A Microeconomic Model of a Corporate Social Responsibility Problem

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Abstract: One of the key parts of management theory is a strategic management. We can find many opinions that strategic management theory should be connected with an economic theory. There suggestions revealed in the beginning of the nineties. Many scientists say that the theory of strategic management could be modelled by simple economic models. The purpose of this attitude is not a making of an alternative scientific paradigm. They also do not want to change main methods used in management theory. There models should support and strengthen current pieces of knowledge in the strategic management. By using model there is a great opportunity to give more logical consistency and more precise list of the theory’s assumptions. We summarise main arguments in favour and against using economics models in strategic management theory. Then we use modelling in describing of a corporate social responsibility problem. We describe a choice of a corporation to produce goods with and without abide by corporate social production standards. Then we make conclusion and discussion of results.

Key words: strategic management, corporate social responsibility, management models, microeconomics, market equilibrium, Marshallian demand, consumer preference analysis

1 Introduction

We can use this well-known definition of strategic management: „Strategic management can be defined as the art and science of formulation, implementing, and evaluating cross-functional decisions that enable an organization to achieve its objectives. As this definition implies, strategic management focuses on integrating management, marketing, finance/accounting, production/operations, research and development, and information systems to achieve organizational success.“ [1]

Management became an autonomous science discipline in the 19th century. Strategic management was constituted as a part of this discipline after the Second World War. [2] Function and a decision-making of corporations were also analyzed by economic theory. Of course the firm theory was one of the key parts of microeconomic theory. [3], [4]

One of the main problems is the relation between economics and management theory. We can often meet an opinion that the economics is too theoretical discipline and so it cannot be applied to such a practical discipline as a management theory. We can already say that this opinion is wrong. There are several theorems and theoretical concept from economics which were transferred to the management theory. One of the main examples is a learning curve and an increasing of labour productivity in time without increasing an amount of investment to the capital stocks of the company. [5]

On the other side economic theory cannot be applied directly in a directing of a company. We need to consider a context of the concrete problem. We will build a microeconomic model of our concrete problem, which is the corporate social responsibility, and put the conclusions of the model to the wide context of management theory. We will make implications for decision making of firms. Economics developed a system where we can clearly identify consumers’ preferences and behaviour of the firm. Then we can use concept of market equilibrium. This concept is often connected with British economist Alfred Marshall. Market equilibrium price is set by interaction of both firms and consumers. This equilibrium price is a compromise of both sides of the market.

The economic model can give a rigorous description of researched situation. Then the model gives description of future development of the situation. We can use model to predict amount of sales and price of the good. The main advance of the model is a logical consistency.

A lot of critics do not fully understand to a logic and purpose of the economic model. The main issue is assumptions of the model. They often say that the model cannot be used when there are differences between models’ assumptions and the reality. Actually the models cannot be a copy of reality. It is obvious from the definition of the model that the model is only a simplification of the reality. So the assumptions of the model cannot fully reflect the
reality of the described market or economic phenomena. [6] Some critics or some theorists say that we should choose the model with the assumptions closest to the reality. Friedman argued that there is no scale to measure how close models’ assumptions to the reality are. In most cases these comparisons are subjective. Friedman drew up another measure of the model quality. It is the accuracy of the models’ predictions. It is possible the compare two models by accuracy of prediction of the future development. Of course we prefer the model with more accurate prediction. The only exception is if the cost of gaining economic data for the first model is much higher than the cost of gaining data for the second model and the higher cost does not compensate the higher accuracy of the predictions. [7]

2 The microeconomic fundament
There is not many economic model of the corporate social responsibility in the literature. The first model the market demand and the market supply was described by McWilliams. [8] Bagnoli and Watts created a model in which one firm invests to public goods. The investments to the public goods represent the socially responsible production of the good. Model is based on the Bertrand duopoly model. The Bertrand model is the game theory model where two firms decide simultaneously about the price of the good. [9], [10] In this paper we will describe neoclassical model of the corporate social responsibility. There are several advantages of this model. We can describe a market with more firms than two. We will describe and compare two representative firms where one is socially responsible and the second one is not socially responsible. We will use Walras auctioneer to set the market price. This price will reflect both consumers’ and firms’ preferences and utility and profit functions. The model is based on discrete time. [11] Let us assume that there are two representative firms on the market. The firm A maximizes its profit and owners and management do not consider the social responsibility to its decision making. The firm B produces socially responsible good. We will denote the good produced by firm A as X and the good produced by firm B as Y. There is no other difference between these firms so the other parameters of the model are the same for both firms. The good X and Y are physically equal. So the consumers’ behaviour is based on the methodically subjectivism. [12] The consumers may consider the information about socially responsible production into their behaviour but there is no reason for them to distinguish between good X and good Y. This assumption is not in a conflict with neoclassical methodology because there is no strict definition of the good structure. [13] Now we will describe the representative consumer’s behaviour. This consumer represents the demand side of the market. Let us assume that consumer spend some fix amount of his income on the described market. We will denote this amount of money as I. This amount is only a part of the consumer’s income and the described market is only a part of all goods produced in economy. But for simplification of the description of the model we will denote this amount of money as a consumer’s income. Let us assume that consumer behaviour can be described by Cobb-Douglas utility function. This function is given by

\[ U(X, Y) = X^\alpha \cdot Y^\beta. \] (1)

The parameters \( \alpha > 0 \) and \( \beta \geq \alpha \) describes consumer’s preferences. We can see that the law of law of diminishing returns in action so marginal utility decreases when the amount of consumed good increases. We can derive Marshallian demand from this utility function. Marshallian demand for good X is a function of price of good X, price of good Y and the consumer’s income I. The value of the Marshallian demand for good X is the amount of good X which will be bought by the consumer. We will denote Marshallian demand for X as \( M_X \). We will denote the price of the good X as \( P_X \) and the price of the good Y as \( P_Y \). The Marshallian demand for good Y is function of the same variables and we will denote it as \( M_Y \). The value of the function is amount of good Y bought by the consumer. [14] Marshallian demand \( M_X \) and \( M_Y \) can be derived from formula (1) as

\[ M_X = \frac{\alpha \cdot I}{(\alpha + \beta)P_X} \] (2)

and

\[ M_Y = \frac{\beta \cdot I}{(\alpha + \beta)P_Y} \] (3)

The derivation is based on Lagrangian multiplier method and it can be found in book [15]. Now we will describe the representative firm. We will consider that the firm A maximizes its profit. The firm B is socially responsible. We will model this socially responsibility by special parameter in production function. The socially responsible production is more expansive and it is less effective.
So we will add a parameter \( \gamma \in (0, 1) \). We will multiply the production function by this parameter. Each firm uses two production factors: labour and capital. We will denote amount of capital in production at time \( t \) as \( K_t \). The amount of capital at time \( t \) is given by formula
\[
K_t = K_{t-1}(1 - \delta) + I_t. \tag{4}
\]
Amount of capital at time \( t \) depends on the amount of capital at previous time period \( t - 1 \). The amount of capital is reduced by depreciation of the capital. The reduction of the amount of capital due to depreciation is given by amount of capital multiplied depreciation factor \( \delta \). Firm also invest and buys new capital. The investment \( I_t \) is the amount of capital bought at time \( t \). Firm can use new capital immediately. \[16\]

Now we should define production function. Amount of produced good depend on the amount of capital and amount of good. This is given as a value of production function. We will denote production function of the good \( X \) as \( Q_X \). We will use Cobb-Douglas production function which is given by
\[
Q_X(K_{t-1}, I_t, L_t) = K_t^\xi \cdot L_t^\eta = [K_{t-1}(1 - \delta) + I_t]^\xi \cdot L_t^\eta. \tag{5}
\]
We will denote production function of the good \( Y \) as \( Q_Y \). The production function
\[
Q_Y(K_{t-1}, I_t, L_t) = \gamma \cdot K_t^\xi \cdot L_t^\eta = \gamma [K_{t-1}(1 - \delta) + I_t]^\xi \cdot L_t^\eta. \tag{6}
\]
Parameters \( \xi > 0 \) and \( \eta > 0 \) defines the marginal productivity of work and capital. These parameters are equal for both representative firms.
Let us assume that there is \( N \) consumers on the market who buy good \( X \) and \( Y \).

### 2.1 Market equilibrium

The equilibrium amount of traded good \( Y \) is given by formula
\[
Q_Y = \frac{-\gamma [(\alpha + \beta) - \gamma^2 w]}{(\alpha + \beta) \gamma} + \frac{(\alpha + \beta) \gamma}{\sqrt{(\alpha + \beta) \gamma^2 w} + [(\alpha + \beta) \gamma^2 w + (\alpha + \beta) \gamma w + w}. \tag{7}
\]
The equilibrium price of good \( Y \) is given by
\[
P_Y = \frac{(\alpha + \beta) \gamma}{w + \sqrt{(\alpha + \beta) \gamma^2 w + (\alpha + \beta) \gamma w + w}}. \tag{8}
\]
We can see that the equilibrium is given by all previous parameters of the model. The constant \( w \) in both equations represents price of labour and the constant \( r \) represents price of investment.

The equilibrium price and traded amount of good \( X \) could be calculated analogically to this.

### 3 Analysis of possible situations

The main problem of the model is a comparison of profit of firm \( A \) and \( B \). It is easy to see that the relative profit of both firms depends on parameters \( \alpha, \beta \) and \( \gamma \). If \( \beta \) is much higher than \( \alpha \) and \( \gamma \) is close to 1 then the socially responsible firm could gain higher profit than the socially irresponsible firm. This means if consumers strongly prefer socially responsible production of good and this socially responsible production is almost as effective as irresponsible production then the socially responsible production is more profitable.

We should specify a border when socially responsible production starts to be more profitable. If \( \alpha \) and \( \gamma \) are constant and \( \alpha \) is independent on \( \beta \) there is a specific value of \( \beta \) when socially responsible production starts to be more productive. We will now define a marginal rate of consumer’s preference of socially responsible production which represent this specific value of \( \beta \).

**Definition:** Let us assume that there are two representative firms on the market. One of the firms is not socially responsible and the other one is socially responsible. The production of socially responsible firm is multiplied by the parameter \( \gamma \in (0, 1) \). Both firms buy labour for a constant price \( \alpha \) and capital for a constant price \( \beta \) and the depreciation factor is \( \delta \). The goods are physically identical and consumer can distinguish between both goods because the socially responsible and irresponsible production. The preferences of representative consumer is given by parameters of the consumer’s production function \( \alpha \) and \( \beta \). Then a marginal rate of consumer’s preference of socially responsible production is a value of \( \beta^* \) for which profit of both socially responsible and socially responsible have the same profit.

If \( \beta > \beta^* \) then the socially responsible production is more profitable. If \( \beta < \beta^* \) then the socially irresponsible production is more profitable.

### 4 Interpretation and conclusion

We can see that socially responsible production can either increase or decrease the profit of the firm. There are a lot of researches about consumers’ preferences of socially responsible goods. \[17\] Some research is also based on experimental economics. \[18\] All these researches can be shortly described as estimations or descriptions of utility functions like our function (1). We defined
parameters $\alpha$, $\beta$ and $\gamma$ as constants. But these parameters can be described as functions of other variables.

Consumers’ preferences depend on information in media, advertisement, economic situation of the consumers, state of the environment etc.

With our conclusion we can argue Milton Friedman critical opinion that each firm should only maximize its profit. He saw this as the most socially responsible action. We proved that firm can maximize its profit by socially responsible production. [19]

Socially responsible corporation can also increase its profit by change of parameters $\alpha$, $\beta$ and $\gamma$. Change of the parameter $\beta$ is change of the consumers’ preferences. If a corporation do not want to increase its profit and it only want to produce socially responsible good (and shareholders voluntarily agree with lower shares) then there is no reason why the socially responsible firm should give publicity to its socially responsible production. But most of the socially responsible corporations proclaim this information and the importance of the socially responsibility to the customers. We can say that they want to increase the value of parameter $\beta$ to gain higher profit. So the corporation want to compensate higher costs of the production or the use social responsibility as a way to increase its profit.

Firm can also change value of parameter $\gamma$. There is often an information asymmetry between the consumer and the firm. There is no way to examine if the production is truly socially responsible for the consumer. So the firm can take advantage by publishing information about its costly socially responsible production and produce the good in a similar way as other companies. The extreme case is a fraud. Unfortunately there are many cases in frauds. This strategy of the firm is immoral but it can be very profitable. [20]

References