1 Introduction

The aim of the paper is to investigates the relationship between the growth rate and the degree of competition of market structure when monopolistic and oligopolistic competition coexist in a model of growth. Inter-sector monopolistic competition is more or less intense, depending on the substitutability among di¤erentiated goods, while the degree of competition at the intra-sector level depends on the …rms' sectorial shares.

Remarkable contributions on endogenous growth are focused either on monopolistic competition or oligopoly. The existing papers typically conceive of the two market structures as separate or unconnected; sometimes, the distinction between monopolistic and oligopoly with di¤erentiated goods is unclear. Often, the two terms are used with a vague sense of imperfect competition: monopolistic competition refers to numerous …rms and free entry, while the oligopoly describes fewer …rms competing with or without free entry.

The four standard properties of monopolistic competition are: (1) there are many …rms producing di¤erentiated commodities; (2) each …rm is negligible, in the sense that it can ignore its impact on others …rms; (3) free entry results in zero-pro…t of operating …rms; (4) the equilibrium price exceeds marginal cost[1].

In much recent papers, the attention has been focused on the markets where the existence of the set-up costs limits the number of operating …rms, hence, each of them is not negligible in the previous sense. Again, models with a …nite number of …rms, generally, allow for possibility of making positive pro…ts, violating the zero-pro…t condition. Therefore, these models are developed under oligopolistic rather than monopolistic competition.

A paper that does not su¤er from this criticism is Dixit-Stiglitz (1977), where there are N identical mono-product …rms, each of them producing a di¤erentiated brand. Given the set-up cost, …rms will be negligible when a large number of di¤erentiated commodities exists in the economy. Moreover, free entry implies that pro…ts are approximately zero; therefore, they obtain true monopolistic competition.

The many attractive proprieties of the Dixit-Stiglitz aggregation method may explain its frequent adoption in models of growth under monopolistic competition. First, the CES formulation of the utility function implies fair proprieties of the aggregate demand function, mainly a simple analytic form. Second, a single (constant) parameter characterizes the degree of product di¤erentiation (itself related to "taste for variety", degree of substitutability between goods and market power), facilitating the relationship between …rms' market power and the growth rate. The last propriety is the symmetry between old and new varieties, which allows elimination of the product obsolescence and thus excludes complications related to improvements in quality.

By contrast, the di¢culty of de…ning a satisfactory notion of equilibrium under di¤erentiated oligopoly consistent with some balanced growth rate limits the size of the literature under this market structure.

[1] See, for example, Hart (1985) or Wolinsky (1986).

The traditional models are due to Romer (1990), Grossman-Helpman (1991) and Aghion-Howitt (1992), who make various assumptions to internalize growth under monopolistic competition. However, many economists have abandoned the monopolistic competition hypothesis in order to introduce oligopolistic markets and to study e¤ects of strategic interaction on the growth rate.

Remarkable contributions are those by Peretto (1998), Vencatachellum (1998), and Cellini (2000). The main outcome of these models is the ambiguous in‡uence of the level of interdependence among …rms on the growth rate.

Also, economists who have studied the links between the degree of competition and balanced growth in the presence of strategic interaction usually rely on the assumption that a large number of …rms results in a negligible e¤ect of individual choices on the aggregate price index (or equivalently, on the aggregate quantity index). As a consequence, they ignore the cross elasticity of demand[2]. This assumption is acceptable only in a world of monopolistic competition, not in oligopoly. These formulations are closer to a world of monopolistic competition rather than an oligopolistic one.

This paper studies a framework where monopolistic and oligopolistic competition coexist, at a di¤erent level. In particular, my aim is a twofold purpose: …rst, I propose a di¤erent approach where two market structures simultaneously coexist in a growth model; second, I study the in‡uence of the degree of competition on the growth rate when strategic interaction really plays a fundamental role.

In the next section, I present a model based on three simple ingredients. (1) The …rst is the traditional creation of new varieties according to the (R&D) technology à la Grossman-Helpman. (2) The second regards the industrial research and the imperfections in the patent system. I assume that patents do not e¤ectively deter unauthorized uses, both because of their legal imperfections, and because entrepreneurs' investments are directed to developing new product designs which are assumed not to be private knowledge. In this way, the R&D output is not usable only by the inventor: R&D provides general ideas which are of public domain. (3) Third, there are two dimensions of competition: inter-sector competition between di¤erentiated products under monopolistic competition and competition under Cournot oligopoly at the intra-sector level.

The framework leads to a unambiguous conclusion as concerns the relationship between the degree of competition and growth: when the former is high, prices go down, the aggregate quantity raises and the available labor force for R&D activity are reduced, so the growth rate falls. On the contrary, a lower degree of competition leads to a higher growth rate. The increasing in prices reduces the aggregate production, more resources are available for R&D and the result is a higher growth rate.

I begin with a description of consumers' behavior. In the second subsection I analyze the production side. The two last subsections provide the structure of

[2] For the relation between the two assumptions see Yang-Heijdra (1993) and D'Aspremont-Ferreira (1996)

R&D activity and the dynamic equilibrium. Section 3 contains some concluding remarks.

2 The model

2.1 Preferences

Consider an economy with $\bar{L}$ identical households and differentiated goods produced in N_m varieties, $[x_i]_{i=1}^{N_m}$. The representative household maximizes its lifetime utility:

$$U(t_0) = \int_{t_0}^{\infty} e^{-\rho(t-t_0)} \ln u(t) dt \tag{1}$$

subject to the intertemporal budget constraint that the present discounted value of expenditure cannot be greater than the present discounted value of lifetime labour income, plus initial wealth:

$$\int_{t_0}^{\infty} R(t)Y(t)dt \leq A(t_0) + \int_{t_0}^{\infty} R(t)w(t)dt \tag{2}$$

where $\rho > 0$ is the individual discount rate, $R(t) = e^{-\int_{t_0}^{t} r(s)ds}$ is the cumulative discount factor, Y is nominal per capita expenditure, and A is initial wealth. The typical household takes the path of wages and the interest rate as given. Throughout the analysis, wage is the numéraire.

Preferences are identical for all consumers. We assume that there is a large number of varieties, all of which enter symmetrically into the instantaneous utility function $u(t)$, which we assume to be of the Dixit-Stiglitz type[3]:

$$u = \left(\sum_{i=1}^{N_m} x_i^{\beta} \right)^{\frac{1}{\beta}} \tag{3}$$

where x_i is the consumption of each variety and $0 < \beta < 1$. As is well known, this specification has proved to be the most tractable when product differentiation is the main concern. The love for variety could alternatively be modelled in a slightly different framework, by extending preferences over a continuous product space and assuming that at any given moment in time only a subset of potential varieties are available (Grossman and Helpman, 1989; Krugman, 1980). Over time, innovation can expand this subset, and $N_m(t)$ is the number of varieties at time t. This utility function implies constant elasticity of substitution between any couple of varieties:

$$\sigma = \frac{1}{1-\beta} > 1 \tag{4}$$

[3] In the rest of the paper the time variable, t, is suppressed.