Chapter 10

The Enterprise Production Block of the Business Sector

10.1 Introduction

The neoclassical heart of MM consists of the twelve behavioural identities 115-126. These are referred to in this book as the enterprise production block of the business sector. They concern input and output decisions by business enterprises.

The technology of the business sector involves three inputs: labour, capital and imports, and two outputs — a domestic good and a good for export. Since first-order conditions for cost minimization and for revenue maximization generate the behavioural identities referred to above, they are precisely those that arise in the construction of a model with comparable technology but based on competitive assumptions.

Broadly speaking, the enterprise production block has two roles. The first is to specify a competitive equilibrium configuration of inputs and outputs to which the economy converges in the long run. The second is to provide medium-run neoclassical equilibria which act like moving targets that influence the dynamics of many of MM's variables. Because the simulated values of its variables tend to move towards their targets, MM behaves in the medium run (say over 5 to 7 years) rather like a neoclassical model, albeit one subject to rigidities, sluggish adjustment and cyclical behaviour.

The plan for the balance of this chapter is as follows. In section 10.2 an overview is given of production relations in the business sector. Then in section 10.3, the notion of input-output separability is introduced, and its application to the constant elasticity of substitution/constant elasticity of transformation (CES/CET) production system in MM is explained. Graphical illustrations are given of the solution of the first-order (tangency) solutions for cost minimization and revenue maximization. The solution of the first-order conditions yields MM's underlying input demand and output supply equations.

The first-order conditions may be approached either via the production and transformation functions, or via their duals — the cost and revenue functions. Given the assumption of constant returns to scale in MM, the composition of the cost-minimizing input mix at any output level depends only on relative input prices, and not on the level of output; similarly, the optimal proportions for the output bundle depend only on ratios of output prices, and not on the scale of production. Hence the relevant duals are the unit cost and revenue functions. Tangency solutions using these functions are also illustrated in section 10.3.

The different lengths of run of the enterprise production block and of MM as a whole are discussed in Section 10.4. The idea that any given variable within a model (or a sub-model) may be endogenous from some points of view but exogenous from others is introduced in sub-section 10.4(a). The different concepts of length of run used in this book are explained in sub-section 10.4(b), which includes definitions of the three lengths of run distinguished in MM as a whole. Then in 10.4(c) the results
of Section 10.3 are used to derive eight key behavioural identities linking equilibrium inputs, outputs, and relative prices in the enterprise production block. These identities are used to characterize the medium run of the enterprise production block in sub-section 10.4(c) itself, and subsequently to define the block’s long-run in sub-section 10.4(e).

The intervening sub-section 10.4(d) gives a brief account of the estimation of the parameters of the behavioural identities of the enterprise production block. These include substitution, transformation, and technical change parameters.

Finally, sub-section 10.4(f) contains a short discussion of the way in which the medium- and long-run values of variables defined in the enterprise production block lead to the convergence of MM as a whole to a competitive long-run solution.

10.2 An overview of the production structure of the enterprise economy

The production function of MM's business sector is summarized pictorially in Figure 10.2.1. Medium-run decisions made by private agents1 within this framework are essentially neoclassical; i.e., marginal rates of substitution and transformation are set equal to relative price ratios, and factors receive their marginal products. However, these medium-run 'decisions' would only actually be realized in a solution of MM by chance. This is because MM's dynamic equations are influenced by short-term frictions that prevent instantaneous market clearing and lagged responses that set up cycles which are often relatively persistent (but which eventually die away).

The complete set of variables which are inter-related by the production structure set out Figure 10.2.1 are shown in the left-hand panel of Table 10.2.1. The variables which are taken as exogenous by the representative producing agent in each length of run of the enterprise production block are shown in the right-hand panels of Table 10.2.1. Note that many (but not all) variables which are exogenous to the producing agent are endogenous to the model as a whole.

To relate the wage variable in this chapter to the one occurring in Chapter 5, we note that pay-roll taxes put a wedge between the price of labour $W_B$ paid by the business sector and the gross (before income tax) wage $W$ paid to workers:

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(10.2.1) \quad W_B = (1 + R_6) W , \tag{111}
\]

where $R_6$ is the proportional rate of pay-roll tax.

10.3 Preliminaries on the CES/CET production technology

Input-output separability The CET/nested CES production structure shown in Figure 10.2.1 is an example of input-output separability (see, e.g., Hasenkamp (1976)) in which there is a unique scalar input aggregating function $F(F, M^I)$ with value $Y_B$ equal to that of a unique output aggregating function $\Gamma(X,Y_B)$. This implies that input-mix and output-mix decisions can be visualized as proceeding more or less independently. That is, with generalized output or capacity to produce $Y_B$ held

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1 Government-owned trading enterprises are assumed throughout to behave in the same way as private agents.