Chapter 3
Literature Review

This chapter will first deal with the critics of the restriction of homogeneity in production functions and the non-wage-labour-cost. Those are important questions not dealt with in the neo-classical production literature.

Secondly, the "engineering" approach, which is an interesting alternative and/or complement to the "econometric" approach, is shortly discussed and merits and drawbacks of the two approaches are shortly discussed.

3.1 Underlying Model Assumptions

Milton Friedman among others denies that inquiring into the reality of the assumptions can test a model. These economists conclude that the only way to determine the validity of a model is to see whether it is capable of explaining and predicting real world events[1].

Homogeneous vs. Non-Homogeneous Production Function

The production function model chosen in this study is as already stated the Cobb-Douglas, because of the belief that factor income shares has stayed constant over time. In spite of the above argument Erkin I. Bairam[2], still consider it important to test for assumptions before making restrictions to the production function.

Moreover, Erkin I. Bairam argues (in the same volume) that the production functions in applied research are assumed, without a prior test, homogeneous. Unfortunately, it is not generally known that homogeneity (and hence, constant scale elasticity) assumptions is not appropriate for some aspects of the production theory. Rinstad (1974) and Erkin I. Bairam (1991) has shown that much of the theoretically work is based on production functions with a scale elasticity which is decreasing with increase in output. This contrast with the Cobb-Douglas homogeneous production function used in this study. Another

---

[1] Walter Nicholson, Microeconomic Theory, p. 5.

[2] Erkin I. Bairam, Homogeneous and Nonhomogeneous Production Functions, Theory and Applications. (England: Avebury Ashgate Publishing Ltd. 1994) p. 35.

serious problem with the Cobb-Douglas production function (and other homogeneous production functions) is that it also assumes the elasticity of substitution is constant.

This study takes those critics serious, but unfortunately, this study is working with a small sample: yearly data from period 1982 to 1997. In addition factor-inputs employment and output has showed a clear trend over time without fluctuation of significance hence the scale of operation is highly correlated with time. It therefore becomes difficult to distinguish empirically between technical progress and returns to scale. Therefore, the achievements of estimating a non-homogeneous production function is *not of great value*.

Non-Wage Labour Costs

The last two decades have seen a substantial increase in the fixed costs of employing labour. Firms taking on additional labour faces substantial on-off costs and these often fundamentally affect their demand for labour. A consequence is that, in many jobs, labour can no longer be considered as a variable factor of production. For the firm the decision to employ a labour is analogous to an investment decision[3].

Labour costs embrace a significant non-wage-labour-cost (NWLC) proportion in Europe, Japan, and US. Robert A. Hart suggests that NWLC is in the area of 30-40 percent. Not only are NWLC quantitatively important they also affect the firm's labour market behaviour in ways that are not captured by the studies that concentrate primarily on the role of direct wages[4].

Whether labour hours should be considered as quasi-fixed is not important for this study, since the focus is on the long run behaviour. What is important: is that NWLC counts for a significant fraction of the labour cost, and that labour cost's share of total cost is a important factor in determining the elasticity of a single firm's demand for labour hours. Hence, ignoring NWLC will be making a serious miscalculation.

---

[3] Robert A. Hart, The Economics of Non-Wage Labour Costs, (London: Goerge Allen & Urwin Ltd., 1984)

[4] Ibid. p.171

Is Labour-Hours Cost Equal to MRP_{Lh} in Presence of Trade Unions?

The neo-classical production theory assume that the profit-maximising firm hires labour-hours until marginal revenue products equals the marginal cost of employing labour-hours (MRP_{Lh}=ME_{Lh}), as it was derived in *equation 2.15*. However, as we saw in section 1.3 the existence of trade unions change this.

The firm and the union set different wages as their goal and a range of indeterminacy exists; there is no determinant wage or employment solution. In existence of trade unions the wage is established as a result of bargaining. The level at which it is established will reflect the relative bargaining strength of each party.

The bargaining strength depends on (i) the firm's willingness to withdraw their labour; (ii) the magnitude of the cost one party can impose on the other; (iii) the price elasticity of the firm output.

Nonetheless, it is still assumed that labour-hours is paid *relatively* in accordance to their productivity. This is because (assume the two parties' bargaining strength are equal) any labour-hours paid below the productivity will be meet by a demand from the trade union and *vice versa* by the firm.

However, "in most firms, employment does not fluctuate in line with changes in output. Output will normally fall faster than employment of labour hours. Nor are the wages reduced in line with this decline in productivity (MRP_{Lh}) so the relationship between the labour costs and MRP_{Lh} varies over the stage of the business cycle". –In spite of this, it can be assumed that: the cost of labour-hours (C_{Lh}) (on average) equals labour-hours productivity (MRP_{Lh}=C_{Lh}).

3.2 Econometric vs. Engineering Production Function

The approach chosen to derive the firm's production function is as before mentioned the "econometric approach". This approach is based on the idea that a process can adequately be described by examining its outputs and inputs. It is not necessary to know anything about the 'science' involved in the process, all that is needed is a set of reliable

observations on what goes in and what comes out. The parameter values are then inferred from these observations.

The other interesting approach is the engineer approach. This approach requires no observations of inputs and outputs but does require knowledge of the 'science' being applied in the process in order to know the production possibilities of the production process[5].

There is no sharp line between the two approaches: the degree of *engineering* varies from 0 to 1. The engineering approach was developed to improve the quantitative aspect in econometric production analyses[6].

The pure engineer technique is not without problems, however. These arises because it deals only with the technical aspects of production without considering the economic aspects; it deals with ideal rather than actual real world conditions; and is based on current technology without considering the technical progress over time.

"Observable data are in one sense more reliable than hypothetical data. An observed input-output point represents something that has really happened, that is, an actual behaviour which has taken place. This is not the case for pseudo-data"[7].
However, the engineer approach has successfully been applied in estimating new processes where no historical data have been available[8].

---

[5] David F. Heathfield and Soeren Wibe, An Introduction to Cost and Production Function, (Houndmills, Basingstoke, Hampshire RG21 2XS and London: Macmillan Education Ltd., 1987) p. 153

[6] Ibid., p. 179.

[7] Ibid., p.177.

[8] Dominick Salvatore, Managerial Economics, (McGraw-Hill International Edition, 1996).