

## THE STRUCTURE OF MARGINAL COSTS: A PEDAGOGICAL REVIEW

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**Abstract:** *The paper assumes an implicitly given production function with capital and labor and derives marginal costs from it. Further, it analyzes conditions under which marginal costs change. Finally, based on the derived structure of marginal costs, capital and labor market policies for affecting firm-level behavior are discussed, which economics students easily understand.*

*Understanding marginal costs is essential to interpreting firm-level and aggregate equilibrium outcomes. However, microeconomics students rarely see a full-fledged derivation of those costs in either introductory or advanced-level microeconomics courses. In the standard introductory-level textbook literature, the issue of the structure of marginal costs is too early to grasp, and hence is left out (e.g. Alchian and Allen 1965, Case and Fair 2007, Farnham 2009, Mankiw and Taylor, 2014, Parkin 2004, and Sloman 2006). In the more advanced literature (e.g. Varian 1992 and Mas-Colell, Whinston, & Green 1995), the issue is left out because it is either assumed to be known a priori, or trivial. It can also be left out or because the textbook allegedly needs to deal with more important issues for the advanced students.*

*As a result, students rarely understand the intuition behind marginal costs, and assume them as given – which they are not. A direct implication is that students do not see exactly how certain rational capital and labor market policies work at the level, at which they matter most – the firm. This is an issue, because it hampers the acceptance of the fundamental mechanics of microeconomics.*

*To remedy the issue, I propose a simple derivation of marginal costs, which holds both pedagogical and policy implications. The derivation is a standard procedure used in advanced microeconomics classes in Western schools, and arrives at the basic structure of marginal costs.*

*The derivation procedure starts with an implicit production function:*

$$Q = F(K, L),$$

*where the quantity of output  $Q$  is a function of the quantities of capital ( $K$ ) and labor ( $L$ ). To produce  $Q$ , however, the firm needs to pay factor prices, and hire factors with varying productivities. Therefore, the total costs of the firm are directly affected by how much the firm produces, which is further related to the amounts of capital and labor that the firm hires:*

$$TC(Q) = TC[Q(K, L)].$$

*As marginal costs are, by definition, equal to  $dTC(Q)/dQ$ , we first need to totally differentiate the cost function:*

$$dTC(Q) = dTC[Q(K, L)].$$

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When we further develop the total differential of the cost function, we can attribute the change in total costs to the underlying changes in factor quantities and factor prices:

$$dTC(Q) = dTC[Q(K, L)] = \frac{\partial TC}{\partial Q} \frac{\partial Q}{\partial K} dK + \frac{\partial TC}{\partial Q} \frac{\partial Q}{\partial L} dL.$$

That is, total costs change due to both changes in capital and labor. The first part of the expression tells us how much total costs change due to the change in capital, and the second part – due to labor. Within each part, there are three multiples:  $\frac{\partial TC}{\partial Q}$ ;  $\frac{\partial Q}{\partial Z}$  and  $dZ$ . The multiple  $\frac{\partial TC}{\partial Q}$  tells us the change in total costs due to a unit change in output; then,  $\frac{\partial Q}{\partial Z}$  tells us how output changes due to a unit change in any factor  $Z$ ; finally,  $dZ$  informs how much of a change there has been in  $Z$ .

Dividing both sides by  $dQ$ , we get:

$$\frac{dTC}{dQ} = \frac{\partial TC}{\partial K} \frac{dK}{dQ} + \frac{\partial TC}{\partial L} \frac{dL}{dQ}.$$

Note that, by definition,  $\frac{dTC}{dQ} \equiv MC$ . Further,  $\frac{\partial TC}{\partial K} \equiv p_K$ , or the price of capital, because it is the increase in total costs due to a unit change in capital  $K$ , again by definition. Similarly, we notice that  $\frac{\partial TC}{\partial L} \equiv p_L$ , or the price of labor. Thus, we see that the first two elements of each of the expressions of the marginal costs are actually the factor prices  $p_K$  and  $p_L$ .

The other two elements are also easy to understand. Note that, by definition,  $\frac{dQ}{dZ} \equiv MPZ$ , where  $Z$  is any factor. Then,  $\frac{dK}{dQ} \equiv \frac{1}{MPK}$ , and  $\frac{dL}{dQ} \equiv \frac{1}{MPL}$ . That is, the second set of elements in the structure of marginal costs are the inverse of factor productivities. Having this in mind, we finally arrive at the structure of marginal costs:

$$MC = p_K \frac{1}{MPK} + p_L \frac{1}{MPL}.$$

Explicitly arriving at the structure of marginal costs allows for the following conclusion: marginal costs are in a positive relation with factor prices, and in an inverse relation to factor productivity. As marginal costs directly affect firm-level equilibrium, we can analyze the conditions under which output increases, given prices. In turn, intuitive policy implications are easy to derive, given output prices:

- 1) lower interest rates reduces marginal costs, and increases production;
- 2) lower wages increase production – but also higher wages are compatible with higher production if labor productivity increases faster than wages;

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##### **CORE COMPETENCES:**

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3) *increasing capital productivity increases production;*

4) *increasing labor productivity increases production.*

*Naturally, the above production function from which we started assumes away many other relevant production factors. Two of the important ones to understand are: material inputs (e.g., transportation, electricity and any other specific material input to the firm) and human capital. Both of them have varying contributions to marginal costs, and bring additional policy implications. Having this structure of marginal costs in mind, it is easy to sell those policy implications to advanced economics students.*

### **References**

*Alchian, A. & W. Allen (1965). University Economics. Third ed. Wadsworth Publishing Co., Belmont, California*

*Case, C. & R. Fair (2007). Principles of Microeconomics. Eighth ed. Pearson Education, Inc., New Jersey*

*Farnham, P. (2009). Economics for Managers. Second ed. Pearson Education, Inc., New Jersey*

*Mankiw, G. and Taylor, M. (2014) Microeconomics, CENGAGE Learning, Hampshire, UK*

*Mas-Colell, A., Whinston, M., & J. Green (1995). Microeconomic Theory, Oxford University Press*

*Parkin, M. (2004). Economics, Seventh ed., Addison-Wesley*

*Sloman, J. (2006). Economics, Sixth Ed., Prentice Hall*

*Varian, H. (1992), Microeconomic Analysis, Third Ed., Norton*

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## ANALYSIS OF THE STRUCTURE OF BANK RECEIVABLES FROM THE BUSINESS SECTOR IN THE REPUBLIC OF SERBIA

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**Abstract:** *This paper will analyze the claims of banks in the Republic of Serbia from the business sector in the period 2008-2017. It will point to the existing trends in the structure of receivables as indicators of the state of the economy and the dynamics of economic development. In the observed period, there was an increased need for liquid assets in the economy, but also insufficient wideness of financial products that would meet those needs. Financing the development of the economy is conditioned by the banking offer, due to the insufficiently developed financial market and the monopoly position of banking institutions on it. In the last years of the observed period, it is evident that the quality of banking products is improving, and the lower risk and safer assets yield a lower interest rate. Such developments contribute to the increase of banks' credit potential and the growth of credit activity while at the same time the business sector operates on somewhat more favorable terms.*

**Key words:** *banks, business sector, Serbia*

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