of milk purchased (Q) goes up, Ps must go up too. In other words, Ps is a function of price and therefore (3) can be re-written as:

$TC = g(Q)Q$

So what is the Marginal Cost to the Monopsonist of buying more milk? To see this we differentiate Total Cost PsQ = g(Q)Q by Q using the product rule:

$$\frac{dTC}{dQ} = Ps\,\frac{dQ}{dQ} + Q\frac{dPs}{dQ}$$

$$\frac{dTC}{dQ} = Ps + Q\frac{dPs}{dQ} \qquad (12)$$

What (12) shows is the Marginal Cost to the Monopsonist of buying more milk from the farmers. As can be seen, since $Q\frac{dPs}{dQ}$ is positive (since Q and dPs/dQ are both positive), the MC of milk to the supermarket is greater than the supply price of the milk Ps. Thus, in Figure 3 we see that the Marginal Cost line is above the supply price of milk line Sm.

Assuming that our Monopsonist/Monopolist firm is a profit-maximiser, it will buy milk from farmers until the MC of the milk it buys is equal to the Marginal Revenue it derives from selling that milk. We have already seen that in the case of perfect price discrimination MR = P. Thus the Monopsonist/Monopolist purchases milk until:

MC = MR

$Ps + Q\frac{dPs}{dQ} = Pd$

Or

$$Ps = Pd - Q\frac{dPs}{dQ} \qquad (13)$$

Since the term $Q\frac{dPs}{dQ}$ is positive, it follows that the price milk producers receive Ps is less than the price of the last unit of milk sold to consumers, the difference increasing with the amount of milk sold (Q) and the slops of the supply line dPs/dQ.

These results are illustrated in Figure 3 below.

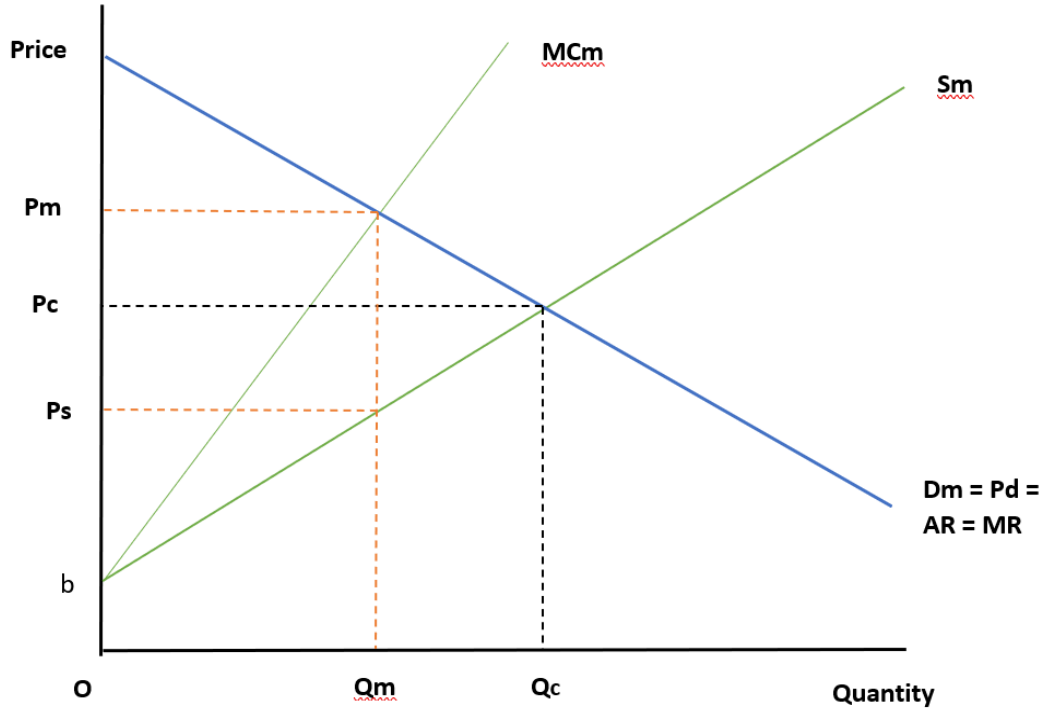

Figure 3. A Monopsony Buyer Acting as a Perfect Price-Discriminating Monopolist

In Figure 3, the initial equilibrium in the milk market is where the demand for milk equals the supply at price Pc and quantity exchanged Qc. The market is allocatively efficient since Pc = MC of producing milk as shown by the supply line. There is no deadweight welfare loss. The effect of Monopsonising the buying of milk from farmers is to cause the emergence of the new Marginal Cost of buying milk line, MCm. The Monopsony firm is also a Monopoly and faces the downward sloping market demand curve for milk Dm = Pd. Since we are assuming Perfect Price Discrimination, then Pd = MR as shown. The profit maximising Monopsony/Monopoly buys milk from farmers until the Marginal Cost of that milk equals the Marginal Revenue from its sale. This is quantity Qm where MCm = MR. At this output Qm the last unit of milk sold sells for Pm. The effect upon consumers of Monopsony/Monopsony is thus an increase in the price of milk from Pc to Pm. The price of raw milk received by farmers falls from Pc to Ps. *Again, an essential effect of Monopsony is to lower the price received by suppliers to that Monopsony*. At Qm Price Pm exceeds the Marginal Cost of producing milk and there is allocative inefficiency and a deadweight welfare loss to society as a whole.

A Numerical Example

We can illustrate this case by developing the numerical example we commenced earlier. Previously we assumed that the supply function of wheat was Ps = 20 + 8Q.

Let us now call this the supply function of milk. To this we add a demand function for milk in the market as a whole:

$Pd = 150 – 5Q$

These functions show the supply of fresh milk by farmers and the demand for milk by consumers. In the absence of Monopsony or Monopoly the competitive equilibrium of milk exchanged and the equilibrium price can be calculated as follows.

In equilibrium:

$Ps = Pd$

So:

$20 + 8Q = 150 – 5Q$
$20 + 13Q = 150$
$13Q = 130$
$Q = 10$

Given at equilibrium quantity of 10, equilibrium price is:

$Pd = 150 – 5(10)$
$Pd = 100$

Thus, if this milk market was freely competitive with numerous producers and buyers of milk, the equilibrium price of milk would be 100 and the quantity bought and sold 10. This is our benchmark for assessing the affect of Monopsony and Monopoly.

Now assume that a Monopsony supermarket buys the entire output of milk from farms and sells this milk as a Monopoly to consumers *practicing perfect price discrimination.* In this case the Marginal Revenue for the firm of selling milk is:

$MR = Pd = 150 – 5Q$

The Marginal Cost of *buying* milk is:

$TC = PsQ$
$TC = (20 + 8Q)Q$
$TC = 20Q + 8Q^2$

So the Marginal Cost of milk is:

$\frac{dTC}{dQ}$ = 20 + 16Q
As we have seen, the firm will set MC = MR, so:

20 + 16Q = 150 – 5Q
20 + 21Q = 150
21Q = 130
Q = 6.19

At a quantity of milk bought and sold of 6.19 the final price to the marginal consumer will be:

Pd = 150 – 5(6.19)
Pd = 150 – 30.95
Pd = 119

By contrast the price paid to milk farmers will be:

Ps = 20 + 8Q
Ps = 20 + 8(6.19)
Ps = 20 + 49.5
Ps = 69.5

We therefore see that the effect of introducing a Monopsony buyer/Monopoly seller of milk into this previously competitive market is to: raise the price to consumers from 100 to 119; to reduce the quantity bought and sold from 10 to 6.19; and to lower the price paid to dairy farmers from 10o to 69.5. *Monopsony raises the price to consumers and lowers the price received by suppliers.*

Model Three: A Monopsony Firm Selling in a Monopoly Market with No Price Discrimination

In this section we remove the assumption that the Monopolist practises perfect price discrimination in the product market. In effect we assume the standard case of a firm which is a Monopsony *buyer* in the goods-supply market and a Monopoly *seller* in the final-goods market, where the Monopolist does not practise price discrimination and sets just one price for its good to consumers.

Since we are dealing with a Monopolist who sells the entire output of an industry, the firm's Total Revenue is:

TR = PdQ

Pd is a function of quantity sold, i.e. Pd = h(Q). Substituting in Pd = h(Q) for Pd, this can be written as:

TR = h(Q)Q

Differentiating the Total Revenue function h(Q)Q by Q we get the firm's Marginal Revenue from selling milk in its stores:

$$\frac{dTR}{dQ} = MR = Pd\frac{dQ}{dQ} + Q\frac{dPd}{dQ} = Pd - Q\frac{dPd}{dQ} \quad (14)$$

We have shown $Q\frac{dPd}{dQ}$ with a negative term since dPd/dQ is always negative – when Q increases, Pd falls. This means that a Monopoly seller's Marginal Revenue is less than Price: MR < Pd. This is a well-known result for any Monopoly.

The Monopoly seller of milk is also, of course, a Monopsonist *buyer* of milk from dairy farmers. We have considered the case of the Monopsonist buyer above, and it will be recalled that the Marginal Cost of buying milk from farmers is:

$$\frac{dTC}{dQ} = Ps + Q\frac{dPs}{dQ}$$

This expression shows the Marginal Cost to the Monopsonist of buying more milk from the farmers. Since $Q\frac{dPs}{dQ}$ is positive, the MC of milk to the supermarket is greater than the supply price of the milk Ps.

The Profit Maximising Purchase of Milk by the Monopsonist/Monopoly Firm

Now we consider the profit maximising amount of milk the Monopsonist/Monopoly firm will wish to *buy* from the dairy farmers. Profit equals Total Revenue – Total Cost. Thus:

Π = TR – TC = PdQ - PsQ

To arrive at the profit maximising quantity of milk bought by the supermarket we differentiate the profit function by Q and set the differential equal to zero:

$$\frac{d\Pi}{dQ} = Pd\frac{dQ}{dQ} + Q\frac{dPd}{dQ} - \left(Ps\,\frac{dQ}{dQ} + Q\frac{dPs}{dQ}\right) = 0$$

Which simplifies to:

$$\frac{d\Pi}{dQ} = Pd + Q\frac{dPd}{dQ} - \left(Ps + Q\frac{dPs}{dQ}\right) = 0 \qquad (15)$$

Which we can re-arrange as:

$$Pd + Q\frac{dPd}{dQ} = Ps + Q\frac{dPs}{dQ}$$

Since dPd/dQ is always negative, this can be written as:

$$Pd - Q\frac{dPd}{dQ} = Ps + Q\frac{dPs}{dQ} \qquad (16)$$

The expression on the left is the Marginal Revenue of the supermarket as a Monopoly when **selling** milk; the expression on the right is the Marginal Cost of the supermarket as a Monopsonist when **buying** milk.

Thus: the supermarket will purchase milk from dairy farmers to sell to consumers until the MC of buying the milk equals the MR it derives from selling the milk, i.e. MC = MR. We represent this outcome in Figure 4.

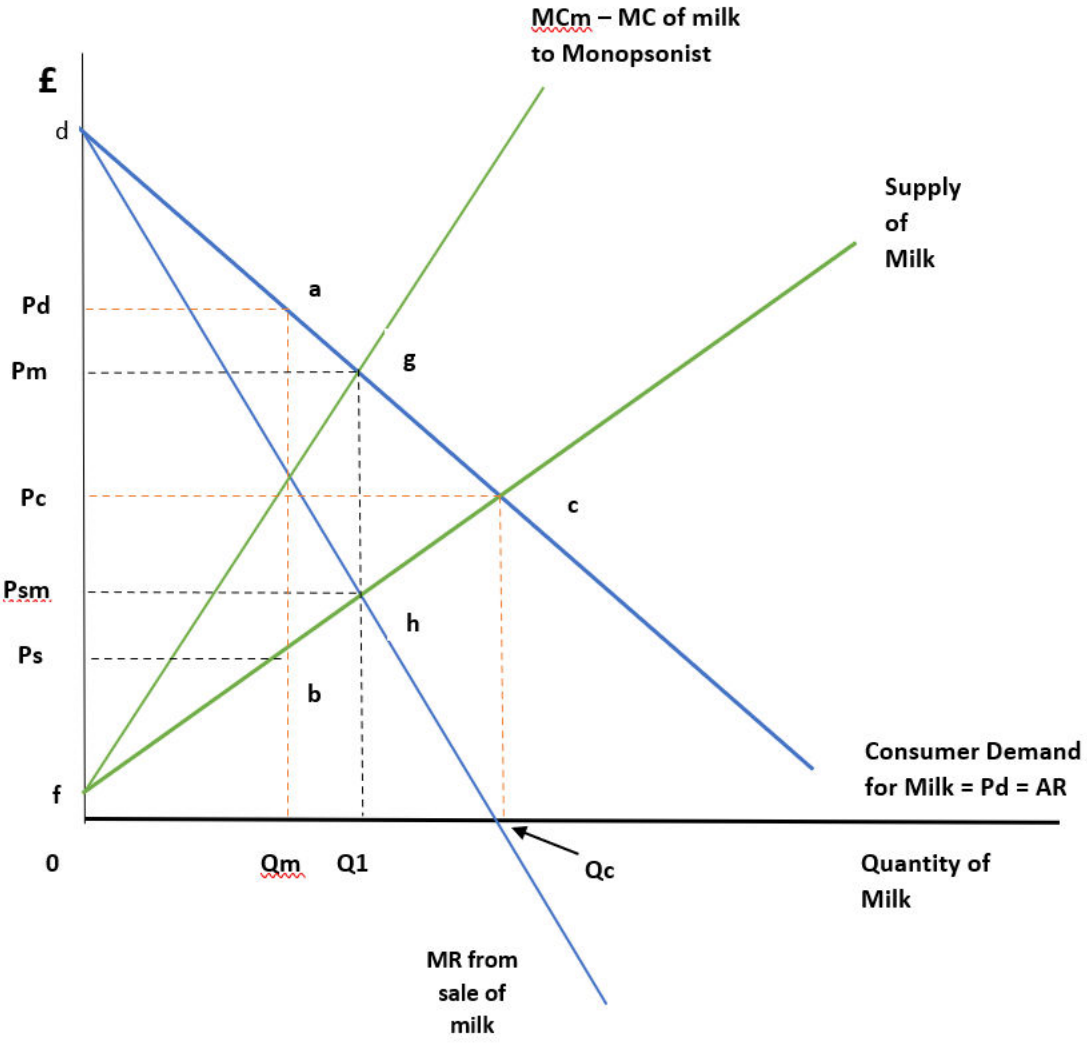

Figure 4. The Monopsony/Monopoly Market for Milk

This diagram shows the market for milk when a Monopoly seller of milk to consumers is a Monopsony buyer of milk from suppliers.

If the market was **perfectly competitive**, with large numbers of sellers and buyers, then the equilibrium price of milk would be Pc and the equilibrium quantity bought and sold would be Qc. Pc would be the price received by the dairy farmers, who would sell their milk to consumers at this price. The milk industry would be allocatively efficient, as Pc = MC of production for dairy farmers, and the **consumer surplus** would be **dcPc**. The **producer surplus** of the dairy farmers is **Pccf**.

Now let us assume that we introduce a large supermarket firm which is a Monopoly seller of milk to final customers and a Monopsony buyer of milk from farms.

This Monopoly firm will face the downward sloping market demand curve for milk, and, since to sell more milk it must lower the price of all the milk it sells, the MR line is below the firm's Price or AR line.

But as a Monopsony buyer of milk the firm faces an upward sloping supply curve of milk and the Marginal Cost of milk to the Monopsony (MCm) is above the supply of milk line. The MCm line is above the supply line since the supermarket is a Monopsony purchaser of milk and its demand for milk from dairies takes up the entire output of the dairy farms. Hence the supply curve faced by the firm is the supply curve of milk to the market, and as we have seen, the supply of milk is a function of price. To cause dairy farms to produce more milk the supermarket must raise their offer price for milk and thus move up the supply line. And when it raises the price it pays for milk it raises the price is pays for **all** its milk, including the amount it previously purchased per unit of time. This means, as we saw previously, the Marginal Cost of purchasing an additional unit of milk is the price of that milk *plus* the increased price it must pay on its previously existing quantity. In other words, MC>P. Hence the Marginal Cost line of milk to the Monopsonist is above the supply curve of milk to the Monopsonist. The supply line shows the price the Monopsonist must pay farmers for their milk, but the Marginal Cost line shows the *cost to the Monopsonist of buying that milk, which exceeds its price.*

How much milk will the Monopsonist/Monopolist firm wish to purchase? As we saw above, the profit maximising purchase decision of the firm is where the Marginal Cost of purchasing milk equals the Marginal Revenue they derive from selling it. And this is output Qm, where it can be seen that the MR line from selling the milk crosses the MC from purchasing it. And at this output the price at which the milk is sold to consumers is Pd.

There are three losers as a result of this shift from a competitive to a Monopoly/Monopsony market: milk consumers, milk producers, and society as a whole.

Take first *consumers*. The price they pay for milk rises from Pc to Pd while the quantity of milk available in the market has contracted from Qc to Qm. Consumer surplus contracts from **dcPc** to **daPd**.

Milk *producers* have also lost out. The price they receive for producing the smaller amount Qm falls from Pc to Ps. Less milk is being demanded and supplied and hence the supply price has fallen. As a result, the producer surplus of farmers has declined from **PcCf** to **Psbf**.

The major winner from this shift from a competitive milk market is the Monopoly/Monopsonist firm. With a demand for milk of Qm and a price of Pd, the firm's Total Revenue is PdQm and its Total Cost of purchasing Qm milk is QmPs, or the area **PsbQmO**. Thus, the firm's Supernormal Profit, where TR>TC, is **PdabPs**. We therefore see that a large part of the net benefit (or economic rent) previously enjoyed by consumers and producers has been shifted to the Monopoly/Monopsony firm. But not all: *for there is also a deadweight welfare loss to society as a whole represented by the triangle **acb***. This is because, at the output of milk Qm, the price to consumers of Pd exceeds the supply cost of milk Ps, which represents the costs to dairy farmers of producing milk. The milk industry is now *allocatively inefficient* as Pd > MC of production. The effect of a Monopoly/Monopsony market is to cause a net welfare loss to society as a whole.

To summarise. The combined effect of Monopoly and Monopsony in the market for milk is to cause the price to consumers to be higher, the price to suppliers to be lower, and the quantity of milk sold in the market to be less (Qm compared to Qc) than it would be if the market were a competitive one. At the quantity Qm the price consumers pay (Pd) exceeds the Marginal Cost to dairy farmers of making the milk so there is a deadweight welfare loss – equal to the triangle **abc**.

Interestingly, combining Monopsony *and* Monopoly in one firm does not make a large difference compared to the outcome of either alone, at least when we use linear demand and supply functions. If, in Figure 4, we revert to the case considered in Figure 3, where the Monopoly carries out perfect price discrimination so MR=P, then it will buy Q1 milk which it sells at Pm. This reduces the price received by the milk farmers to Psm. Equally, if we assume that the Monopsonist carries out perfect price discrimination in its purchases of milk, so that it pays each individual farmer only that price required to bring forth their product, then Ps = MCm and the supply line of milk will also be the Marginal Cost of milk to the Monopsony. In this case the Marginal Cost of milk equals the Marginal Revenue from selling milk also at Q1. The effect of both Monopsony and Monopoly considered individually is to lower the demand for milk from producers and to raise price to consumers. When we combine the two we are in large part simply replicating the same effect. But not completely: by making our Monopsony buyer *also* a Monopoly seller, we have found that the Quantity bought and sold declines still further (from Q1 to Qm) and the price charged to consumers increases still further, from Pm to Pd, and the price for milk received by suppliers falls from Psm to Ps. The deadweight loss to society grows from **gch** to **acb**.

A Numerical Example of a Monopoly/Monopsony Firm

Let us now amend our previous numerical examples by assuming that the Monopsonist is also a Monopolist in the selling of milk to a closed UK market, where this monopolist does not practise price discrimination.

Since the firm is a Monopolist in the sale of milk we assume it faces a downward sloping market demand curve for milk. The demand function for milk we have assumed is:

$Pd = 150 – 5Q$

Given this demand function, the Monopoly firm's Total Revenue is:

$TR = PQ = (150 – 5Q)Q = 150Q - 5Q^2$

Hence Marginal Revenue equals:

$\frac{dTR}{dQ} = 150 – 10Q$

These relations summarise the firm's situation as a *seller* of the finished product Q. However, the firm is also a Monopsony *purchaser* of Q from suppliers. This is the case we analysed above. It will be recalled that the Monopsony firm buys milk from UK wheat farmers whose supply function is:

$Ps = 20 + 8Q$

The Total Cost for the Monopsonist of buying this milk is:

$TC = PsQ$

It follows that the Total Cost function of buying milk from suppliers is:

$TC = PsQ = (20 + 8Q)Q = 20Q + 8Q^2$

Hence the Marginal Cost of buying the product to the firm is:

$\frac{dTC}{dQ} = MC = 20 + 16Q$

The firm's Total Profit function is:

$\Pi = TR - TC$
$\Pi = (150Q - 5Q^2) - (20Q + 8Q^2)$

To arrive at the profit maximising purchase of milk Q we take the first differential of Π with respect to Q and set it equal to zero:

$$\frac{d\Pi}{dQ} = (150 - 10Q) - (20 + 16Q) = 0$$

Which can be rearranged as:

$150 - 10Q = 20 + 16Q$

We have already seen that the left-hand expression equals MR from selling milk to domestic consumers while the right hand expression equals the MC of buying milk from farmers. Hence the profit maximising Monopsonist/Monopolist will purchase products from suppliers until the MC of the last unit bought equals the MR that can be derived from selling it on to consumers.

We can now solve this equality for Q as follows:

$26Q = 130$
$Q = 5$

Thus the monopsonist will purchase 5 units of Q. The price they will pay to suppliers is:

$Ps = 20 + 8(Q) = 20 + 8(5) = 20 + 40 = 60$

However the price at which this product is sold to consumers will be:

$Pd = 150 - 5(5) = 150 - 25 = 125$

Thus the price consumers pay is 125 – 60 = 65 more than the suppliers receive.

The profits of the Monopsonist/Monopolist are:

$\Pi = TR - TC$
$\Pi = PdQ - PsQ$
$\Pi = (125)(5) - 60(5)$
$\Pi = 625 - 300 = 325$

Comparing the Numerical Results

In summary. We saw above that if the milk market were purely competitive, with a supply function Ps = 20 + 8Q and demand function Pd = 150 – 5Q, then the equilibrium quantity exchanged would be 10 and the price paid by consumers and received by producers would be 100.

When we introduced a firm that was a Monopsonist buyer of milk and a Monopoly seller practising perfect price discrimination, the equilibrium quantity of milk bought and sold was 6.19 compared to the previous 10, while the price charged to the last consumer was 119 and the price paid to the milk producers was 69.5, compared to 100 previously.

Lastly, we assumed a firm acting as a Monopsony buyer and a standard Monopoly seller. In this case the equilibrium quantity bought and sold contracted still further from 6.19 to 5, while the price charged to consumers rose from 119 to 125 and the price paid to milk producers fell from 69.5 to 60.

The profits of £325 in the Monopsony/Monopoly case compare with the £200 profits made where the Monopsony sold in a competitive market, showing the effect of making a Monopsony firm also a Monopoly firm is to raise its profits.

Conclusion

What our analysis has shown is that *the effect of introducing a Monopsony buyer of a product into a previously competitive market, where that Monopsony is a Monopoly (or even dominant) buyer of that product, is to cause the price received by suppliers to that market to fall.* This happens whatever we assume about the scenarios in the final product market – whether competitive or monopolistic. Not without reason do suppliers to Monopsony buyers complain that the effect of Monopsony is to drive down the price they receive for their product with the result that they incur a notable reduction in Producer Surplus. *The chief gainer in Monopsony is the Monopsony firm which makes Super Normal Profits*, while the losers are the suppliers and society as a whole, since price exceeds the Marginal Cost of Production and there is a deadweight welfare loss. If the Monopsonist sells into a competitive market and is a price taker, then there will be no impact on consumers of Monopsony as such – the market price remains the same and it is only the price paid to suppliers that falls.

This, however, is likely to be an untypical case. It is more likely that a Monopsony buyer of a product will also be a Monopoly supplier of that product to final consumers.

In this case it is hard to disentangle the dual effects of Monopoly and Monopsony. A firm with a Monopoly in the final product market alone will, since it faces a downward sloping demand line and has an Marginal Revenue curve below its Average Revenue curve, wish to cut back sales, resulting in higher prices to consumers and lower prices to suppliers. Even without Monopsony, milk producers in our example saw prices fall significantly, consumers paid more for milk, and there was a deadweight welfare loss in the milk industry, from the fact that the supermarket was a Monopoly seller of milk to consumers. What Monopsony does, in this case, is to compound these effects still more, further lowering the price paid to producers and further raising the price charged to consumers, while the deadweight welfare loss increases as does the Monopsony/Monopoly firm's Super Normal Profits.

Thus, while Monopsony in product markets yields market failure and a shift in net-benefits from producers and consumers to the Monopsonist, in practice the Monopsonist is likely already to be a Monopolist in the final product market, and Monopoly, too, leads to market failure and a transfer of economic rents from consumers and suppliers to the Monopoly retailer. The effects of Monopoly and Monopsony thus reinforce each other more than they add to each other. And while suppliers to large purchasers rightly complain at the deterioration in the terms of trade they face, the root cause of the lower prices they receive is the Monopoly position firms like Amazon, Spotify, YouTube, and Tesco enjoy in the final product market. Although Monopsony and Monopoly tend to go together, in most cases it is dominance in the selling market that leads to dominance in the buying market. Thus, a company like Spotify first gains a Monopoly position in the selling of digital music and from this follows its dominant position in the buying of digital music. It is harder to imagine it first becoming the Monopsony buyer of music and then using this to become a Monopoly seller since it will lack the final resources to leverage control over the supply of music. This would be more likely to occur when a firm first corners the market for some raw material in limited supply – such as the De Beers diamond corporation which in the 1980s purchased 90 per cent of the world's rough diamonds before selling them on processed to consumers, yielding it a Monopoly retail position also.