

The Creedy–François Model of Higher-Education Economics as the Basic Framework for our Analysis

Creedy and François (1990) developed a framework in which the following analysis takes place. The framework is a two-period cohort model with heterogeneous agents who endogenously decide on higher education with respect to taxation and subsidization. Higher education is the only investment good. An individual's choice of higher education depends in particular on its exogenously given endowment. Agents' income is taxed by a constant tax rate, and part of the direct costs of obtaining higher education is subsidized, where ρ denotes the rate of subsidization.

5.1 The Educational Choice of Individuals

A population of heterogeneous individuals who differ with respect to individual ability characteristics (endowments), denoted by y_i , is assumed. These endowments are crucial for the individual productivity and for the decision in favor or against pursuing a university degree. Two periods are considered. In the first period, each individual faces the decision whether to pursue a degree or, alternatively, to start working as non-educated. In the second period, all individuals work. An individual chooses higher education if her net-lifetime earnings with a university degree exceed the lifetime earnings in case that she does not invest in higher education. The degree causes direct (and non tax-deductible) costs, c , for each individual. The total costs consist of the direct costs (e.g. teaching aids, tuition fees) and the foregone earnings. *Basic* incomes equal the individual endowment, y_i . Students have the opportunity to work even in the first period and, thus, earn the portion h of the income earned without higher education. Therefore, the total costs of obtaining higher education amount to

$$(1 - h)y_i + c. \tag{5.1}$$

Individuals who have completed a degree in the first period will raise their income in the second period due to the rate of return to education. To simplify

matters, it is assumed that the individual rate of return to education, s_i , is proportional to the individual endowment:

$$s_i \equiv u \cdot y_i. \quad (5.2)$$

As noted above, in the first period each individual faces the decision whether to pursue a degree or, alternatively, to start working without a university degree. The share's size of those choosing higher education depends on the exogenously given distribution of y .

It is assumed that graduates cause an externality benefiting (also) non-graduates, because this externality, denoted by g , raises all incomes. Furthermore, it is assumed that g depends on the graduation rate, denoted by p , and by an exogenously given parameter,¹ $\vartheta \in \mathbb{R}_{++}$, specified as

$$g = \vartheta \frac{p}{1+p}, \quad (5.3)$$

so that g increases from zero, when no investment in human capital takes place, to 0.5ϑ if all agents invest in higher education. ϑ , however, is exogenously given.

The lifetime earnings of educated agents, V^E , and the lifetime earnings of non-educated ones, V^N are given by

$$V_i^E \equiv h y_i - c(1 - \rho) + \frac{y_i(1 + s_i + g)(1 - t)}{1 + r} \quad (5.4)$$

and

$$V_i^N \equiv y_i + \frac{y_i(1 + g)(1 - t)}{1 + r} \quad (5.5)$$

where $r \in \mathbb{R}_{++}$ represents the discount rate. It is possible to find an ability level corresponding to that of an agent who is indifferent to investing in higher education, by setting (5.4)=(5.5). This ability level is defined to be *educational-choice margin (ECM)*, \tilde{y} . An individual i makes a decision in favor of higher education if her net-lifetime earnings as a graduate exceed those of being a non-graduate. This is the case if her endowment, y_i , exceeds the educational-choice margin.

As a consequence of this model, only those individuals with the highest endowment will be enrolled in higher education. The government can introduce a subsidy to higher education in order to (partially) cover the direct costs of higher education. $F(y)$ denotes the distribution function of y , so that it measures the proportion of individuals with endowments less than or equal to y . The proportion of individuals who invest in higher education is given by

$$p \equiv 1 - F(\tilde{y}). \quad (5.6)$$

¹ We use ϑ instead of δ in the original source.