

Chapter 11

DIFFERENTIATED CAPITAL AND THE DISTRIBUTION OF WEALTH

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Abstract We present a one-sector growth model with finitely many households who differ from each other with respect to their endowments, their preferences, and the type of capital supplied to firms. There is monopolistic competition on the capital market and perfect competition on all other markets. We show that there exists a unique stationary equilibrium and that all households have strictly positive wealth in this equilibrium. We study how the stationary equilibrium depends on the time-preference rates of the households and on the elasticity of substitution between different types of capital. We also analyze the stability of the stationary equilibrium.

1. Introduction

In his seminal contribution, Ramsey (1928) conjectured that, in a stationary equilibrium of what is now considered as the standard neo-classical growth model, only the most patient household(s) would own capital while all other households would consume their entire income without possessing any capital at all. A formal proof of this so-called ‘Ramsey conjecture’ was first given by Becker (1980).¹

If the number of households who share the smallest time-preference rate is large, the Ramsey conjecture makes sense. However, if there are only a few most patient households (or even a single most patient household), then the result is conceptually inconsistent with one of the most fundamental assumptions under which it is derived, namely with

¹Becker (1980) assumes that households cannot borrow. Bewley (1982) analyzes the model without the no-borrowing constraint.

the assumption that the households act as price takers. More specifically, if all the capital is owned by only a few households, as predicted by the Ramsey conjecture, then these households must realize that they have market power on the capital market. Consequently, they will not take the interest rate as exogenously given. To address this issue, Sorger (2002) has studied a model in which the households take the inverse capital demand function rather than the interest rate as given. The capital market is therefore an oligopoly, on which the households interact strategically. Using this framework, Sorger has shown by means of examples that the Ramsey conjecture may fail to hold. Becker (2003) has extended Sorger's examples to the case of a general Cobb-Douglas production function and has derived a necessary and sufficient condition for the Ramsey conjecture to be true. He has also derived a number of comparative statics results for stationary strategic Ramsey equilibria.

The analysis of the dynamic oligopoly model from Sorger (2002) and Becker (2003) becomes cumbersome when the number of households is large. For this reason, both Sorger and Becker have restricted their studies to the case of two households and a Cobb-Douglas technology. In the present paper we extend the analysis to the case of an arbitrary number of households and a general production technology. In order to avoid the messy algebra that arises in the oligopolistic framework, we assume that each household supplies a different type of capital and that there is monopolistic competition on the capital market. As in the oligopolistic model from Sorger (2002) and Becker (2003), households face elastic capital demand functions and can therefore influence the rate of return on their capital holdings. At the same time, however, the monopolistically competitive model retains a convenient feature from the perfectly competitive one in Becker (1980), namely that households take the evolution of aggregate variables other than the interest rate (e.g., aggregate output) as given.

We model monopolistic competition using the formal approach pioneered by Dixit and Stiglitz (1977) and Ethier (1982). The Dixit/Stiglitz model has figured prominently in many modern endogenous growth theories, notably in Aghion and Howitt (1992), Grossman and Helpman (1991), and Romer (1990). Contrary to most applications of this approach, the model of the present paper does not feature a symmetry property with respect to the differentiated goods. This is due to the heterogeneity of the households, especially to the heterogeneity with respect to their time-preference rates.

The paper is organized as follows. The model is formulated in section 11.2, where we describe the behavior of households, the behavior of firms, and the market clearing conditions. In section 11.3 we prove