

THEORETICAL ANALYSIS OF MICROECONOMIC EFFECT OF PUBLIC INVESTMENT



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ABSTRACT

Keywords

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maximizing behavior.

We raise important questions about the relative contribution of public investment to economic development evaluated at individual household and firm level. By assuming perfect complementarity between private and public investment, we analyze how public investment influences household demand and firm profits. We equally raise an important issue on implication of different sources of funding public investment such as raising investment fund through tax revenue or borrowing from banks or through seigniorage. The study describes the desirability or otherwise of increasing the proportion of public capital in the production function and the impact of such increased capital on utility maximizing behaviour in the household sector as well as profit maximizing behaviour in the business sector.

Contribution/ Originality: This study is one of very few studies which have investigated the relative effects of public investment by evaluating such effects on utility maximizing behavior of household and profit maximizing behavior in the business sector.

1. INTRODUCTION

Theoretically, public investment by the workings of the multiplier principle is believed to exert positive influence on the economy. By expanding such investment, the economy is expected to improve for better. Public investment represents an important component of capital input in the production function. The quality and quantity of such capital in the production function determine the output in return. An increase in the quality or quantity or in both quality and quantity of public investment usually regarded as public capital is expected to have positive

impact on firm profit and household welfare. Moreover, public investment is expected to have certain influence on the price of goods and services which might have differing effect on both the individual household and business firm. Public investment can also bring about differing effect on individual household and firm due to how such public investment is financed. The differing effects of public investment have been well documented in the literature especially in the works of Aschauer (2000), Barro (1990), Calderon and Serven (2004), Canning and Bennathan (2000), Deaton (1997), Gramlich (1994), McCulloch (2003), Milbourne *et al.* (2003), Edward *et al.* (2006), Sahn and Younger (2000). An additional public investment will generate an additional public capital that will complement the private capital in the production function. Such an increase in public investment will therefore lead to an increase in the aggregate output; hence, such effect is called a macroeconomic effect of public investment. However, this study examined the relative contribution of public investment to economic development evaluated at individual household and firm levels.

The remaining part of this paper is organized as follows: section 2 describes the analytical procedure while section three concludes.

2. ANALYTICAL PROCEDURES

We start by isolating the basic assumptions under which the effect of public investment on individual household and firm can be felt. One of the key effects of public investment is to increase the quantity or quality or both quantity and quality of public goods and services. An increase in the size of public investment indicates a rise in the supply of public goods. As it is well known, the private sector will typically not supply public goods, because they cannot charge a price for their use and also because it is not profitable for private individual to produce such goods. Such goods must instead be provided by the government, through its ability to raise revenues from domestic taxation or foreign aid or by borrowing either at home through the Central Bank or borrowing abroad. In this case, the amount of public good which is provided, and which any one firm or household can use is in effect rationed. Nevertheless, additional public investment can increase the supply of this rationed quantity, benefiting households and firms in the process. In this analysis, the following assumptions are very important, these are:

1. Public capital acts as a perfect complement to private capital, hence the possibility of crowding-out effect is ruled out.
2. Preferences for public good are fixed for both the household and the business firms.
3. Tax liability for both consumers and producers is fixed, i.e. a change in public investment does not lead to a corresponding change in tax liability for both the households and the firms.
3. Absence of user charges.
4. Rationality of consumers and producers, i.e. the behaviour of these agents are governed by a rule of rationality.

5. The economy is still operating below equilibrium, that is consumption and production are not optimal.

With these assumptions in mind, the effect of public investment can better be evaluated. Public and private capital enter the production function as complementary inputs. This assumption is very strong for if both happen to be substitutes, then it means public capital will crowd out private capital. This results to crowding-out effect. We equally assume that, the economy is still operating below the optimum, both the consumer and the producer are said to be operating below equilibrium, there is low capacity utilization. Each consumer can still move towards a higher indifference curve while each firm also can attain a higher isoquant. This is the real situation in most of the developing economies where shortages persist in the supply of public goods relative to the demand. Developing countries are confronted with serious infrastructural challenges as well as low saving to generate the required capital to overcome the problem of underdevelopment. The problem of low saving is due to low income resulting from low output. An impoverished individual characterized with vicious circle of poverty will have a low purchasing power creating deficiency in demand. This has implication on firm sales and ability to run a successful business. In the same vein, deficiency in infrastructure will increase the cost of doing business and hence put a threat to competitive advantage. Business becomes less attractive to potential investors since profit serves as the primary goal of the firm. Any government action that stimulates firm profit by reducing cost of production would raise output and lower the prices of goods and services. We then express the profit function of any one individual firm as

$$\pi_i = f(P_i, G_k, X_j), \dots \dots \dots (1)$$

Where π_i is the profits of firm i , P_i are the prices of the various goods and services produced or used as inputs by the firm i , G_k is the fixed amount of the various types of public capital to which the firm has access, and X_j is a set of other characteristics which affect the firm's profits which may include efficiency of its work force, the location as well as other factors that reduce the cost of production. The effect of public investment on the firm is given by the derivative of profit function with respect to the fixed amount of public capital available to the firm from the stock of additional public capital. This is denoted by $\partial\delta\pi_i/\partial\delta G_k$. The magnitude of this effect is largely determined by the initial level of public investment. The size of this effect is likely to be smaller if the initial level of public capital is higher because of the law of diminishing returns. It is also likely to vary across different types of public capital, and different sectors of the economy.

Similarly, public investment also provides direct welfare benefits to households, in the form of increased quantity or quality or increased quantity and quality of available goods and services. To analyze this effect, we assume a household utility function of the form

$$U_h = f(N_h, P_h, G_h), \dots \dots \dots (2)$$

where U_h is the utility of household h , N_h is the disposable income of household h , P_h are the market prices of the various final goods and services consumed by household h , and G_h represents the amount of public goods consumed by the household h .

The direct effect of public investment on household welfare is obtained by taking the derivative of household utility function with respect to the amount of public goods consumed by

household h . This is denoted by $\partial\delta U_h/\partial\delta G_h$. It should also be noted that this will again tend to be smaller if the initial amount of public good being provided is higher, reflecting, in this case, the law of diminishing marginal utility, one and the first of the three laws of Gossen. An additional level of public capital will raise the consumer utility by an outward shift in the indifference curves. This is graphically illustrated as shown in the diagram identified as Figure 1.

2.1. The Budget Line and Indifference Curves Analysis

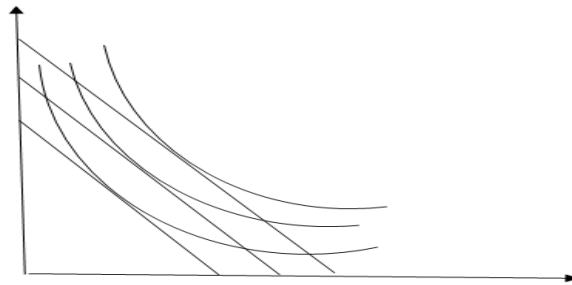


Figure-1.

In the diagram identified as Figure 1, at the initial stage, the household operates along the indifference curve labeled IC1 subjects to budget constraints B1. An increase in public investment enables the household to experience an outward shift in the indifference curve, i.e. from IC1 to IC3 as the household budget lines also experienced an outward shift from B1 to B3 where the amount of public good consumed has moved up.

An increase in the size of public investment will lead to a rise in the supply of public goods and lower the cost of production where such public goods are used as production input. It lowers the prices and thereby increases further access to the final consumer. The firm has more access to production inputs that will shift the isoquants farther away from the origin. In the diagram below, at the initial stage, the firm operates along the isoquant curve labeled IS1 subjects to cost or input constraints I1. An increase in public investment enables the firm to experience an outward shift in the isoquant, i.e. from IS1 to IS3 as the isocost shifts outward from I1 to I3. This is graphically illustrated as shown in Figure 2.

2.2. The Isocost lines and Isoquant curves analysis

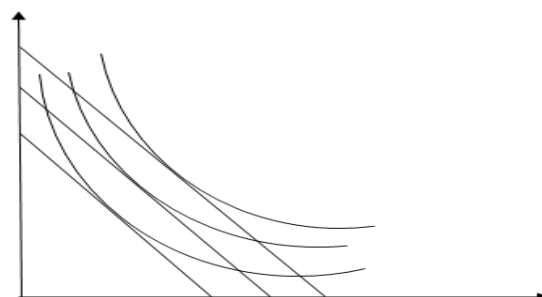


Figure-2.

We proceeded by analyzing the effect of public investment on Prices of goods and services and how these affect individual households and firms. Attention was also given to the extent in which public investment changes affect the prices of the various market goods and services used and/or produced by firms, and consumed by households. This may occur for two reasons: first, when the public good or service being provided is either a substitute or a complement to other market goods and services consumed by households or used by firms; and second when the good or service being provided by the government is not in fact a pure public good, and instead simply contributes to existing private sector production.

The effect of price changes on households can be analyzed using the utility function shown in equation (2). The effect of a change in the price of market good and service on household utility is given by $\delta\delta U_h/\delta\delta P_h$. This is positive for price decrease and negative for price increase. In any of these cases, the magnitude of the effect on household depends on how large the households' initial consumption of the goods or services which have changed in price as well as the ease on the part of the households to substitute consumption away from goods or services which have risen in price, or substitute consumption towards the goods or services which have fallen in price.

Similarly, the effect of price changes on firms can be analyzed using the profit function shown in equation (1). In this case, the effect is given by $\delta\delta\pi_i/\delta\delta P_i$. For goods produced by the firm, this is positive for price increases and negative for price decreases; for goods used as inputs it is negative for price increases and positive for price decreases. In each case, the magnitude of the effect on the firms depends on how large the firms' initial production (or consumption) of the goods or services which have changed in price as well as the ease on the part of the firms to expand production of goods (or reduce consumption of inputs) which have risen in price, or to reduce production of goods (or increase consumption of inputs) which have fallen in price.

Estimating the likely changes in the prices of market goods and services caused by public investment requires the use of modeling techniques, which span from simple partial equilibrium approaches to more detailed general equilibrium techniques. The advantage of the latter is that they take into account the effect which an increase in investment in one sector has on levels of prices and output in other sectors of the economy.

Other effects of public investment on households and firms are reflected in the way and manner such investment is financed by the government. It should be noted that public investment will have further implications for a household's disposable income to the extent that it is financed by direct taxes. The incidence of direct taxes will typically differ across households, depending on the government's tax policy, and on the amount by which households adjust their behaviour in response to a given tax policy. (The impact of indirect taxes can be analyzed through their effects on prices.)

Some public investment also imposes implicit non-income taxes on households. An example would be a kind of relocating households usually affected by road expansion projects or other community development projects that will displaced a particular set of households from their original settlement usually with compensation but atimes with no compensation. It should be noted that this kind of scenario is capable of imposing high non-income (psychological) costs on

households that have to move, particularly when they are not subject to negotiation. In the developing West African Economies, the poor masses of people usually fall victims of this kind of implicit taxation. It is very important to note that this set of people are so vulnerable to this uncompensated compulsory relocation because they actually find it difficult to have the required documents that will qualify them for the government compensation. Without been able to produce some important documents, you may end up bear the whole cost without any compensation from government. It becomes very difficult to get justice through the legal institutions for these set of documents are very important to prosecute any case before any court of law. For instance many households do not have what is popularly known as certificate of ownership on houses or landed property assets which weakens their chances of getting government compensation whenever there is need for the government to reclaim the ownership of such assets from these households for the production of publicly used goods and services. Asides how many of the weaks and the vulnerables in the developing West African countries can afford to pay the cost involved to seek legal redress in such cases? This has important implication on the development of the economies of West Africa's and other developing countries having these similar characteristics. The fact that much of the public investment is financed by direct taxation means that policy-makers need to weigh up the benefits for households subject to the quantity and price effects described above, as against the costs of direct taxation. It also means that the net effect of public investment on household welfare may be positive or negative, depending on the difficulties encountered in order to observe household's preferences.

3. CONCLUSION

This paper theoretically analyzed the microeconomic effect of public investment by examining the effect of public investment on individual households and firms. This is a kind of a highly disaggregated analysis which allows for the differential effect of public investment across firms and households, and the 'indirect' effects of public investment which arise through changes in the relative prices of goods and services. These effects are likely to be significant in practice; therefore the issues raised in this paper are important. The main task of any development activity is directed towards improved quality of lives for a large number of people living on the planet earth. Utility maximization becomes an important aspect of this process. There is no doubt that the healthiness of the business firms is paramount in the realization of this objective. Profit maximization is also a crucial element of the whole process. Business successes have important implication on the entire economy. The supply of public goods should be done in such a way that it complements the household and business firms' ability to achieve their objectives. The development of any society is greatly determined by the overall welfare condition of its people as well as the quality and quantity of its productive agents. This kind of a highly disaggregated economic analysis can be used in the prediction of the effects of public investment on aggregate variables, such as growth and employment. It is important to know that the healthiness of the household and business agents would actually lead to the healthiness of the whole economy. This means that in practice, both aggregated and disaggregated theoretical analysis are of relevance,

both in terms of assessing the performance of the investment ex-post that is, the performance of past investments and evaluating the worth of investment ex-ante that is, the desirability of future investments.

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