

# 1 Theory of the firm in a nutshell

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A look at, and past, a purely-competitive firm.

Like the consumer, the firm wants to do the best it can subject to the constraints it faces (this is an assumption in the theory of the firm).

- What does "best" mean?

In Econ 2010 we assume that the firm wants to maximize its profits but other goals are possible.

If profit maximization is the goal, in a one-period world the firm maximizes one-period profits.

In a multiple-period world, maximizing profits generalizes to maximizing the present value of the firm's profit stream.

We will only consider one-period profit maximization.

Think **theory** of the firm:

what are the assumptions

what are the endogenous variables

what are the exogenous variables.

- All firms are constrained by the state of technical knowledge for producing the commodity(s) that they produce and sell

There are many ways to express this constraint mathematically. Two of the ways are production functions and cost functions.

- A production function identifies the **maximum** output associated with any combination of inputs. E.g.  $x = f(l, k)$ , where  $x$  is the output level,  $l$  is the amount of labor uses, and  $k$  is the amount of capital used.
- A cost functions,  $c = c(x, w, r)$ , identifies **minimum** cost, in \$, as a function of the number of units of output produced,  $x$ , the wage rate,  $w$ , and the rental price of capital,  $r$ .

- All firms are constrained in terms of what they can sell at what price:
- For the competitive firm this constraint is represented by the **exogenous**  $p$ . The firm can sell as much as it wants at  $p$ . Demand curve for the competitive firm's output is the horizontal price line ( $\$$  on the vertical axis)
- For the monopolistic firm (the only firm producing this product) this constraint is represented by the market demand function  $x = x(p)$ .
- For the oligopolist (a firm in an industry that has only a few firms), things are more complicated.

- All firms are constrained by the supply of inputs:
- The firm that is competitive in input markets can buy as many inputs as desired at their competitive market prices. Input prices are **exogenous** for the competitive firm
- In contrast, a monopsonistic firm (the only purchaser of these inputs)<sup>1</sup> faces an upward sloping supply curve for inputs: it has to pay more per unit if it want to hire more.

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<sup>1</sup>E.g. the factory in a one-factory town

- The solution to the firm's optimization problem can be expressed in **numerous** ways:
- In terms of the best quantity,  $x^*$  to produce and supply.<sup>2</sup>
- In terms of the best price,  $p^*$  to charge (only for non-competitive firms)<sup>3</sup>
- How much of each input to hire<sup>4</sup>,  $l^d$  and  $k^d$   
What price to pay for inputs,  $w^*$  and  $r^*$  (only for firms that are not competitive in input markets, e.g. monopsonists)

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<sup>2</sup>The \* represents the profit-maximizing amount.  $x$  is an endogenous variable in the model.

<sup>3</sup>For a competitive firm  $p$  is exogenous. For a monopolistic firm it is endogenous.

<sup>4</sup>These are endogenous variables for most firms, including all competitive firms.

## What exactly is a competitive firm?

A competitive firm produces a product that is identical to the product produced by many other firms.

A competitive firm, simply put takes prices (the price of its output,  $p$ , and the prices of its inputs,  $w$  and  $r$ ) as given/exogenous.

That is, the price can sell as many or few units of output as it chooses at the going competitive market price. (It cannot affect the price at which it sells its output.)<sup>5</sup>

And it can buy as many inputs as it wants at the going competitive prices for the inputs. (It cannot affect input prices.)

In the longrun a firm can enter or exit a competitive industry. (Longrun is the simply the length of time it would take to go out of business, or to enter the industry as a new firm.)

The decision for the competitive firm can be described in one of two ways:

1. How much labor and capital to hire; their demand functions for inputs. (This implies how much they will produce and sell.) Or
2. How much to produce and sell; their supply function. (The will want to produce this amount in the minimum cost way which implies how much labor and capital they will want to hire.)

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<sup>5</sup>It could never sell produce at below the market price. Why sell at a lower price what you could at a higher price.

## What is a non-competitive firm?

It is a firm that can influence prices. It will have this ability if it produces and sells a sufficiently large proportion of the total market supply of the product.

Monopolies and oligopolies are examples.

Monopolies are simple to model because there is only one firm to worry about.

Oligopolies are difficult to model because what firm A does affects the other firms in the industry and what the other firms do affects firm A. What happens is the outcome of a game amongst the firms.

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As microeconomists we want to predict/explain the behavior of a firm.

Here, in my section of econ 2010, we will restrict ourselves to explaining the behavior of only competitive firms.

This means we are interested in estimating their supply functions for the product they produce.  $x^s$

For a competitive firm, the profit-maximizing level of output,  $x^s$  is a function of  $p$ ,  $w$ , and  $r$

$$x^s = x(p, w, r)$$

And their demand functions of their inputs.

$$l^d = l(p, w, r)$$

and

$$k^d = k(p, w, r)$$