EFFICIENT PROVISION OF EDUCATIONAL SERVICES AND PUBLIC VERSUS PRIVATE UNIVERSITIES: THE CASE OF TURKEY

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ABSTRACT

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This thesis studies the relative efficiencies of public and private universities in Turkish higher education system in producing human capital output for the economy in 1998-2002 period, by aiming at to propose a resource allocation policy for the realm of higher education to be pursued by the government. For this purpose, it develops a model which is built on the academic quality and per student expenditure variables of the public and private universities in producing human capital output, and calibrates it with Turkish higher education data. The results of the calibrated model have revealed that the resources devoted to higher education were allocated inefficiently between the public and private universities in Turkish higher education system in the above mentioned period. It is shown that the implementation of the government policy, which is proposed by study, helps the higher education market approach to Pareto optimum allocation of higher educational resources between public and private universities.

Keywords: Education, Turkish Higher Education System, Human Capital Production Function, Public and Private Universities, Efficient Provision of Educational Services.

ÖZ

EĞİTİM HİZMETLERİNİN SAĞLANMASINDA VERİMLİLİK VE TÜRKİYE'DE KAMU İLE VAKIF ÜNİVERSİTELERİNİN BİR KARSILAŞTIRMASI

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Bu tezde; Türk yükseköğretim sistemindeki kaynak dağılımını daha verimli hale getirecek bir hükümet politikası önerisi geliştirmek amacıyla, kamu ve vakıf üniversitelerinin beşeri sermaye üretimindeki görece verimlilikleri 1998–2002 dönemi içinde incelenmektedir. Bu amaçla; beşeri sermaye üretim sürecinde, kamu ve vakıf üniversitelerinin akademik kalite ve öğrenci başına harcama değişkenleri üzerine kurulan bir model geliştirilmiş ve model Türk yükseköğretim verileri ile kalibre edilmiştir. Kalibre edilmiş modelin sonuçları kullanılarak yukarıda adı geçen dönemde Türk yükseköğretim sistemi bünyesindeki kaynakların kamu ve vakıf üniversiteleri arasında verimsiz dağıldığı gösterilmiştir. Çalışmada önerilen hükümet politikasının uygulanmasının, yükseköğretim kaynaklarının kamu ve vakıf üniversiteleri arasındaki dağılımını Pareto optimum kaynak dağılımına yaklaştıracağı gösterilmiştir.

Anahtar Kelimeler: Eğitim, Türk Yükseköğretim Sistemi, Beşeri Sermaye Üretim Fonksiyonu, Kamu ve Vakıf Üniversiteleri, Eğitim Hizmetlerinin Sağlanmasında Verimlilik.

To My Mother

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TABLE OF CONTENTS

LIST OF TABLES

TABLES

CHAPTER 1

INTRODUCTION

Human capital is a major determinant of economic growth. Human capital stock of an economy is mostly determined by the resources that it devotes to education. As is well-known, the more the resources are and the more efficiently they are utilized, the higher the human capital accumulation of the economy is. Hence, policies increasing the human capital accumulation of an economy through a more efficient usage of the educational resources are of primary importance for the growth of an economy. The extent to which the educational resources are efficiently utilized is mostly determined by the appropriateness of the educational regime to the internal dynamics of the economy.

Glomm and Ravikumar (1992), Saint-Paul and Verdier (1992, 1993), Penalosa (1995), Fernandez and Rogerson (1998) and Cardak (1999) study the relationship between income inequality and economic growth through the mechanism of education[1]. They discuss the choice of educational regime[2] under different socio-economic settings, and its effect on per capita income. However, these studies mainly stress on the distributional issues such as income inequality and access to educational services, and they do not differentiate among the levels of educational attainments. The analysis conducted in this thesis departs from the above studies in these respects: In this thesis, we focus purely on the "efficient" provision of educational services in production of human capital, and we only consider the "higher education" institutions.

[1] See Chapter II, 2.5 Public versus Private Education.

[2] Education regime here refers to public or private education.

The last decade of Turkish higher education has witnessed the decreasing governmental support for public education, while the demand for higher education experienced a boom. As a result, enormous excess demand for higher education services was created, and the introduction of the private universities into the higher education system has gained a more justified ground. In the last 11 years, 23 new private universities were established while the number of public universities remained unchanged. The total share[3] of the private universities reached one tenth of in the Turkish higher education system in the last decade. Moreover, the share of funds allocated to public universities through the annual state budget decreased from 79 percent to 55 percent in 1993-2003 period. In addition to this, per student budget allowances granted to the public universities have been reduced approximately 39 percent in real terms in the above mentioned period. Finally, the share of higher education budget in overall government budget decreased from 4.3 percent to 2.6 percent in that period. All of these observations verify the idea that the government is gradually leaving the field of higher education to the private initiative. Indeed, private universities have been motivated through financial allowances from the government budget.

The thesis studies the relative efficiency of public and private universities in Turkish higher education system in terms of the production of human capital output for the economy during the 1998-2002 period. The study attempts to show that increasing involvement of the private sector in the higher education market led to the misallocation of educational resources in that period. Moreover, it indicates that in order to correct this observed market failure; the government should have increased the relative size of the public sector in the higher education system in the above mentioned period. In this sense, the elimination of state financial allowances granted to the private universities would

[3] In terms of resource usage.

have led to a Pareto improvement in human capital output production process**.** Moreover, the observed demand boom would have been relieved due to the expansion of public sector in the higher education market. Therefore, in order to maximize the human capital output[4] in the economy and to avoid the misallocation of resources in the higher education sector, government should define and follow a resource allocation policy in the realm of higher education. This study mainly proposes such a resource allocation policy, which satisfies the above requirements, by building a model which focuses on the academic quality and per student expenditures of the public and private higher education institutions.

The organization of the thesis is as follows: Chapter II gives an overview of the issues in education, Chapter III analyses the recent developments in Turkish higher education system. Chapter IV proposes a model and calibrates it with recent Turkish higher education data in order to determine efficient allocation of educational resources between public and private universities. Chapter V presents the conclusions.

[4] i.e. human capital output which is produced by the higher education institutions..

CHAPTER 2

ISSUES IN ECONOMICS OF EDUCATION

2.1 A Quick Review of Human Capital Theory

2.1.1 Introduction

Human capital is the capitalized value of investments in individuals. The common property of these investments is to increase productive skills, talents and knowledge of individuals. In recent years, economists have devoted a great deal of effort to developing and quantifying the concept of human capital and to applying it through the notion of investment in the formation of human capital to some activities such as education, on-the-job training, migration, and medical care (Kiker, 1971).

Human capital is not a new notion, and it was prominent in the economic thinking until Alfred Marshall discarded the idea as unrealistic. One of the first studies of human capital is by Petty (1691)[5], who named labour as the "father of wealth". He is followed by other economists who considered human beings or their skills as capital, such as Smith, Say, Senior, List, von Thunen, Roscher, Bagehot, Ernst, Engel, Sidwick, Walras and Fisher. These authors used the concept of human capital to demonstrate the power of a nation, to determine the total cost of a war (in terms of man-power loss) and to emphasize the economic significance of human life (Kiker, 1966). Human capital theory, aimed at finding out the production and evolution of human capital, was brought into mainstream

[5] Sir William Petty (1691) mainly attempted to estimate the monetary value of human being.

economics by Schultz (1961, 1963), Denison (1962), Becker (1967, 1975, 1993) and Mincer (1970, 1974) during the second half of the Twentieth Century and since then it has continued to be one of the most important areas of study in the economics literature (Hanushek, 2002)[6]. The researchers in this strand of literature assert that expenditures on man which lead to increases in future productivity are investment in capital, and that it is useful to treat them in both theory and practice as capital formation (Kiker, 1971). According to human capital theory, the productive capacity of labour can be increased and the quality of labour can be expanded and improved through education and training, health improvements and internal migration to take advantage of better job opportunities (Weisbrod, 1962). In these and similar ways, the quality of human effort can be greatly improved and its productivity enhanced (Schultz, 1961). The understanding of heterogeneous labour brought a new perspective to the explanation of national output, income distribution and economic growth and development issues. As Schultz (1961) noted, increases in the national output is larger compared with the increases on land, man-hours and physical reproducible capital, and investment in human capital is probably the major explanation for this difference. Hence, introduction of the human capital variable into the aggregate production function defined human capital as one of the sources of economic growth and brought in a new dimension in economic analysis.

2.1.2 Measurement and Pricing of Human Capital

Economists view human capital accumulation as a production process. Ben-Porath (1967) states that "individuals' own abilities, innate or acquired, the quality of cooperating units, the constraints and opportunities offered by the institutional setup determine the form of the production relation". Due to differences in abilities among individuals, a given level of investment (e.g., schooling) may not yield the same amount of human capital in each individual.

[6] According to Kiker (1971), the rebirth of the concept of human capital can be "precisely" dated from T. W. Schultz's presidential address at the 1960 meeting oh the American Economic Association. In this pioneering address, Schultz suggests why economists have been reluctant to undertake a systematic analysis of human capital.

These differences may be genetic (e.g. ability differences), but they may also be generated by the home environment within which the individual is raised. In other words, the amount and the quality of interrelation between an individual and his family are of particular importance in the process of human capital accumulation along with the other determinants. Such immeasurable features embodied in human capital accumulation process makes the measurement of human capital a hard task. Human capital is measured in terms of the value of its productive services. Therefore, if each unit of equal quality human capital in an economy always receives the same price, then differences in the value of human capital indicates equal differences in the magnitude of human capital. On the other hand, this is not always the case and some factors prevent the productivity-pricing correspondence. The factors altering the price of human capital can be summarized as imperfect information, transition costs, risk and uncertainty, monopoly powers and economic growth[7] (Erkan, 1996).As Welch (1970) notes, if labour is not paid according to its marginal product, then human capital does not reflect the flow of goods or services which labour produces. Hence, under imperfect competition in the labour market, the price paid for human capital does not reflect its productivity.

2.1.3 Investment in Human Capital

Investment is an expenditure which generates a flow of benefits that extend beyond the current accounting period. Human capital theory approaches investment in the productive capacities of individual by mimicking the existing investment theories in physical capital. According to Becker (1967), a rational individual selects a path of human capital investment that maximizes the present value of "profits", i.e. the present value of the difference between benefits and costs of accumulating human capital. In order to explain the optimum level of investment in human capital, he carries out a simple supply-demand framework as follows:

[7] Notice that these factors alter the pricing of physical capital, as well.

The demand curve for human capital investment shows various combinations of marginal rates of return on additional human capital and the value of human capital invested in dollar terms, and it is downward sloping. Becker (1967) states that

> the principal characteristic that distinguishes human (capital) from other kinds of capital is, by definition, that the former is imbedded or embodied in the person investing. This embodiment of human capital is the most important reason why marginal benefits decline as additional capital is accumulated. One obvious implication of embodiment is that since the memory capacity, physical size, etc. of each investor is limited, eventually diminishing returns set from producing additional capital.

On the other hand, the supply curve of human capital relates various amounts of marginal rates of cost of acquiring additional human capital and the value of human capital invested in dollar terms, and it is upward sloping. Becker (1967) justifies this as

> other things remaining the same, an increase in the value of time raises the marginal cost of later investments compared to the earlier ones since the former use more expensive time. For any given rate of increase in its value as he ages, the costs of later investments are generally greater.

Given this framework, the value of total benefits and costs are given under the area of demand and supply curves, respectively. The maximum difference between benefits and costs are obtained by investing up to their point of intersection at which marginal benefits are equal to marginal costs.

As can be seen the above formulation of human capital investment requires strong assumptions. Indeed, Becker (1967) himself points out that

> the sufficient conditions for (the above framework) are that all persons are rational[8] and neither uncertainty nor ignorance prevents them from achieving their aims. Of course, these are strong conditions, and a fuller model would make room for irrationality, uncertainty and discrepancies between actual and "desired" (human) capital stock, etc.

Moreover, the above model also assumes that capital markets are perfect and everyone can borrow at the ongoing interest rate. However, as Schultz (1961) notes that economists should place a greater stress on the imperfections of the capital market in providing funds for investment in human beings.

As Weisbrod (1962) states, individuals can increase their human capital through investment in education, health improvements and migration. Amongst the means of acquiring human capital, however, education is the most important component relative to the others. Education affects the human capital accumulation process in two ways: formal education and on-the-job training. Formal education is the principal institutional mechanism for developing human capital (Güngör, 1996). It has standardized and well-defined layers, and it differs from other areas of public expenditure because direct measures of outcomes are available, so that it is possible to consider results in quantitative terms (Hanushek, 2002). Not only governments but also individuals carry out a calculation of benefits and costs of an educational[9] investment before they undertake it. Below, this issue will be discussed in detail.

[8] Since all persons are very young during much of their investment period, it may seem highly unrealistic to assume that their decisions are rational. (Becker, 1967)

[9] From now on, when we use the term education it shall mean formal education.

2.1.3.1 Investment in Education

According to human capital theory as applied to educational investment decisions; a student can be viewed as a "firm", and enrollment at an educational institution can be viewed as an investment project to be evaluated on the basis of expected costs and benefits[10] (Catsiapis, 1987). The cost of educational investment is composed of direct and indirect costs. Direct costs are the expenditures that the individual incurs directly out of his pocket, such as tuition fee, cost of books and supplies and housing expenses. Indirect costs include the earnings that the individual forgoes during the accumulation of human capital. On the other hand benefits of human capital investment can be classified as monetary and non-monetary benefits. Monetary benefits are in the form of higher lifetime earnings. Non- monetary benefits[11] include self-realization and higher social status that the individual attains in the society.

Costs are incurred during the accumulation of human capital whereas benefits are enjoyed after the completion of the accumulation process and they continue for the lifetime of the individual (Catsiapis, 1987). Money spent and received in different periods of time is not of equal value. Hence, in order to obtain comparable measures, costs and benefits should be analyzed in the same time period. The interest rate is the device that individuals utilize to relate and compare present costs and future earnings. Individuals compare the present discounted value of future earnings with that of costs. The difference between the present discounted value of benefits and costs is defined as net present value of the investment. As long as the net present value is positive, i.e. benefits exceed costs, the individual continues to invest in himself. However, since there

[10] As can be seen, the theory of educational investment, being a special form of human capital investment, hires the same understanding of perfect capital markets as Becker does above.

[11] In order to obtain comparable measures, some studies assume that these non-monetary benefits can be capitalized (See Fields (1974) and Schaafsma (1976)).

is diminishing returns to human capital investment[12] , there is a certain amount human capital at which net present value is zero (that is, costs equalizes the benefits). At that point the individual stops accumulating additional human capital since the benefit which would be obtained by accumulating additional human capital will be less than the cost of it (Erkan, 1996).

Alternatively, the individual can compare the internal rate of return to education (IRRE) (ρ) with the prevailing interest rate (r) after correcting for inflation (i.e. the individual compares everything in real terms). It is defined as

$$(1 + \rho)\, n = E_1/E_2 \quad or \quad \rho = ((E_1/E_2)1/n - 1) \qquad (2.1)$$

where

ρ: internal rate of return

n: number of years of schooling for targeted education

E_1: earning of targeted education

E_2: earning of current education

As long as IRRE exceeds the market interest rate ($\rho > r$), the individual makes the additional educational investment, because in this case resources allocated to educational investment brings a higher return than the rental return of those resources. On the other hand, if IRRE is equal to the prevailing interest rate ($\rho = r$), then the individual is indifferent between making the investment or

[12] According to human capital theory as the unit of investment increases, the amount of human capital produced increases less than proportionately. As a result, as the amount of human capital increases the returns per unit of money declines**.** For a detailed discussion, see Becker (1967, 1993).

spending his time and money somewhere else. Finally, given $\rho < r$, the individual does not undertake the investment in education, (Erkan, 1996)[13].

2.2 Education and Economic Growth

2.2.1 Introduction

Starting from the 1950's, economists noticed the fact that increases in national income have been more than proportional to increases in the traditional factors of production (land, labour and physical capital). Many economists maintain that part of the explanation for the divergence between inputs and outputs is the improvement in the quality of the labour force which often has been neglected as an input.

The concept of human capital is widely used by economists as a means of emphasizing the importance of education. Efforts are made to determine the amount of human capital investment attributable to education and its yield. Much emphasis is being placed on this factor as a source of economic growth (Kiker, 1971).

2.2.2 Theoretical Explanations

Economists generally consider education as an investment both by individuals and by the society at large. The viewpoint interrelating education and economic growth dates back to the 17th century with the writings of Adam Smith (Hanushek, 2002).

[13] However, the approach employed above implicitly assumes that there are no alternative investments apart from education. If there are some other alternative projects, then the individual compare IRRE of education and that of alternatives, and choose the one with greater yield (Kiker, 1971).

In his famous "Wealth of Nations", Adam Smith mentions the relationship between education and economic growth for the first time. Although he did not specifically define the term "capital", Adam Smith included the skills and useful abilities of individuals in his category of fixed capital. The skill of a man, he said, may be regarded as a machine that has a genuine cost and returns a profit (Kiker, 1966). According to Smith, the expenditure incurred to obtain education is an investment in skill and knowledge and this expenditure creates a certain kind of accumulation, which in turn affects the well-being of the overall economy (Türkmen, 2002). As mentioned above, many economists studied the formation of human capital through education until Alfred Marshall discarded the notion as unrealistic.

Theoretical studies about human capital and the role of education experienced a rebirth during the second half of the 20th century. The survey continues with Solow's famous contribution to the literature: The Solow Model[14]. Although this study did not incorporate the human capital variable explicitly in the analysis, it laid down the fundamentals of the Neoclassical Theory of Growth and became a point of departure for many future studies. The model focuses on four variables: output (*Y*), capital (*K*), labour (*L*) and "knowledge" or the "effectiveness of labour". The production function exhibiting constant returns to scale (CRS) takes the form

$$Y(t) = F\,(\,K(t), A(t)L(t)\,) \qquad (2.2)$$

where *t* denotes time.

[14] The Solow Model, which is also known as Solow-Swan Model was developed by Robert Solow (Solow, 1956) and T.W Swan (Swan, 1956).

According to Equation (2.2), the amount of output obtained from given quantities of capital and labour increases over time (i.e. there is a technological progress) only if the amount of knowledge increases. *A(t)L(t)* denotes units of effective labour, and technological progress entering in this fashion is referred to as "labour augmenting" or "Harrod-neutral". Technology is assumed to be completely exogenous, and in Growth Accounting approach[15], which was pioneered by Abramowitz (1956) and Solow (1957), it is treated as a residual (Romer, 2001).

A specific example of the production function is the Cobb-Douglas form,

$$Y=F(K,AL)= K^{\alpha}(AL)^{1-\alpha} \qquad 0< \alpha <1 \qquad (2.3)$$

where (1-α) and α denote the output elasticity of labour and capital, respectively.

Both of the production factors exhibit diminishing marginal returns. By this property of the model, Solow hypothesized that countries with different stocks of capital would converge to each other in terms of the growth rate. By taking the natural logarithms of both sides in Equation (2.3), we obtain

$$ln\ Y= C + alnK + (1-a)lnL \qquad (2.4)$$

where $C = (1-a)lnA$

[15] Growth accounting which rests on the neoclassical theory of growth is the framework used to determine the effect of the growth rate of inputs on output growth rate in terms of magnitude and direction (Güngör, 1996).

Equation (2.4) states that percentage changes in output can be expressed as the weighted sum of percentage changes in capital, labour and the residual (*C*). The results of the model revealed that technological advancement is crucial for a sustainable growth. However, The Solow model has a large residual variance and attributes everything unexplained to technological advancement.

Therefore, an extended version of the Solow model was formalized including human as well as physical capital by Mankiw, Romer and Weil (1992). The production function under this setting is given by[16]

$$Y(t) = K^{\alpha} H^{ß} (A\,L)^{1-\alpha-ß} \qquad 0<\alpha<1,\ 0<\beta<1 \qquad (2.5)$$

where *H* is the total amount of productive services supplied by workers, and *K* and *L* is the same with the original Solow model. The human capital variable *H* captures the total contribution of workers of different skill levels to production. Therefore, the model includes the contributions of both raw labour (i.e. the skills that individuals are endowed with) and human capital (i.e. acquired skills). In the spirit of the Solow model, above formulation takes the saving rate, technology and the allocation of resources to human capital accumulation as exogenous. Adding human capital to the Solow model improves its performance, and dispose of a fairly large part of the model's residual variance explaining about 80 percent of the cross country variation in income (Mankiw, Romer and Weil, 1992).

[16] For simplicity, the time variable t is omitted from the equation.

On the other hand, the above mentioned models lack the framework illuminating the underlying mechanisms of technological advancement which is a core determinant of economic growth. Therefore, recent studies stressing on the determinants of technological progress lead to the development of the Endogenous Growth Theory (Romer, 2001). Lucas (1988) is a leading study in this area. Lucas starts with a production function which is seemingly very similar to the ones described above[17]:

$$Y=F(K,AH)=K^{\alpha}(HL)^{1-\alpha} \quad , \quad 0<\alpha<1 \qquad (2.6)$$

However, in Lucas' formulation human capital is endogeneized. It enters into the production function as a separate factor of production, and as a result, the production function exhibits increasing returns to scale (IRS). In this sense, Lucas associates technological advancement with human capital accumulation, which is a more concrete indicator of productivity increase, as opposed to the Solow model which takes technological progress as exogenous.

Lucas (1988) asserts that education (being the primary source of human capital accumulation) leads to a certain degree of positive externality, which is one of the primary components of IRS (Türkmen, 2002). In other words, he argues that education provides economic benefits to society greater than the sum of its benefits to individuals – by providing a rich environment for innovation, scientific discovery, and education can accelerate the growth rate of the economy. That is, benefits of attaining a higher average education are similar to the spillover benefits of network systems; more subscribers to such systems increase the gains to existing subscribers (Güngör, 1996). According to Lucas (1988), educated workers can adapt the new working and technological conditions more easily, and interaction among educated workers is more effective. In other words, education increases

[17] For simplicity, the time variable t is omitted from the equation

the “effective” labour force and this in turn leads to an increase in the output elasticity of labour (Türkmen, 2002).

Other studies sharing the same intuition with Lucas (1988) can be listed as Romer (1990a), Barro (1991), Jorgenson and Fraumeni (1992), and Barro and Sala-i-Martin (1995). (Hanushek, 2002) More recently, Acemoglu (1996) points out that growth effects depending on the aggregate level of education in the economy enter as an externality to the individual. He shows that “the equilibrium rate of return on the human capital of a worker is increasing in the average human capital of the workforce even though all the production functions in the economy exhibit constant returns to scale and there are no technological externalities” (Acemoglu, 1996).

2.2.3 Empirical Evidence

Several empirical studies have been carried out to explain the residual of unexplained growth in national income mentioned above. Some of them are discussed below.

Starting from the 1950’s, a revival of interest emerged in the role played by education in the determination of economic growth. In 1956, J.W. Kendrick studied the factors affecting the output growth (which is 3.5 percent on average) in USA for the period 1889-1957. He has shown that the conventional factors of production such as capital, land and labour could explain only 1.9 percent of the output growth. According to him, the missing portion of 1.6 percent could be explained by the increasing quality of workforce by some reason (Türkmen, 2002).

Aukrust (1959), employing conventional Cobb-Douglas assumptions, suggests that the rate of growth in an industrial economy is not strongly influenced by the

rate of conventional capital formation. He finds that in 1948-1955 period in Norway, the growth in national income 3.4 percent was found to be composed of 0.46 percent from increased employment, 1.2 percent from increased conventional capital, and 1.81 percent from "human factors" (defined vaguely as organization, professional skills, and technical knowledge.)

In a similar manner, Solow (1957) carries out an empirical analyses based on the Solow Model that we mention above, and investigates the growth performance in the US for the 1915-1955 period, and finds out that economic growth interacted by some "sub-production factors" apart from the conventional factors of production (Kiker, 1971).

Denison (1962) attempts to explain the growth performance of the US for the period 1910-1960 with conventional inputs[18] by employing the growth accounting method. He has found out that there was a huge discrepancy (residual) between the growth rate of the economy and that of conventional inputs. As a result, he concentrated on other possible variables, which may account for the above observation, such as average rate of education of the workforce and the change in the quality of physical capital. At the end, he has shown that 23 percent of the growth of output could be explained by the increase in the average rate of education of the workforce.

Moreover, Denison (1979) revealed that 20 percent of the increase in per capita GDP in the US in 1948-1973 period was a result of the educational advancement of the workforce. On the other hand, Schultz (1961) employed the IRRE method and found out similar results (Türkmen, 2002).

[18] Physical capital, labour and land

Jorgenson and Fraumeni (1993) find that increases in educational quality of the labour force could explain 25 percent of output growth in the US for the period 1948-1986 (Türkmen, 2002).

More recently, Lau et al. (1993) studied the relationship between education and economic growth in Brazilian economy for the period 1970-1980. They used the average rate of education of the workforce as a proxy for human capital. In the period mentioned, the average growth rate of the Brazilian economy was 10.66 percent, and according to this study, 2.6 percent of this growth is associated with the education variable. Moreover, they have shown that a one-year increase in the average rate of education of the workforce increases the GDP by 21 percent. (Türkmen, 2002). Moreover, they suggest that there may exist a macroeconomic effect of education which is more than the aggregate of microeconomic effects based on individual decisions. They find evidence for a "threshold level" of average national education beyond which average education has a positive effect on output (Güngör, 1996).

2.3 Demand for Education

2.3.1 Introduction

Demand for education is defined as the quantity of education actually purchased by a family and corresponds to the enrollment and persistence of the family's children in school (Pearse, 1979). There are many factors which determine the demand for education, such as monetary motives, non-monetary (psychic) benefits, status of credit markets, general status of the labour market and parental influences. Below each of these factors will be discussed in detail.

2.3.2 Monetary Motives

Individuals demand additional education primarily for the purpose of enhancement of their own personal and economic status. Hence, it can safely be assumed that demand for a given level of education mainly depends on the size of the expected private return to that level of education (Fields, 1974). Several authors dealing with investment in education maintain that this investment is undertaken mainly for future returns (Kiker, 1966). Education is a form of investment to acquire human capital, and as mentioned above additional education brings along additional benefits as well as costs in the form of higher lifetime earnings and individuals decide to invest in themselves based on a comparison of the anticipated present discounted value of benefits and costs (Becker, 1993).

In line with this understanding of educational investment, Catsiapis (1987) views the individual as a firm with an initial stock (H_o) of human capital, and the educational process as production of additional human capital *(h)*.The inputs in this production process are market resources (R) combined with the student's own time (T) and initial stock of human capital as a technological parameter, according to some production function:

$$h = h\,(R, T; H_o) \qquad (2.7)$$

assuming that the opportunity cost (w) of the time spent in the production of education and the price (p) of a standard unit of market resources are given exogenously, the cost of production is given by the sum of direct costs (pR) and forgone earnings (wT). Then, the total cost function of obtaining a given level of education is given by

$$C = Co + pR + wT \quad (2.8)$$

where Co represents any initial information and set-up costs. Under this setting, the expected net present value *(NPV_e)* of this project is given by

$$NPV_e\,(R, T) = G_e + sF_e - C + k_e h(R, T; H_o)/\, i \quad (2.9)$$

where

G_e = expected amount of financial aid

F_e = expected amount parental contribution

s = the fraction of F_e which is an education specific gift

k_e = expected rate of return per unit of human capital

i = the appropriate discount rate

given above framework, the individual chooses the levels of market resources (*R*) and study time (*T*) so as to maximize the expected net present value. If this maximum is positive, then the individual chooses to enroll, otherwise he understands that the project is not “profitable”, and hence it should not be undertaken. This model assumes an environment in which education is valued purely for its monetary value. Below, we will present alternative models incorporating some other motives in relation to demand for education.

2.3.3 Non-Monetary Benefits

On the other hand, education has some non-monetary benefits, as well. According to Becker (1967), it is the sum of the monetary and the monetary equivalent of psychic benefits from human capital, not just the former alone that determines the demand for human capital investment. Schaafsma (1976) criticizes the investment theoretical analyses of the demand for education which state that an individual will acquire the amount of education which merely maximizes the present value of the anticipated stream of net income. Education can be viewed as an activity that generates two outputs: a life-time stream of net income and non-monetary benefits. He considers education both an investment which brings along some benefits and a consumption good which increases the utility of the individual through the accumulation of non-monetary benefits. Therefore, by adding the non-monetary benefit variable into the utility function of the individual, he constructs a static microeconomic model analyzing the effects of changes in the present values of the anticipated streams of monetary and non-monetary benefits on the demand for full-time education. The model is quite tractable. The agent derives utility from monetary and non-monetary benefits of education, but each of these variables exhibit diminishing returns.

$$U = U(X,C) \qquad U_x, U_c > 0; \qquad U_{xx}, U_{cc} < 0 \ ^{19} \qquad (2.10)$$

where

U: Utility of the individual

X: present value of the anticipated lifetime flow of net income

C: present value of the anticipated lifetime flow of non-monetary benefits

[19] Subscripts c and x denotes the partial derivatives of U with respect to c and x.

The agent maximizes *U* subject to the constraints

$$X = F(E; \beta) + Xo, \quad F_E > 0 \text{ for } E < E'; \; F_E < 0 \text{ for } E > E' \qquad (2.11)$$

$$C = G(E; \gamma) + Co, \quad G_E > 0 \text{ for } E < E''; \; G_E < 0 \text{ for } E < E'' \qquad (2.12)$$

where,

Xo: initial endowment of wealth

Co: initial endowment of non-monetary benefits

γ, β: shift parameters.

After solving the model, Schaafsma (1976) finds out that monetary and non-monetary maximums may occur at different points (i.e. $E' \neq E''$) and the agent may attain a higher level of satisfaction by trading off some of the increase in the present value of the anticipated lifetime stream of net income for that of non-monetary benefits. Hence, non-monetary benefits may be an important determinant of the demand for education. Schaafsma states that the observation that some students enroll in graduate studies in which the IRRE is very low or even negative indicates that non-monetary returns may be an important consideration in deciding whether or not to acquire education. These benefits may be self-realization of the individual, a higher social status in the society or simply the interest in learning.

2.3.4 Imperfect Capital Markets

The models above assume that individual's budget can always afford the cost of the desired level of education. Therefore they stress only the choice of additional amount investment on education so that the utility of the agent is maximized. However, in reality, individuals differ in terms of endowment and some may not afford the cost of this optimum level of education. Fields (1974) is one of the first who recognizes this feature. According to him, an individual's decision to demand education depends on three factors: individual's expectation of the present discounted value future financial benefits he will receive less the cost of educational attainment (PV_i), psychic benefits of being an educated person less pecuniary costs [20](N_i) and the ability of individual (or his family) to afford the direct cost of education (θ_i).If

$$PVi + Ni > 0 \qquad (2.13)$$

the individual will wish to be educated. This wish will be translated into an "effective demand" if the student is able to meet the direct costs. Letting θ_i have the value 1 if the i^{th} family can pay for the cost of schooling, and 0 otherwise, the individual demand for education is

$$D_i = 1 \quad if \quad \theta_i(PV_i + N_i) > 0 \qquad (2.14)$$

$$D_i = 0 \quad if \quad otherwise$$

and the aggregate demand for education is

[20] Although Fields (1974) mentioned the non-monetary benefits before Schaafsma (1976), he did not include the non-monetary benefit variable exclusively in the analysis. Fields's main concern is the monetary benefits of education

$$D = \Sigma D_i \qquad (2.15)$$

As can be seen, the model differentiates between total desired level of educational attainment and total effective demand. Moreover, it implicitly touches upon the issue of "excess" demand for education. It considers that some individuals cannot acquire education although they are willing to do so. Therefore, they cannot be represented in the "effective" demand. From this observation it follows that if the capital markets are imperfect and there are borrowing constraints against the future earnings, actual and effective demand for education may differ.

2.3.5 General Status of the Labour Market

Many people lose their jobs in periods of economic crisis, and for many of them it becomes harder to find another job in a short period of time due to the shortage of vacant places in the job market**.** As the unemployment period extends, the damage to the individual becomes more severe**.** Hence, the "ability of finding a new job" in such an environment in a short period of time is very important; and as will be shown below, it directly affects the demand for education. Thurow (1972) states that

> in a labour market based on job competition, the function of education is to certify the status of individual's trainability and to confer upon him a certain status of virtue of this certification. Jobs and higher incomes are distributed are distributed on the basis of this certified status.

Fields (1974) employs a similar perspective, as well. In the "Bumping Model" that he developed to explain some underlying mechanisms in labour market, Fields studies the relative job finding ability of educated and uneducated

workers.[21] In the model, there are two kinds of jobs: skilled and unskilled. Skilled jobs yield greater returns to their owners compared to the unskilled jobs, and employers prefer educated workers for either kind of jobs since the educated are believed to be more productive. According to him, if there is a surplus of educated workers (which we can interpret as an economic crisis in the skilled labour sector), educated workers will move to unskilled jobs, "bumping" a less educated workers from their (potential) jobs[22]. When the crisis is over later on, they will turn back to their own skilled (and high-pay) jobs. As can be seen, educated workers never become unemployed although the crisis emerges in their sector and enjoy a new job (although low-pay) at the expense of uneducated people. Above picture mainly results due to the preferential hiring practice of employers which is based on the belief that educated workers are more productive. As a result, people would be willing to obtain more education, not only for higher pays or psychic benefits but also to decrease their unemployment period in times of economic crisis.

Another study which relates status of markets and demand for education is by Crean (1973). According to him, demand for education is determined by the net present value of monetary and psychic benefits of the educational investment. However, he points out that the expected present value of monetary and non-monetary benefits are not subject to change to a great extent. On the other hand, expected present value of costs can change dramatically since the forgone earning component of cost is very sensitive to availability of jobs in teenage labour market. Crean notes that "it is not unusual for changes in this market to raise or lower forgone earnings in real terms from one year to next." Following this intuition, he carries out an empirical investigation among Canadian high

[21] The terms "educated" and "uneducated" can also be considered as "more educated" and "less educated", which does not alter any of the implications of the model.

[22] On the other hand, the crisis in the unskilled sector will end up with some uneducated workers losing their jobs, and educated workers would not be affected by the crisis at all.

school students, and finds out strong support for the positive relation between the unemployment rate in teenage labour market and the demand for education.

On the other hand, Acemoglu (1996) argues just the opposite of the above finding. According to him, in a high unemployment environment, people often expect their human capital not to be used and thus may end up investing less in their education. In other words people demand less education because they anticipate that, even with high education, they will not be able to get jobs.

2.3.6 Effects of Parents

Most of the time, children have their decisions guided by their parents, and as long as parents receive some monetary or psychic benefits from an increase in their children's economic well-being, parents have an incentive to help children to make wise decisions (Becker, 1967). Therefore, considering the fact that individuals incur their educational attainment at early ages in life, they are mostly dependent on their parents in financial terms. Moreover, the time that the parents spend for their children and the education level of the parents are also very influential on the schooling decisions of the children (Kotte and Ritzen, 1988). Therefore, it will be necessary and informative to discuss the effect of parents in educational decisions on the demand for education. Chuang and Chao (2001), analyze the factors determining the educational decisions within the framework of an intergenerational utility function which suggests that each generation cares about his own consumption and the human capital accumulation of his children.

The utility maximization of the individual is given by:

$$\max U = U(C_p, H_c) \tag{2.16}$$

$$\text{subject to } P_h H_c + C_p = \alpha H_p t$$

where

C_p: parents' consumption level

H_c: stock of children's human capital

H_p: parents' human capital

P_h: price of children's human capital

t: total time available

α: parent's working ability

and the price of the consumption good is taken as the numeraire. The utility function has the usual properties of $U'>0$, $U''<0$. After constructing the Lagrangean and solving for C_p and H_c, it is obtained that

$$U_C/U_H = 1/P_H \tag{2.17}$$

[23] U_C and U_H denote the partial derivative of the utility function with respect to C_p and H_c.

Equation (2.17) shows parents' trade-off between own consumption and their children's human capital accumulation, which depends on the price of children's human capital. Therefore, the parents must allocate their time between working and educating his children.[24] The time constraint of the parents is given by

$$t_h + t_w \tag{2.18}$$

where

t_h: the time engaged in children's human capital accumulation

t_w: time spent in working activities

Moreover the model assumes that human capital accumulation and parent's consumption constraint has the following functional forms:

$$Hc = A\, t_h H_p \beta \tag{2.19}$$

$$Cp = \alpha H_p t_w \tag{2.20}$$

Equation (2.19) implies that children's human capital formation is influenced by their own ability (A), the time that parents spent with them, and the parent's own human capital. Equation (2.20) indicates that parents' consumption availability depends on the parents' working income, which in turn depends on parents' ability, their stock of human capital and the time they work. After a few calculations, Chuang and Chao (2001) find the relation below

[24] This feature of the model contains implications regarding the time that the parents spent for their children and the education level of the parents.

$$Uc/U_H = 1/P_H = A/\alpha H_p(\beta\text{-}1) \qquad (2.21)$$

which shows that under intergenerational utility maximization, the children's human capital depends on their individual factors as well as their family background. Therefore, the individual demand for education can be defined as

$$E = f(A, \alpha, H_p, \beta) \qquad (2.22)$$
$$+ \; + \; + \; ?$$

2.4. Equality of Opportunity and Access to Educational Services

2.4.1 Introduction

The roots of the idea of equality of opportunity and its application to education date back to the times of ancient Greece. According to Aristotle, injustice arises when equals are treated unequally and also when unequals are treated equally (Frankel, 1971). The notion is very popular among many recent authors, as well. Below; firstly, the concept of equality of opportunity will be discussed in its broad sense, and then it will be narrowed down to "equality of educational opportunity" to in order to elaborate the subject of "inequality in access to educational services" and its possible consequences.

2.4.2 The Concept of Equality of Opportunity

In its most general sense, equality of opportunity defines an environment in which people are enabled to attain some particular social good on the basis of their natural abilities and actual achievement, and not on the basis of arbitrary

factors such as race, religion, sex and social class origin. This implies the development of one's ability and access to various places in the social structure irrespective of one's initial place in the social order (Joseph, 1980). In other words, in such an environment individuals' life chances are determined solely by their own capacity. According to Westen (1985), equality of opportunity exists when two or more people have a chance to attain a specified goal without being hindered by a specified obstacle. Stanley (1977) states that equality of opportunity is a state of affair, which offers everyone a fair and equal chance to find a suitable place within the society.

The concept of equality of opportunity can be disaggregated into two major categories: formal and compensatory. Formal equality of opportunity suggests that any recruitment should be in accordance with the proven merit, as defined by actual performance or achievement (Joseph, 1980). It is performance-based, clear-cut, straightforward and definite. It does not take into account the possible obstacles people confront in relation to results, but concentrates purely on the performance. According to Frankel (1971), formal definition stems from the logic of Aristotle in the sense that injustice arises when equals are treated unequally and also when unequals are treated equally. He asserts that this formula obviously requires that we, humans, possess rules which allow us to determine who is equal to whom, and what is equal to what. Any distinction between individuals is made on the basis of prescribed rules irrespective of the environmental factors, which may hinder the actual performance. Hence, few believers of equality are satisfied with a purely formal interpretation of it (Frankel, 1971).

On the other hand, compensatory equality of opportunity also suggests recruitment according to merit, but a distinction is made between one's natural abilities and his actual performance. According to this definition, the achievement of an individual should be a reflection of his ability and effort

alone, and the development of one's capacities should not be hampered by the social position into which he is born (Joseph, 1980). In this approach, pre-existing inequalities are treated as barriers for which there must be some compensation. As a result, the individual can have an opportunity to show his inherent capacities and be judged on that basis. In line with this reasoning, Rogoff (1960) focuses on the major sources of "inequality". According to her, if major sources of "inequality" can be clarified, we can compare the opportunities available to those equal in capacity but unequal in some respect which affects their chances of getting such opportunities. She states that "here we are in a fortunate position since there is a great amount of research which shows the central role of 'social class' as one of the leading sources of inequality." Joseph (1980) points out the disadvantages resulting from one's social origins, as well. He argues that "any sort of compensatory conception of equal opportunity requires distributive measures to balance the advantages and disadvantages rooted in different social backgrounds''

Some authors, on the other hand, approach the subject from a pure political science perspective. Schaar (1967) argues that the doctrine of equality of opportunity, when put into practice, leads inevitably to hierarchy and oligarchy. According to Schaar, "resulting increased social mobility, which is often justified as well as carried out on the basis of equality of opportunity principle, can lead to a highly stratified society". Schaar exemplifies Plato's republic which rests on a system of equality of opportunity in which children are put into separate classes in accordance with their ability. Frankel (1971), on the other hand, approaches the subject from a different viewpoint. According to Frankel, Plato defended the rigid hierarchical structure of his 'ideal state' in part by arguing that it would be so organized that the best people in it would be selected for the most powerful positions.[25]

[25] As can be seen, from a political science perspective authors generally refer to the "formal" equality of opportunity.

According to Schaar (1967), equality of opportunity is one of the most important barriers in attaining a true democracy, because it conceals the truly oligarchic nature of the regime which employs it. On the other hand, Stanley (1977) asserts that the doctrine of equality of opportunity can be quite compatible with democracy. He refers to Hannah Arendt who has constructed a theory in which democracy can easily be merged with the principle of equality of opportunity.

2.4.3 Equality of Educational Opportunity

> It will be profitable as mere investment to give the masses of people much greater (educational) opportunities than they can avail themselves of.
>
> *Principles*, Alfred Marshall[26]

The field of education is a natural candidate for the application of the concept of equality of opportunity. For this reason, many studies discussing equality of opportunity, which is an abstract notion, exemplify it with reference to equality of educational opportunity, for which more concrete analysis can be carried out. Starting from the 1930's and continuing up to the present day, demands for equal chances in education have become more apparent. Most of the time, these demands are justified in terms of social justice and economic waste (Evetts, 1970). Similarly, whether inequality in educational expenditures constitutes a denial of equality of opportunity became very popular among economists especially in the last few decades (Fernandez and Rogerson, 1996).

[26] From Solmon (1970)

As in the case of equality of opportunity, there are different interpretations of the concept of equality of educational opportunity. Evetts (1970) classifies these interpretations into two broad groups: according to the first group of thought, equal opportunity in education means that each individual should receive an equal share from the educational resources, irrespective of his potential ability. According to them, all schooling should be standardized, whatever the capacities of the respective students are. However, this view misses the point that resources to be devoted to education are scarce, and for this reason they should be utilized in the most efficient way in order to obtain the most desirable outcomes. Green (1988) states that equality of opportunity should not be reduced to equality of coercion, since it is not the same with equality of material resources for the education of each person.

The second group of thought, on the other hand, argues that equality of educational opportunity represents treating all those children of the same measured ability in the same way irrespective of environmental factors. For example, Green (1988) suggests that it is possible to sustain equality of opportunity between individuals, if public educational resources are allocated according to testable individual abilities and needs. Green asserts that "schools can do more to equalize opportunities if they are organized under principles of strict selection and separation under educational charters". In line with this approach however, one needs to consider the fact that environmental factors play a large role in "measured" ability[27]. Hence, separation of individuals purely in terms of measured ability does not capture their "real" ability. According to Green (1988), "no system of educational selection counters the inegalitarian effect of the domestic environment".

On the other hand, according to Evetts (1970) both of those broad categories above are far from explaining the true nature of the idea of equality of

[27] Measured ability here refers to the results of standardized tests during the schooling period.

educational opportunity. Evetts argues that the distribution of ability is completely random in different groups within the population. Therefore, there is a pool of talent that can be found in every sub-group of the population. In other words, the working class has the same proportion of bright children as the upper classes. Moreover, Green (1988) states that there is much evidence of widespread intellectual ability amongst the manual population. However, environmental deprivation can keep individual from performing up to his genetic potential. Therefore, if environmental factors are standardized, equalization of opportunity can be realized. Indeed, one of the most important tasks of education is to give each individual an equal opportunity to realize his innate potential regardless of irrelevant factors such as social class, income, race, religion or early handicaps (Green, 1988). According to Cohn (1970), even though it is observed that the percentages of college graduates are much higher among the rich; psychologists argue that talent is much more evenly distributed than income. Moreover, Evetts (1970) notes that "in so far as differential educational achievements are not solely reflective of differential abilities, (a given) education system is both socially unjust and economically wasteful."

Under this interpretation of equality of opportunity, attempts are made to equalize the environmental factors. The idea here is that that no one should be barred from attaining certain social positions because of his initial place in the social order. In the like manner, Green (1988) asserts that there is an unequal distribution of resources in the society. As a result, some families have more material goods than others, and they employ this advantage to equip their children with additional educational resources. This may take the form of private education, extra books, private tutoring, and the like. However, according to Green (1988),

> equality of educational opportunity demands that the supply of public funds be free, equally available to all, so that every individual is able to benefit from the education in the most appropriate way for his needs and abilities, and the task of a state committed to this idea should be to supply a public education facility in order to encourage

> the development of skills which are latent in the individual and to devote the appropriate resources to the nurture of the individual.

2.5 Public versus Private Education

2.5.1 The Role of Government in Education Market

The governmental involvement in education[28] is justified on many grounds such as externalities, economies of scale, capital market imperfections, and redistributive motives. As it is clear, in the presence of these features, purely private decisions on educational issues are unlikely to lead to optimal social decisions.

According to many economists, the existence of externalities is the primary reason for government's presence in education[29]. Education does not only increase the income of individual (individual benefit) who obtains it, but also leads to many social benefits. Primary external benefits of education can be listed as increasing productivity and economic growth, improvement in income distribution, lower mortality and fertility rates, improvement in health facilities, increasing environmental consciousness, decreasing crime rates, reinforced democratic institutions, involvement of people in the community and government and political stability (Türkmen, 2002). Recent economic studies

[28] Governmental involvement in the education market may take different forms. On the one hand, it may be in the form of altering tax and subsidy schemes, which are used to correct the market failures so that markets produce efficient outcomes. On the other hand, government may involve in the direct provision of education in the form of public education.

[29] In general, activities that are perceived to have significant externalities are prime candidates for increased governmental support (Hanushek, 2002).

argue that education may provide economic benefits to society greater than the sum of its benefits to individuals[30].

According to a study[31] conducted in India, while educating 1000 girls at primary school levels primary level costs 32,000 USD in India; the benefit of this additional education to the society is 109,300 USD through decreasing fertility and child mortality rates (Türkmen, 2002). Therefore, benefits of education exceed its price perceived by the individuals. This feature of education leads to a kind of positive externality and make it a public good. As is well-known, markets do not provide goods efficiently when those goods are public goods. Hence, in order to make the markets work efficiently, such benefits should be subsidized by the government (Rosen, 1999).

The influence of social benefits of education in the context of developing countries is much stronger than that of their developed counterparts, because in most of the developed countries half of the population has attended at least some postsecondary schooling; hence another year of average schooling seems unlikely to change the dramatically for example the political awareness of the population. Hence**,** the practice of governmental interventions in order to correct externalities and to move toward a social optimum has a "more" justified ground in the context of developing countries (Hanushek, 2002).

In the like manner, government also is attributed a natural role when capital markets are imperfect. If individuals cannot borrow against their human capital,

[30] Education of a worker does not only increase his own productivity but also increases the productivity of other workers in the economy through positive spillover effects. For a detailed discussion, see Mankiw, Romer, and Weil (1992) and Acemoglu (1996).

[31] The Hunger Project Online Briefing Program The Condition of Women in South Asia

there may be underinvestment in education. This possibility is observable especially in postsecondary education (Becker, 1993). A very popular suggestion is that government should aim at making capital markets perfect so that loans for educational purposes are released, borrowing constraints vanish, and as a result the risk of underinvestment in human capital which may be caused by liquidity constraints is eliminated. Provided that this policy is effective, one can conclude that it will equalize the human capital investments of individuals who have equal ability.[32]

The last but not least justification for governmental intervention is the redistributive motive. If society has certain goals for the distribution of income and well-being, private markets left to their own devices are unlikely to achieve those goals. Education helps to achieve both greater social equality and greater equity in the distribution of economic resources. Note also that redistributive goals may also interact with concerns about capital market constraints, where the desire is to break any linkages of poverty that exist because parents cannot provide appropriate schooling opportunities to their children (Hanushek, 2002). Otherwise, a wide dispersion in educational facilities will lead to a highly skewed human capital income distribution, which in turn creates a very uneven income distribution. Hence, efforts to eliminate income inequality in the society should stress on factors affecting the distribution of human capital and aim at to distribute it more evenly (Erkan, 1996). As discussed above, education is the primary way of accumulating human capital. Therefore, a government aiming at a more equal income distribution in the society should curb the influence of income distribution on access to educational services and create a desirable educational environment for people to realize their real potentials.

[32] However, this is the type favored by those who believe that markets are highly efficient but occasionally need some help to correct some minor flaws in their operation; and one should never forget that making capital markets perfect requires a little more than the stroke of a pen. (Erkan, 1996)

Below, a quick survey regarding the human capital approach to income distribution will be carried out. Afterwards, the choice of regime type in relation to income distribution and economic growth will be discussed mostly within the framework of recent endogenous growth models.

2.5.2Human Capital Approach to Income Distribution

The concept of income distribution is first brought into the realm of human capital approach by Becker (1964). It is followed by Becker and Chiswick (1966) and Mincer (1970). All of these studies employ a common framework in which individuals invest in themselves by undergoing education. Everyone is free to undergo education as far as he wishes[33], and they are assumed to be interested solely in maximizing the present value of their income stream. Earning per unit of time over the working life is assumed to be constant. Moreover, abilities and opportunities are assumed to be equal among individuals. Under these conditions, the above mentioned studies reach at the conclusion that the distribution of income will depend on the distribution of educational attainment among individuals[34].

Oulton (1974) criticizes the models mentioned above arguing that given people have the same level of ability and access to educational services, everyone should choose the same level of education[35]. This in turn requires that everyone

[33] The model assumes that capital markets are perfect in the sense that everyone can borrow and lend at the ongoing interest rate.

[34] e.g. if education is distributed log-normally, then income is distributed log-normally, as well.

[35] Because all individuals will be motivated to increase their education until the discounted value of the additional income, which they achieve, is just equal to the opportunity cost (forgone earnings) they incur during the education period (Oulton, 1974).

has the same level of income[36]. In other words, there is a "perfect" equality among individuals in terms of income levels. However, in real world economies, the typical income distribution is quite uneven and skewed to the right. Therefore, when equality of opportunity and ability is assumed, these models lead to an income distribution curve which is very dissimilar to the empirically established character of such curves. As a result, Oulton suggests that the above approach to human capital is incomplete and cannot account for the observed pattern of income distribution; since the distribution of income is made to depend on education distribution but the latter is not explained and taken as given[37].

Oulton raises three suggestions to overcome the deficiencies mentioned above: Economists should stress on the nature and effect of "inequalities of opportunity" in access to educational services. Moreover, they should employ the fact that people have "unequal abilities". Finally, any worthwhile theory of income distribution must be able to predict a skewed income distribution curve similar to the ones in real life.

Recent studies stressing on education and income distribution realize the suggestion of Oulton and construct models which take unequal abilities and market imperfections into account. Moreover, these models consider involvement of government in education market to correct market failures, and the possible effects of redistributive policies through public education on income

[36] Since people with the same level of educational attainment acquire the same amount of human capital, and by marginal productivity rule they should earn the same level of income.

[37] However, it is well-known that markets are not "that" perfect which affects the distribution of education by differentiating between those who can afford the cost (including forgone earnings) of obtaining extra education and who can not although the net expected benefits are equal. As a result, just like educational distribution determines the income distribution, income distribution determines the distribution of education, as well. Therefore, any theory failing to capture this two-way relation misses a big part of the picture (Oulton, 1974).

distribution and economic growth by making use of heterogeneous agent framework and endogeneizing educational decisions. Below these models will be discussed briefly.

2.5.2.1 Educational Regime, Income Distribution and Economic Growth

As it is discussed above, endogenous growth theory starts with the works of Romer (1986) and Lucas (1988), which highlight investment in human capital as an important factor contributing to growth. However, these models do not account for the public sector investment in education.[38] Moreover, they use the representative agent framework which cannot address the issues concerning income distribution. Glomm and Ravikumar (1992) incorporate the deficiencies observed in these models into the analysis. They examine the implications of public investment in human capital (in the sense of formal education) on growth and the evolution of income inequality in an economy in which individuals have different income and skill levels.

Glomm and Ravikumar construct an Overlapping Generations (OLG)[39] model in which "heterogeneous" agents live for two periods and their stock of human capital depends on the parent's stock of human capital, time spent in school and the quality of schools. Each parent has a bequest motive and values the quality of education that the children receive. Given this framework, they compare the outcomes for the economy under public and private education systems, respectively.

[38] Here, public sector investment in education does not necessarily means public education.

[39] In a typical Overlapping Generations (OLG) model there exist two generations, young and old, at a given point in time. The young of this period becomes the old of the next one while the old of any given period dies at the end of it.

Under the public education regime, government taxes the income of the old and uses the tax revenue to provide “free” public education for all. The quality of public education is an increasing function of the tax revenues, and the tax rate is determined endogenously by the old agents in each period through majority voting. On the other hand, in the private education regime individuals allocate their income between the quality of education their children receive, which is an increasing function of the income share devoted on it, and their own consumption.

The model links the generations through two channels: first, the stock of human capital of parents affects their children’s learning. This feature captures the parental effect mentioned above, and it is specific to the household being independent of the education policy. The second linkage occurs through bequests in the form of quality of education passed onto the children. This one (although shows great variation in the private regime) does not differ across agents of the same generation under the public education regime, since school quality under this system is the same for all agents.

Glomm and Ravikumar investigate the results of the above model in the steady-state and reach at the following conclusions: income inequality declines faster under public education than under private education. Moreover, if two public education economies begin with the same per capita income but differ in income inequality, then the economy with lower inequality has higher per capita income in all future periods; this result holds for two private education economies under some additional restrictions. Finally, if the income inequality is “sufficiently” high, then the public education regime yields higher per capita income for future periods. As a result, they suggest that societies should choose public education if the majority of agents have incomes below average.

With the same reasoning Cardak (1999), which is mainly an extension of the work of Glomm and Ravikumar (1992), investigate public and private education regimes and their respective outcomes within the OLG framework under the added assumption that the preferences over education expenditures are heterogeneous. He investigates the importance of heterogeneous preferences for income and its distribution and shows that heterogeneous preferences for education increase income inequality in private education. On the other hand, public education can overcome the added heterogeneity and reduce income inequality. Cardak states that "the introduction of heterogeneous preferences here shows that public education mechanism has a strong capacity to reduce income inequality relative to the private education mechanism".

However, one thing should be pointed out: in reality, people differ in many other respects apart from their preferences for education, such as their cultural backgrounds, geographical location, initial income and access to educational services and capital markets. In accordance with this observation, Cardak (1999) suggests that "as the heterogeneous characteristics of the society increases, the equity gains of public education increases and the motivation for public education as a redistributive mechanism becomes stronger."

On the other hand, according to Alesina and Rodrik (1991) and Persson and Tabellini (1991, 1992a), the more unequal a society is, the higher the desire for redistribution among the people and the higher the preferred tax rate is, because individuals poorer than the average gain from it. Since a higher tax discourages investment, long-run growth is affected adversely. These models stress on the effect of inequality on physical capital investment through increased tax rates. However, inequality is also a crucial determinant of the proportion of population that becomes educated. Especially, when education is privately purchased and the capital markets are imperfect, the degree of inequality determines the share of population that can afford education.

Saint-Paul and Verdier (1992, 1993) assert that inequality determines the stock of human capital, which in turn determines the rate of growth. Therefore, they examine how income inequality affects agents' decisions about whether to have public or private education[40], and if the former is decided, what rate of tax should be imposed to finance it. Saint-Paul and Verdier argue that public education accelerates growth as it increases the stock of human capital. On the other hand, government needs to levy some taxes in order to finance public education, which creates a disincentive to accumulate human capital. That which one of these two opposing effects dominates depends on the level of the development of the country. They suggest that very equal societies will vote for a private education system and achieve the maximum growth rate. On the other hand, those having a medium level of inequality will choose a public education system. Finally, very unequal economies will choose public education, as well, since the increase in proportion of skilled labour will cancel out the effect of tax distortion, and growth will be faster relative to the private education situation.

Penalosa (1995) asserts that given the initial stock of human capital is low enough; the public education may yield higher growth. The larger the initial inequality and the lower the cost of education relative to the average income, the more likely is that public education increases growth.

According to Fernandez and Rogerson (1998), education expenditures are a form of human capital investment that yields a return in the form of higher productivity later in life. If there is little opportunity for borrowing against these future earnings to finance current expenditures, inefficiently low investment among children from poor families may be the outcome. As a result, finance

[40] All of the decisions in the model are reached through the majority voting principle by exploiting the median voter hypothesis.

systems which redistribute resources from rich and toward poor may therefore have important implications for the evolution of the income distribution and overall efficiency.

In line with this understanding, Fernandez and Rogerson construct an OLG model which embodies intergenerational dynamics. In the model, agents live for two periods and in each period there are a large number of families, each consisting of one old member (parent) and one young member (child). An old individual's income is determined by the education that he has received when he was young. Taking their income as given, old members decide the amount of resources to devote to public education via majority voting. This determines the income distribution for the next generation of adults (and hence the education distribution for the next generation of children), and the process repeats itself every period. In other words, income distribution among adults in period *t* depends on the education distribution among children in the period (*t-1*), which in turn is determined by the income distribution among adults in period (*t-2*), and so on.

Fernandez and Rogerson also make use of some observations that they consider central to an analysis of public education finance[41]. First, there is substantial heterogeneity of income across households. Second, individuals are mobile across communities[42]. Communities are stratified by income, and spending on education is perfectly correlated with community income, hence richer communities have higher quality education than the poorer communities. As a result, children from higher income families have higher expected income than do children from poorer families.

[41] Fernandez and Rogerson obtained these observations from US data, but these features are more or less are the same almost every country.

[42] Communities can be thought as the 20 percent quintiles in an income distribution survey and, mobility across communities is realized mostly through education.

Solving for the steady-state equilibrium in this economy, holding total spending on education constant, they show that the economy's total income next period would be greater if this period's expenditure on education were divided "equally" across all students. Hence, the model captures the possibility that a centralized system may offer an efficiency gain relative to a local system. After solving the model, they calibrated the model to US data and find that relative to the case of pure local financing, a policy of state financing leads to higher average income in the steady-state, higher spending on education and higher welfare.

In short, the results strengthen the arguments for public education as a redistributive mechanism. Moreover, given a sufficient level of inequality, public education can increases the overall efficiency and economic growth, as well.

CHAPTER 3

RECENT ISSUES IN TURKISH HIGHER EDUCATION SYSTEM

3.1 Introduction

Turkish higher education experienced great improvements since the establishment of Istanbul University in 1933. In the last 72 years, the number of universities increased from 1 to 78, student enrolment went from 2,914 to 1,168,724 and the number of academic staff jumped from 307 to 77,061. A major part of that increase took place especially in the last 20 years. This chapter mainly discusses the recent developments of Turkish higher education.

We start with a quick review of the history of Turkish higher education. Then, we focus on the recent figures in Turkish higher education. We will discuss the boosting demand for higher education, which becomes more manifest during the last two decades. Afterwards, we study the status of private universities in the Turkish higher education system. Finally, we analyze the financial considerations, which gave way to the observed decreasing governmental involvement in the Turkish higher education.

3.2 A History Quick Review of the History of Turkish Higher Education[43]

Turkish higher education can be dated back to as old as 11th century. In that time, Seljuk Turks founded the "Nizamiye Madrasa"[44] in Baghdad. Ottoman period also witnessed the establishment of many madrasas. However, it would be incorrect to say that madrasas are the ancestors of today's modern universities in Turkey; because all of these universities were founded in the Republican period to "replace"[45] the madrasas. In 1863, the first European-type university, "Darülfünun", was founded. That year witnessed the establishment of Robert Collage, which was the first Anglo-American type university in Ottoman Empire, as well.

The proclamation of the Republic in 1923 brought a new perspective to the understanding of higher education; all madrasas and religious schools were closed down and independent schools and faculties were started to set up In 1931, Prof. Albert Malche of the University of Geneva prepared a report on the reform of Turkish higher education. In conformity with this report, the Grand National Assembly passed law 2253 in 1933, which replaced the Darülfünun with Istanbul University. 1933 Reform is viewed as the commencement of the notion of "modern university" in Turkey. In 1944, Istanbul Technical University was reorganized from the Higher School of Engineers. Ankara University was

[43] This part mainly uses Council of Higher Education (CHE), Türk Yüksek Öğretiminin Bugünkü Durumu, p.20-25,November, 2004.

[44] Madrasa, which offered courses in religion, philosophy, mathematics, medicine and astronomy, was a kind of medieval university.

[45] Madrasa was an institution established on the logic of the "interpretation" of knowledge, rather than the "creation" of it. Having these properties and lacking intellectual stimulation, it appeared as a barrier to modernization attempts in late Ottoman period.

set up in 1946 through the unification of six independent schools and faculties[46]. In the same year, the Grand National Assembly passed law 2253 which regulated the organization and governance of these three universities. All of these universities were "European-type". However, the 1950's witnessed an alteration in this established pattern of the Turkish higher education. The government of that period[47] was very market oriented and had close relations with USA. Therefore, four new universities, under the influence of the "American university model" were established: Karadeniz Technical University (1955) in Trabzon, Ege University (1955) in Izmir, Middle East Technical University (METU) (1956) in Ankara, and Atatürk University (1957) in Erzurum. Following this, Hacettepe and Bosporus Universities[48] were found in 1967 and 1971, respectively. There was an ever increasing demand for higher education. In 1973-1981 period, 10 new universities were founded all over the country[49] outside the three big cities[50].

In 1974, the Student Selection and Placement Center was established to organize a central university entrance examination throughout the country. The same year witnessed the initiation of Open University in Turkey with the foundation of YAY-KUR which was established in order to meet the increasing demand for higher education through distant-education. Moreover, two-year vocational schools were also established in the same year.

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[46] School of Law (1925), Gazi Institute of Education (1926), and the Agricultural Institute (1930).The Faculty of Languages, History and Geography (1937), the Faculty of Science (1943) and the Faculty of Medicine (1945).

[47] The Democrat Party.

[48] Robert College was transformed into Bosporus University in 1971.

[49] Diyarbakır, Eskisehir, Adana, Sivas, Malatya, Elazıg, Samsun, Konya, Bursa and Kayseri

[50] İstanbul, Ankara and İzmir.

On the other hand, there were state academies[51] along with universities. These institutions were teaching institutions with four-year bachelor's programs in various professional fields. Moreover, resulting from increasing demand in higher education there emerged some private higher schools in 1960's. However, the Supreme Constitutional Court reached the verdict that these schools were not in conformity with the constitution. As a result, these schools were joined the existing state academies with law 1418.

As can be seen above, Turkish higher education system had a very fragmented structure in the late 1970's. There were universities, academies, two-year vocational schools, conservatories, three-year teacher training institutions under the Ministry of National Education and YAY-KUR side by side. These separate schools developed different programs, which were not coeducational. Therefore, with the Higher Education Law[52] going into effect (after the amendment of the constitution) in 1981; provisions, reorganizing the higher education institutions, were made and the patchy picture of Turkish higher education started to unify. The Council of Higher Education was established, and organization, planning and governance of all higher education institutions were summed up under the same roof. State academies were brought together to form new universities and teachers' colleges were converted into faculties of education. Moreover, vocational schools and conservatories became a part of the universities and, the provision allowing the non-profit foundations to establish higher education institutions was passed. Hence, the fragmented structure of Turkish higher education system was eliminated.

[51]Towards the end of the 19th century, there emerged some professional schools in Istanbul. After the proclamation of the Republic, these schools were evolved to form the non-university sector of the Turkish higher education system. They were reorganized in 1969 and renamed as "state academies".

[52] Law No: 2547.

In 1982, eight new universities were found through these mergers and reorganizations. YAY-KUR's responsibilities were transferred into Open Education Faculty of Anadolu University[53], and distance education programs were modified to include lectures broadcast on TV and direct contact hours.

In 1984, the first private university, Bilkent University, was founded. However, the legal status of the Bilkent University was questioned two times in the Supreme Constitutional Court. After a long debate, the court reached the verdict that private (non-profit foundation) universities could be found only by law. Afterwards, the Grand National Assembly passed law 3785 in line with the verdict of the court in 1992 and, the legal status of the university was clarified.

Turkish higher education experienced its golden age in 1992-1994 period, in which 25 new (public) universities and two technology institutes were established[54] throughout Turkey[55]. Unfortunately, this golden age of public expansion in higher education came to an end with the establishment of Galatasaray University in 1994 and, no public university has been found since 11 years. Afterwards, there emerged a boom in the number of private universities. Koç University and Başkent University were established in 1992 and 1993 respectively. They were followed by five more private universities in 1996. Between 1997 and 2001, 15 more private universities were added to them. Finally, in 2003 TOBB Economics and Technology University was established.

[53] It is shortly named as Open University, as well.

[54] With law 3837

[55] Afyon, Aydın, Balıkesir, Bolu, Çanakkale, Denizli, Eskisehir, Hatay, Kars, Isparta, İzmir, Istanbul, Kahramanmaraş, Kırıkkale, Kocaeli, Kütahya, Manisa, Mersin, Muğla, Niğde, Sakarya, Şanlıurfa, Tokat and Zonguldak.

3.3 Turkish Higher Education in Figures

3.3.1 Excess Demand for Higher Education

Starting from the mid-1980's, Turkish higher education has witnessed a huge demand boom. The number of applicants to university entrance exam increased from 480,463 to 1,569,879 in 1985-2003 period. Moreover, as is indicated in Table 3.1[56] below, in 1985-2003 period, the number of full-time students enrolled in higher education almost quadrupled.

[56] Table 3.1 includes all students from public and private universities and other higher education institutions, such as military academies, in each undergraduate and graduate degree.

Table 3.1 Number of Students in Higher Education

Years	Full Time Students	Open University	Total	Participation Rate
1985-1986	368,472	99,063	467,535	10.7
1986-1987	378,576	124,247	502,823	11.3
1987-1988	386,658	133,586	520,244	11.7
1988-1989	404,065	175,223	579,288	12.8
1989-1990	440,583	228,860	669,443	14.5
1990-1991	471,459	260,962	732,421	15.7
1991-1992	502,558	289,745	792,303	16.4
1992-1993	549,066	347,145	896,211	18.1
1993-1994	617,297	465,766	1,083,063	22.2
1994-1995	630,005	477,315	1,107,320	22.1
1995-1996	701,228	459,460	1,160,688	23.8
1996-1997	759,167	463,195	1,222,362	25
1997-1998	832,991	497,250	1,330,241	26.8
1998-1999	889,589	492,560	1,382,149	27.4
1999-2000	931,358	488,569	1,419,927	27.8
2000-2001	992,057	515,583	1,507,640	28
2001-2002	1,046,134	522,250	1,568,384	NA
2002-2003	1,136,769	661,854	1,798,623	NA
2003-2004	1,189,276	652,270	1,841,546	35.3

NA: Not Available

Sources: Türkmen (2002), CHE (2004)

If the Open University is also considered, total number of student enrolled in higher education institutions have been multiplied by a factor more than five.

Moreover, the participation rate in higher education went from 10.7 percent to 35.3 percent[57] in that period.

There are many reasons for the observed boom in demand for higher education. For example, the proportion of the 18-24 age group, who are the natural candidates for higher education, in the overall population has risen gradually. Moreover, society in general exhibited an increased consciousness about the importance of obtaining a degree in higher education[58]. The most important determinant in regard to this is the high private return of higher education which considerably increases the stream of expected lifetime income (Kesik, 2003). [59] As is discussed before, private rate of return to a certain level of education for an individual is defined as the discount rate which equalizes the present discounted value of the stream of lifetime income, which results from that level of educational attainment, of the individual to total costs incurred to obtain that educational degree. Türkmen (2002) calculated the private rate of return to higher education in Turkey by utilizing the 1987 and 1994 Household Income statistics. He found out that private rate of return to higher education in Turkey is 27 percent and 26.5 percent according to 1987 and 1994 data[60]. Moreover, Türkmen also noted that the annual earnings of a high school and a university

[57] Including Open University and Graduate enrollments.

[58] As a result, more people started to demand higher education given the size of the relevant age group.

[59] Note that this issue is discussed in Chapter II, 2.3 Demand for Education in detail.

[60] Whereas that rate is found to be 4 percent and 7.3 percent in Spain for the years 1981 and 1991, respectively. According to Türkmen (2002), since the educational attainment at higher education level in Turkey is much below than that of Spain, the private rate of return to higher education is much higher in Turkey. (Note: The ratio of the labour force with high school or higher education diploma to total labour force is 15.46 percent and 26 percent in Turkey and Spain, respectively.)

graduate are on average 2,444,548 TL and 5,150,891 TL in 1987[61]. These earnings are found to be 107.287.469 TL and 267.764.800 TL in 1994[62], in the above order. In addition to this, job opportunities for those who do not have a higher education degree narrowed to a great extent as a result of the practice of preferential hiring which favors university graduates in the labour market during the above mentioned period (Kesik, 2003).

The above picture shows the degree of competition in order to find a place in higher education, and unfortunately this competition is increasing year after year. As a natural result of this, preparation institutions which prepare the students for the university entrance examination started to gain considerable importance. Kesik (2003) has found that 88.5 percent of the students who are enrolled in a higher education program in 2001 attended to some kind of preparation institutions while they studied for the university entrance examination. According to the statistics of the Association of Private Preparation Institutions, approximately 580,000 university candidate attended preparation institutions and spent a total of 395 trillion TL (700 trillion TL in 2003 prices) in 2001-2002 period; whereas the total amount of allowance granted to 53 state universities from the consolidated budget that year was equal to 2,500 trillion. Finally, according to a more recent research conducted by Turkish Education Association, in the next 15 years, a total of 84 billion dollar will be spent on the preparation institutions. These results show the willingness of people to acquire higher education in Turkey (TEA, 2005) .

On the other hand, the supply of higher educational services increased at considerable rate, as well. As Table 3.2 indicates, the number of universities

[61] With 1987 prices.

[62] With 1994 prices.

increased from 27 to 78, while the number of academic staff jumped from 22,968 to 77,065 in the last 20 years**.**

Table 3.2 Number of Universities, Faculties, Vocational Schools, Academic Staff Members

Years	Number of Universities	Number of Faculties, Vocational Schools	Academic Staff Member A[63]	Academic Staff Member B[64]	Total
1985-1886	27	310	7,260	15,708	22,968
1986-1987	28	322	7,260	15,708	22,968
1987-1988	29	343	8,685	17,926	26,611
1988-1989	29	368	9,105	19,009	28,114
1989-1990	29	387	10,169	21,021	31,190
1990-1991	29	408	10,720	22,932	33,652
1991-1992	29	424	11,491	22,789	34,280
1992-1993	50	473	12,481	25,099	37,580
1993-1994	52	625	13,621	27,790	41,411
1994-1995	54	741	14,690	28,413	43,103
1995-1996	55	817	16,317	32,917	49,234
1996-1997	61	863	17,544	35,200	52,744
1997-1998	69	937	18,809	36,635	55,444
1998-1999	72	999	20,146	39,024	59,170
1999-2000	74	991	22,131	42,038	64,169
2000-2001	77	1282	23,975	42,775	66,750
2001-2002	77	1332	25,953	44,059	70,012
2002-2003	77	NA	27,617	46,517	74,134
2003-2004	78	NA	29,075	47,986	77,061

NA: Not Available

Sources: Kesik (2003), SSPC (1985- 2004), CHE (2004)

[63] Academic Staff Member A: Professors, Assoc. Professors and Assist. Professors.

[64] Academic Staff Member B: Instructors, Lecturers and Research Assistants.

However, the increase in supply of higher educational services could not meet the boosting demand for it. Table 3.3.a and Table 3.3.b show the applicant and entrant statistics in the university entrances examinations held in the last two decades.

Table 3.3.a Applicants versus Entrants in the University Entrance Examinations

		Entrants			Non-Entrants
Years	Number of Applicants	Full Time	Open University	Total	
1985	480,463	95,433	60,000	155,433	325,030
1986	503,520	96,945	68,911	165,856	337,664
1987	628,389	101,042	73,828	174,870	453,519
1988	693,391	107,296	81,356	188,652	504,739
1989	824,128	108,609	85,056	193,665	630,463
1990	892,975	112,865	83,388	196,253	696,722
1991	875,375	116,968	82,767	199,735	675,640
1992	977,550	145,026	132,561	277,587	699,963
1993	1,154,571	169,477	141,686	311,163	843,408
1994	1,249,880	204,816	165,853	370,669	879,211
1995	1,263,379	216,413	167,679	384,092	879,287
1996	1,398,367	225,596	185,180	410,776	987,591
1997	1,398,367	254,038	191,264	445,302	953,065
1998	1,355,707	254,993	164,611	419,604	936,103
1999	1,478,365	267,599	180,896	448,495	1,029,870
2000	1,414,823	277,936	161,125	439,061	975,762
2001	1,473,908	296,425	181,346	477,771	996,137
2002	1,823,099	368,244	294,516	662,760	1,160,339

Sources: Kesik (2003), CHE (2004)

Table 3.3.b Applicant/ Entrant Ratio

	Entrants/Applicants (%)		
Years	Full Time	Open University	Total
1985	19	12	31
1986	19	13	32
1987	16	11	27
1988	15	10	25
1989	13	10	23
1990	12	9	21
1991	13	9	22
1992	14	13	27
1993	14	12	26
1994	16	13	29
1995	17	13	30
1996	16	13	29
1997	18	13	31
1998	18	12	30
1999	18	12	30
2000	19	11	30
2001	20	12	32
2002	20	10	30

Sources: Kesik (2003), CHE (2004)

According to the tables above, although the applicant/entrant ratio on average rises gradually, the number of applicants who can not be placed in any program increases drastically from 325,030 to1,160,339. The picture becomes more dramatic if we exclude students placed in Open University. In this case the number of applicants who cannot be placed in any full time program becomes 1,454,855 in the year 2002. Hence, every year the number of people who delay or give up their future plans is increasing at a considerably high rate.

Moreover, as Table 3.4 indicates while in 1983 of the students placed a program, 62 percent were enrolled in a full-time program; this ratio falls down to 54 percent in 2003, moving in general between 55 percent and 60 percent.

Table 3.4 Percentage of the Entrants Placed in a Full Time and Open University Programs

Years	Full Time (%)	Open University (%)
1985	62	38
1986	58	42
1987	58	42
1988	57	43
1989	56	44
1990	58	42
1991	59	41
1992	50	50
1993	42	58
1994	55	45
1995	56	44
1996	55	45
1997	57	43
1998	61	39
1999	60	40
2000	63	37
2001	62	38
2002	54	46

Source: Kesik (2003)

Indeed, Table 3.1 shows that the number of students enrolled in the Open University multiplied by a factor more than 10, while the number of full-time students approximately quadruples during the 1984-2004 period.

All of the above statistics support the idea that there is an enormous excess demand problem in Turkish higher education. On the other hand, as we will discuss below the government has not been taking the necessary precautions to overcome this problem. As a result, the idea of private initiative in the realm of higher education has been gaining a more justified ground. Indeed, that 21 of the total 25 private universities operating have been established in the last 9 years is not a coincidence. Below, we will shortly discuss the issue of private universities.

3.3.2 Private Universities and State Financial Aid

The story of private universities in Turkish higher education system started in 1984, when The Higher Education Law No: 2547 allowed the establishment of private universities by non-profit foundations. Private universities can enjoy all the financial privileges and exemptions,[65] and they are under the supervision of Council of Higher Education (CHE) like their public counterparts.

The number of private universities steadily increased after that time and today they reached at 25, 21 of which were established in the last nine years. As mentioned above, main justification raised for the emergence of private universities is the inability of government to meet the excess demand for higher education, which leads the introduction of market rules into the higher education sector (Kesik, 2003).

[65] For example, private universities have no liability to pay the real estate tax

The number of students enrolled in private universities increased from 9,103 to 68,697 in 1997-2004 period. In 2004, they constitute approximately 4 percent of the full time students enrolled in higher education (CHE, 2004).

Table 3.5 Student and Budget Shares of the Private Universities in Total Higher Education Student Population and Total Higher Education Budget

	1998-1999	1999-2000	2000-2001	2001-2002
Student Share of Private Universities (%)	3	3.6	4.2	4.1
Budget Share of Private Universities (%)	10.6	11.1	8.8	7.8

Source: Derived from Higher Education Statistics, (SSPC), 1998- 2002

As can be seen, in 1999-2002 period the budget share of the private universities exceeds their of the student share on average (approximately) three times. This result shows that per student expenditures in the private universities are on average three times higher than per student expenditures in the public universities throughout the period under consideration.

Although the private universities can generate their resources, they can be provided with state assistance by the Ministry of Finance upon the endorsement of the Council of Higher Education and the recommendation of the Ministry of National Education. Conditions concerning the extension of financial assistance are mainly regulated under Law No: 2547 which has been altered by some other

laws from time to time[66]. According to this law, the amount of financial assistance per-student enrolled in a private university can not exceed 30 percent of the amount which is calculated by dividing the total allowance to state institutions from the national budget that year by the total number of students enrolled in formal education programs at state institutions. However, CHE has the power to decrease or increase that rate to 20 percent and 45 percent, respectively. Moreover, that assistance can not exceed 45 percent of the total budgetary expenditures of the private university under consideration.

In order to acquire the above-mentioned state assistance a private university must:

1) have provided formal education at least for two years,

2) grant full-tuition scholarships to a minimum of 15 percent of its students,

3) have a student/teaching staff member ratio equivalent to or less than that of state universities,

4) provide scholarship to a certain amount[67] of doctorate students,

5) have a publication /teaching staff member ratio equivalent to those of state universities which are in the upper half of a ranking of state universities in terms publication per teaching staff member[68],

[66] Law 2547 has been changed between 1983 and 2005 by Law No: 2880, 4584, 4689, 4702, 4629, 4969, 5218, 5217, 5234, 5316, 5335 in chronological order. (Source: http://www.bahum.gov.tr)

[67] This amount depends on the size of the program under consideration. For example, if the program has less than 50 students, then, the university should extend scholarship to 1 doctorate students. On the other hand, for programs with 50-100 students and more than 100 students the number of doctorate students who must be given scholarship increases 2 and 3, respectively.

6) have students who are ranked among the top 5 percent on the student selection examination held that year, and be in a position equivalent to the state universities which are in the upper half of the ranking based on this principle.

If a private university satisfies all of these conditions, it qualifies to acquire the full extent of the state assistance. If it meets with 1, 2, 3, 4 and one of 5 and 6, it is provided with the 80 percent of the full amount. Finally, upon the realization of first four conditions, the university acquires 60 percent of the possible maximum financial assistance.[69] Below, we present the financial allowances granted to the private universities.

Table 3.6 The Amount of Financial Assistance Granted to the Private Universities through State Financial Aids.

	1997	1998	1999	2000	2001	2002
The Amount of Financial Aids (in Billions TL)	1,540.9	1,750	3,920	6,865	7,257	9,164

Source: Kesik (2003)

[68]Note that these articles must be published in a prominent academic journals recognized by an evaluation committee appointed by the Interuniversity Council.

[69] Source: http://www.bahum.gov.tr

3.3.3 Decreasing Government Support in Public Higher Education

One of the most crucial issues in Turkish higher educational system in the last decade is the decreasing governmental support to public universities, which gains a momentum especially in last 10 years. We consider that decrease as the main reason of the observed excess demand that we discussed above.

By 2005, there are 78 universities (53 public and 25 private) operating in the Turkish higher educational system. However, the major burden of the higher education is carried mainly by the public universities. According to CHE's statistics, in 2004 approximately 96 percent of higher education students were enrolled in the public universities.[70]

According to Table 3.7, which shows the sources of funding for the state universities, the share of funds allocated through the annual state budget decreased from 75 percent to 55 percent in 1988-2003 period.[71]Moreover, we notice that the actual decrease took place after the year 1994, in which the last public university[72] was established.

[70] If the Open University is excluded, this ratio falls to 94 percent.

[71] The statistics is not available for the years before 1988.

[72] Galatasaray University.

Table 3.7 Sources of Funding of the Public Universities

Years	Budget (%)	Revolving Fund and other Funds (%)	Student Contributions (%)
1988	75	22	3
1989	76	22	2
1990	79	19	2
1991	80	19	1
1992	**80**	18	2
1993	**79**	19	2
1994	**77**	20	3
1995	**69**	27	4
1996	**65**	28	7
1997	**57**	38	5
1998	**61**	34	5
1999	**60**	35	5
2000	**57**	38	5
2001	**52**	44	4
2002	**58**	37	5
2003	**55**	41	4

Source: CHE (2004)

As Table 3.8 indicates below, the share of higher education budget in overall government budget decreased from 3.8 percent to 2.6 percent in 1983-2004 period, however as it is mentioned above, the actual decrease occurred after the year 1992. In other words, the share of higher education budget in overall government budget decreased approximately 40 percent[73] between 1992 and 2004.

[73] In comparison to the share in 1992.

Table 3.8 The Share of Higher Education Budget in Total Budget and GDP

Years	Percentage Share of Higher Education Budget in Total Budget	Percentage Share of Higher Education Budget in GDP
1983	3.8	0.69
1984	3.7	0.53
1985	3	0.42
1986	3	0.42
1987	2.9	0.42
1988	2.9	0.47
1989	3.2	0.45
1990	3.9	0.56
1991	4.2	0.69
1992	**4.3**	0.84
1993	**4.1**	0.9
1994	**3.8**	1.1
1995	**3.2**	0.9
1996	**2.6**	0.8
1997	**3.1**	0.8
1998	**2.9**	0.86
1999	**2.8**	0.84
2000	**2.2**	0.84
2001	**2.8**	0.89
2002	**2.5**	0.89
2003	**2.3**	0.94
2004	**2.6**	0.93

Source: Kesik (2003)

On the other hand, the share of higher education budget in GDP on average increased in the1983-2004 period. However, as Table 3.9 shows below it is still considerably less than many OECD countries.

Table 3.9 Comparison of Turkey with some OECD countries in terms of Higher Education Budget/ GDP Ratio in Year 1998

Country	Higher Education Budget/GDP (%)
Finland	1.7
Sweden	1.6
Denmark	1.3
Australia	1.2
Israel	1.1
USA	1.1
Germany	1
France	1
Turkey	0.8
Greece	0.8

Source: CHE (2004)

When we take a look at the Table 3.10 below, we observe that per student budget allowances in real terms experienced a considerable decline in from 1983 to 2003. However, the real decrease took place again after 1993; per student budget allowance in 2003 is approximately 40 percent lower than the one in 1993. This decrease amounts to more than 2,000,000,000 TL with 2004 prices.

Moreover, the table shows that per student grant from budget in dollar terms exhibited great variations between 1981- 2003 period. According to the calculations of CHE, per student budget allowances in dollar terms in Turkey is approximately four times lower than the OECD average[74], which is 8.130$.[75]

[74] This calculation excludes USA, whose per student grant is very high in comparison to other countries. If it is included, OECD average becomes 10,444 $. Moreover, these figures are corrected for the purchasing power parity.

[75] CHE (2004)

Table 3.10 Per Student Budget Allowance (Public Sector only)

Years	Per Student Budget Allowance			
	With 2004 Prices (Million TL)		With Nominal Prices (USA $)	
	Full Time	Total	Full Time	Total
1981	4,000.00	4,000.00	2,014	1,932
1982	3,164.56	3,164.56	1,885	1,778
1983	4,901.96	3,676.47	2,287	2,048
1984	3,445.31	3,445.31	1,701	1,494
1985	2,414.00	2,414.00	1,270	1,070
1986	2,595.16	2,162.63	1,270	1,002
1987	2,424.24	1,818.18	1,263	952
1988	2,626.40	1,969.80	1,369	1i020
1989	2.933.87	2,031.14	1,433	1i002
1990	4,317.20	2,802.39	2,114	1,389
1991	4,484.71	2,899.21	2,055	1,319
1992	4,614.65	3,038.91	2,288	1,503
1993	5,273.85	3,241.41	2,658	1,632
1994	3,575.25	2,092.46	2,025	1,185
1995	2,892.17	1,419.79	1,538	755
1996	3,275.16	1,965.09	1,509	943
1997	3,693.55	2,415.86	2,195	1,435
1998	4,156.66	2,569.21	2,002	1,238
1999	4,168.27	2,643.64	1,924	1,221
2000	4,430.10	2,856.98	1,934	1,247
2001	3,165.88	1,934.81	1,190	727
2002	3,327.65	2,248.46	1,463	989
2003	3,247.54	2,067.30	2,059	1,311

Source: CHE (2004)

Finally, we will consider the investment proposals raised by the CHE. As it is clearly seen in the table 3.11, allowances are short of the proposals in each year under consideration. This situation affects the quota of the public universities to a great extent. (CHE, 2004)

Table 3.11 Comparison of Investment Proposals and Allowances with 2004 Prices

Years	With 2004 prices **(**in Millions TL**)**		Proposal/Allowance (%)
	Proposal	Allowance	
2000	3,269,450	1,293,357	39.56
2001	1,894,260	721,813	38.11
2002	1,571,771	917,217	58.36
2003	1,109,301	889,807	80.21
2004	1,207,796	807,615	66.86
TOTAL	9,052,578	4,629,809	51.14

Source: CHE (2004)

To sum up, the observations raised above are clear indications of the fact that the government has considerably decreased its support for the public higher education in the last decade, and this intensified the effects of demand boom. As a result, private universities have found a more legitimate ground to emerge and operate. Moreover, irrespective of their high costs they obtained financial grants from the education budget. However, leaving the education market to private initiative or motivating it indirectly to act in there may not be the correct policy under the current setting of Turkish higher education system. In the next chapter, we will show the validity of this idea by constructing a simple model.

CHAPTER 4

EFFICIENT PROVISION OF EDUCATIONAL SERVICES: PUBLIC VERSUS PRIVATE UNIVERSITIES

4.1 Introduction

This part of the study focuses on the allocation of educational resources[76] between public and private universities in Turkish higher education system, and attempt to reach at some policy implications in regard to the optimum size of the public education, and the magnitude of the state financial assistance granted to private universities. To this end, we construct a model which determines the optimum resource allocation between public and private universities such that the human capital output[77]is maximized.

The model stresses on academic quality and per student expenditure variables, and attempts to determine the optimum combination of per student expenditures in public and private universities which maximize the human capital output in a given economy. Thereafter, the model is solved numerically by utilizing the Turkish higher education data belonging to the 1998-2002 period. Then, these numerical results are discussed within the framework of the state financial aids

[76] From now on, "educational resources (services)" means "the resources (services) available to higher education."

[77] In the study human capital output is determined by the interaction of relevant inputs in a certain period of time (e.g. one year), and it denotes the "additions" to the existing human capital stock resulted from the utilization of higher education resources.

to private universities and the relative size of public and private education in Turkish higher education system.

4.2 The Model

The model considers the universities as factories which produce "human capital" output through the utilization of "academic quality" and "expenditure per student" inputs. In other words, the model solely stresses the role universities play in educating people, and ignores the research output.[78] That is, every year a certain amount of resources is spent to educate individuals under a certain quality, and the result is a certain amount of addition to the existing human capital stock.

The model aggregates public and private universities into different sectors. Each sector has a certain technology which transforms their inputs into per student human capital output. The contribution of either sector to the human capital output is found by multiplying the number of students by the per student human capital produced. Total human capital output is the sum of the human capital produced within the public universities (or in public sector) and human capital produced by private universities (or by private sector) in a certain period of time[79].

Academic quality[80] is a combination of many factors including real school resources, yearly publication per academic staff member, student/ faculty ratio

[78] See the discussion under the heading "Limitations" below.

[79] It is taken as one year in the model.

[80] In rest of the study we will use the term "quality" instead of "academic quality".

and so on, and it is taken exogenously both for public and private sector[81]. We assume that human capital output increases with the quality at a constant rate. On the other hand, per student expenditure for either sector is obtained by dividing total resources extended to the sector by the number of the students in that sector, and it is assumed to increase human capital contribution of its sector at a decreasing rate other things remaining the same.[82] Given the above framework, the human capital production function of the economy is given by

$$W=Hf(P/H;\theta)+hg(\rho/h;ß) \quad ; \quad f'>0, f''<0 \text{ and } g'>0, g''<0 \qquad (4.1)$$

W is the human capital output, and *f(.)* and *g(.)* denotes the production technology employed by public and private sector, respectively. θ and β denotes the quality parameter in public and private sector, respectively. On the other hand, *H* and *h* represents the number of students in public and private universities, respectively. The magnitude of either sector does not influence the results directly, because the model is based on per student expenditures. Finally, *P* and ρ denote the total expenditures incurred by public and private universities, respectively, and they are endogenously determined.

The amount of resources to be devoted to higher education is equal to *C* expressed as

$$P+\rho=C \qquad (4.2)$$

[81] When we discuss the implications of the model for Turkish higher education, we will give a more concrete list of the variables used in the computation of the quality.

[82] For any detail and the solution of the model, see Appendix A.

It is hypothesized that there is a social planner who allocates the entire education budget into different sectors in the economy so that the human capital output is maximized. In order to get tractable solutions, we need to use explicit forms of the above functional expressions, which satisfy the properties of *f* and *g*. For computational easiness, *f* and *g* are expressed by using natural logarithm in the following way:

$$f(P/H;\theta)=\ln[(P/H)^{\theta}] \text{ and } g(\rho/h;ß)=\ln[(\rho/h)^{ß}] \quad (4.3)$$

Therefore, the problem of the social planner is as follows:

$$\text{Max } W=H\ln[(P/H)^{\theta}]+h\ln[(\rho/h)^{ß}] \quad (4.4)$$

$$\text{subject to} \qquad P+\rho=C$$

The model is solved by using the Method of Lagrange Multipliers, and following results are obtained:

$$P^*=\frac{CH\theta}{H\theta+h\beta} \quad \text{and } \rho^*=\frac{Ch\beta}{H\theta+h\beta} \quad (4.5)$$

where P^* and ρ^* are the optimum values of per student expenditures in public and private sector, respectively.

As is predicted, P^* increases with C and θ but decreases with β, whereas ρ^* increases with C and β but decreases with θ. In other words, the higher the total expenditure on higher education is, the higher the equilibrium expenditures are, ceteris paribus. On the other hand, the model implies that as the quality of either sector increases, then the optimum expenditure in that sector increases. We can express the impact of quality on per student expenditure across the sectors (in equilibrium) by dividing the optimum expenditures in each sector by their respective student size. Hence, we obtain

$$P^*/H = \mu\theta \quad \text{and} \quad \rho^*/h = \mu\beta \tag{4.6}$$

where μ is equal to $C/(H\theta + h\beta)$.

Therefore, in equilibrium per student expenditure is directly proportional to the quality of the respective sector. As an extension of this result, it follows that the ratio of per student expenditures in public and private sectors is equal to the ratio of their academic quality. It is expressed as

$$(P^*/H) / (\rho^*/h) = \mu\theta / \mu\beta = \theta/\beta \tag{4.7}$$

In this sense, if $\theta=\beta$, *i.e.* the quality in each sector is equal, then per student expenditure in each sector will be equal to each other. Moreover, if $\theta>\beta$, i.e. the quality of the public sector is higher than that of private sector, then per student expenditure in the public sector should be higher in order to reach at the optimum allocation, and vice versa.

From the above results it is inferred that if the market fails to allocate resources efficiently, (that is, if the actual resource allocation diverges from that of the optimal one) transfer of the resources from inefficient sector to efficient sector up to the point that the ratio of their per student expenditures is equal to the ratio of their qualities, (given the total resources available to the education market, *C*, is constant) increases the human capital output of the economy.

On the other hand, there is one more way to obtain the efficient allocation of resources given the technology of either sector: Increasing the total resources available to the education market[83]. This idea can be formalized as follows: Assume that the private sector is operating inefficiently in the education market, that is, it uses more resource than it should use given the total resources. Letting ρ denote the level of actual resources that the private sector uses, the divergence of the private sector from optimal resource usage is expressed as by $\rho - \rho^* > 0$. At this point, we can find a resource level to be devoted to higher education (that we will denote by C_ρ**)** such that $\rho = \rho^{**}$[84]. That resource level can be found as

$$C_\rho = \rho\,(H\theta + h\beta)/h\beta \qquad (4.8)$$

However, in order the market to operate efficiently, all of this increase (C_ρ –C) should be appropriated to the public sector. Therefore, the new optimum bundle of the economy becomes

[83] One may think of this idea as if the social planner increased the total resources available in the education market.

[84] ρ^{**} here denotes the optimum resource that should be allocated to the private sector when the total resources available to the education market is C_ρ, ceteris paribus.

$$(\rho^{**}, P^{**}) \qquad (4.9)$$

where $\rho^{**}=\rho= C_\rho\, h\beta/ (H\theta + h\beta)$ and $P^{**} = C_\rho\, H\theta/(H\theta + h\beta)$

The same framework can also be applied to the case in which public sector operates inefficiently, that is, $P>P^*$[85]. In this case,[86] we will find a resource level to be devoted to higher education (that we will denote by C_P) such that $P=P^{***}$

$$C_P = P\,(H\theta + h\beta)/ H\theta \qquad (4.10)$$

and the new optimum bundle of the economy is found to be

$$(\rho^{***}, P^{***})^{87} \qquad (4.11)$$

where $\rho^{***}= C_P\, h\beta/ (H\theta + h\beta)$ and $P^{***} = P = C_P\, H\theta/(H\theta + h\beta)$[88]

[85] Where P denotes the actual level resource that the public sector uses.

[86] Notice that since the cases $\rho - \rho^* > 0$ and $P-P^* > 0$ are mutually exclusive, there is a unique level of $C\rho$ and C_P for each of these cases.

[87] Note that $\rho^{**}+P^{**}= C_\rho$ and $\rho^{***}+P^{***}= C_P$.

[88] P^{***} here denotes the optimum resource that should be allocated to the public sector when the total resources available in the education market is C_P, ceteris paribus.

4.2.1 Introduction of the Government

The final part of the study is devoted to the comparison of "actual" resource allocation with the "optimum" one. At this part of the study, we will diverge from the social planner framework and introduce government in order to obtain some policy implications regarding the optimum allocation of educational resources between public and private sectors. As is well-known a major part of the budgets of the state universities is granted from the government budget. Moreover, government also extends some allowances to private universities in the form of state financial aid. On the other hand, universities have other sources of funding such as the revolving fund and the student contributions. We aggregate these other resources into a single body for both sectors. Hence, the total resources actually owned by the public and private sector can be expressed as

$$P=G+O \qquad \text{and} \quad \rho=g+o \tag{4.12}$$

where G and g represents the government share in the overall budgets of public and private universities. In other words, $(G+g)$ represents the portion of government budget allocated to higher education. On the other hand, O and o represents the funds that public and private sectors create by their "own" effort.

As it is clear from the results of the model, there are efficiency gains of correct intervention as long as the actual allocations of the resources between public and private sector are not optimal. Hence, assuming that the government is rational and solely interested in efficient production and the magnitude of human capital output, whenever P and ρ diverge from P^* and ρ^* there emerge a legitimate ground for the governmental intervention[89] into the higher education market. On

[89] By government intervention, we actually mean "a change in the government's current policy", since the government is already in the market.

the other hand, we assume that government can control only the variables *G* and *g*, and it cannot change or influence the variable *O* and *o*. Hence, given this framework, we can write the optimum intervention policy of the government as follows

$$S^* = \begin{cases} g & \text{if} \quad \rho - \rho^* > g \\ 0 & \text{if} \quad \rho^* = \rho \\ \rho - \rho^* & \text{if} \quad 0 < \rho - \rho^* < g \end{cases} \tag{4.13}$$

and

$$s^* = \begin{cases} G & \text{if} \quad P - P^* > G \\ 0 & \text{if} \quad P^* = P \\ P - P^* & \text{if} \quad 0 < P - P^* < G \end{cases} \tag{4.14}$$

where S^* and s^* denotes the amount of resources to be allocated to public and private universities, respectively, in order to obtain a higher level of human capital output. However, one point should be clarified: The strategies described above can not be applied concurrently. The government applies the policy S^* if the private sector is consuming more resource than its optimal amount (i.e. $\rho > \rho^*$). On the other hand, government applies policy s^* if public sector is consuming more resource than its optimal quantity ($P > P^*$). As a result, since the cases $\rho > \rho^*$ and $P > P^*$ are mutually exclusive[90], government can apply

[90] Also notice that $P^*-P = -(\rho^*-\rho)$

only one of them at a given period by utilizing the above criteria. From the Equations (4.13) and (4.14), it follows that

$$S^* \in [0, g] \quad \text{and} \quad s^* \in [0, G] \tag{4.15}$$

In other words, maximum possible transfer of resources from private (public) to public (private) sector under the policy S^* (s^*) is bounded from above by g (G). Hence, the right intervention may not yield Pareto optimum outcomes if the difference $(P - P^*)$ or $(\rho - \rho^*)$ is greater than $\text{Max}(G, g)$[91] in absolute terms. Below, we will extend the model to the case of Turkey.

4.3 The Case of Turkey

In this part, we will calibrate the model with Turkish higher education data in order to analyze the allocation of resources between public and private sector in Turkish higher education system, and attempt find out some implications concerning efficiency of these sectors in transforming society's resources into human capital output.

4.3.1 Data and Methodology[92]

We applied the model for the academic years of 1998-1999, 1999-2000, 2000-2001 and 2001-2002[93] because of the shortage of the data.

[91] Maximum of G and g.

[92] Note that only 12 private universities are included in the research. These universities are Atılım, Başkent, Beykent, Bilkent, Çankaya, Doğuş, Fatih, İstanbul Bilgi, İstanbul Kültür, Koç, Maltepe and Yeditepe University. In other words, in the calculations the private sector is made up of these 12 universities.

[93] Applications to other years are straightforward upon gathering the necessary data.

In order to determine the academic quality parameters θ and β, we will utilize Arslan (2001) which is a comprehensive academic quality ranking of the universities in Turkey. We utilize the results of this study in the following way:

First, we multiplied the grade[94] of each public university[95] by its number of students[96] for the semester under consideration, and take the summation of these multiplications. By this way, we obtain the contribution of each public university to the "total" academic quality in public sector. . Then, we divide that sum by the total number of students in order to obtain the "quality level" of the public sector; that is, the parameter θ. We performed the same calculations for the private sector, and find out the parameter β. As a result, parameters the θ and β is subject to change for each semester mentioned above, due to the changes in the number of students.

On the other hand, we obtain the annual expenditures of the private universities and the state financial aids granted to them for the years 1999, 2000, 2001 and 2002 from Kesik (2003). We divide annual expenditures of the private

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[94] Arslan (2001) attributes a certain final grade to each university under consideration. In this study, the highest and the lowest of these grades are found to be 915 and 242, respectively. For detailed information, see Appendix B.

[95] All of the public universities except Anadolu University and Gebze Technology of Institute are included in the calculations.

[96] Only full time undergraduate students are considered for both sectors.

universities by the number of students in the private sector in order to obtain the actual per student expenditure in the private sector[97].

The expenditure data for public sector and the budget allowance to the public universities are obtained from CHE (2004). The number of students for the above mentioned academic years is also acquired from CHE and SSPC statistics. We obtain the actual per student expenditure in the public sector in the same way we did for the private sector.

4.3.2 Results

Data and results of the calibrated model for the academic years of 1998-1999, 1999-2000, 2000-2001 and 2001-2002 are given below.

Table 4.1 Data of the Calibrated Model for 1998-2002 period
(Monetary Values are in Millions TL)

	1998-1999	1999-2000	2000-2001	2001-2002
θ	4.47	4.4	4.35	4.31
β	4.83	4.2	4.49	4.42
β/θ	1.08	1.05	1.03	1.02
C	1,232,900,252	2,114,686,372	3,409,368,996	4,555,358,548
H	837,779	870,456	921,773	971,062
h	26,158	33,252	40,810	42,524
P	1,101,191,252	1,879,473,371	3,106,431,996	4,199,434,547
ρ	131,709,000	235,213,000	302,937,000	355,924,000
G	676,899,815	1,054,610,700	1,364,910,550	2,495,967,700
g	3,920,000	8,740,000	7,255,000	9,164,000
P/H	1,314	2,159	3,370	4,324
ρ/h	5,035	7,074	7,423	8,370

[97] We use the expenditure data belonging to the years 1999, 2000, 2001, and 2002 together with the number of students in 1998-1999, 1999-2000, 2000-2001, 2001-2002 academic years, respectively.

Table 4.2 Results of the Calibrated Model for 1998-2002 period

(Monetary Values are in Millions TL)

	1998-1999	1999-2000	2000-2001	2001-2002
P^*	1,192,662,632	2,033,135,868	3,260,375,498	4,359,574,953
ρ^*	40,237,620	81,550,504	148,993,498	195,783,594
C_ρ	4,035,627,831	6,099,309,027	6,932,007,295	8,281,395,787
P^{**}	3,903,918,831	5,864,096,027	6,629,070,295	7,925,471,787
P^*-P	91,471,380	153,662,497	153,943,502	160,140,406
$\rho^*-\rho$	-91,471,380	-153,662,497	-153,943,502	-160,140,406
P^*/H	1,424	2,336	3,537	4,489
P/H	1,314	2,159	3,37	4,324
ρ^*/h	1,538	2,452	3,651	4,604
ρ/h	5,035	7,074	7,423	8,37
P^{**}/H	4,66	6,737	7,191	8,162
S^*	3,920,000	8,740,000	7,255,000	9,164,000
s^*	N/A	N/A	N/A	N/A
g	3,920,000	8,740,000	7,255,000	9,164,000

N/A: Not Applicable

Table 4.1 and Table 4.2 reveal the data and results of the calibrated model for the four academic years between 1998 and 2002. According to the tables, there is a slight difference between the quality parameters of public and private sector in each year under study. (β/θ ratios are very close to one for each year.) However, one should keep in mind that the comparison of the ratios belonging to different academic years can be misleading, and the ratios for each year should be considered separately from the other years[98].

[98] The reason behind this is that: Academic quality data for each university is available only for the year 2001, and we find the β/θ ratio for each year by adjusting the number of students in public and the private sector. Hence, the only source of change in the β/θ ratio from year to year is the change in the number of students in public and the private sector. It follows that although the β/θ ratio gives an unbiased comparison of the academic quality of the public and the private sector within the same year, it leads to misleading conclusions when we compare the different points in time due to the "size of the student population" bias.

Table 4.2 indicates that actual spending of the private sector (ρ) is higher than the socially optimum level (ρ^*) under each year under consideration; as a result actual spending of the public sector (P) is always lower than the socially optimum level (P^*) in the same period. This result is supportive of the view that the size of the public sector should have been increased in comparison to the private sector in Turkish higher education market in 1998-2002 period. As a result, the increased size of government involvement could have helped to cure the existing excess demand for higher education.

Following this result, it is found that actual level of per student spending in the private sector considerably exceeded that of the optimum one. The ratio of actual to optimum per student expenditures in private sector is on average 2.5. In other words, the private sector on average spends 2.5 times more resources per student than it should actually spend. This is a clear indication of the inefficiency of the private sector in provision of the service of higher education and in production of human capital output. Therefore, a greater portion of the higher educational services should have been devoted to the public sector in order to attain a more efficient provision of the higher education services in Turkey.

The results also shows that since $\rho > \rho^*$ a rational government, which aims at the maximization of human capital output of the economy given the resource constraint, should have implemented the policy S* in 1998-2002 period. Moreover, since $\rho - \rho^* > g$ in each period, the government should have transferred the maximum available resources[99], g (under its control) from private sector to public sector in each year under consideration. This result clearly shows that within the context of Turkish higher education the full extent of the state financial aid to private universities should have been abolished, and these

[99]In the sense of the maximum available resources "under the direct control of government"; that is, the full amount of state financial aid to private universities.

resources should have been directed to the public sector. It is clear that in this way we would have moved one step closer to the Pareto optimum allocation of resources in the higher education market.

The table also indicates that if efficiency is decided to be satisfied through the augmentation of the total resources devoted to higher education, then the new education budget (C_ρ)[100] should have been approximately three times larger[101] than the previous one. Moreover, in this case the amount of resources that public sector should use also increases approximately three times compared to the previous case holding the resource usage of the private sector constant.

The results above strongly supports the idea that within the context of Turkish higher education system, increasing the size of the public sector in comparison to private sector would have increased the efficiency of the education market; and as mentioned before, in this way the ever increasing demand for higher education could also have been satisfied in each academic year under investigation. Hence, as a resource allocation policy regarding the realm of higher education, the government can follow the one proposed in (4.13) and (4.14).

In this sense, the government should decide how much aid to grant to private sector by calculating the expression (ρ^*-ρ) belonging to previous year. As long as this expression is positive, the government implements the policy s^*. The same procedure applies for the public sector, as well. The government should choose how much allowance to extend to the public sector by calculating the

[100] Notice that $\rho+P^{**}= C_\rho$ in each year under consideration. (Note: $\rho = \rho^{**}$)

[101] On average and by considering the entire period.

expression (P^*-P) by using previous year's data. If this expression is positive, then the government applies the policy S^*. For each academic year the government should follow this procedure by considering the previous year's data. As a final remark, although the policy proposed does not guarantee the attainment of Pareto optimum outcomes, it guarantees some degree of Pareto improvement given that the market outcome is not Pareto optimum.

4.4 Limitations

1) The model treats the quality in both sector as an exogenous variable, and attempts to find out the optimum per student resource grant which maximize the human capital output in that period. However, it is obvious that resources allocated to either sector are the main determinants of the quality in that sector. In order to avoid that problem, quality component should also be endogeneized so that quality variables in both sector can be determined together with the per student expenditures. Moreover, the model is a one-period static model. Therefore, since per student expenditure incurred in either sector this period affects the quality of the respective sector in the next period, the model should be carried out in a dynamic setting.

2) The model considers only human capital output production role of the universities. However, universities produce a considerable amount of research output, as well. Hence, the above framework should be modified so that it incorporates research output into the analysis, as well.

3) The model takes the total amount of resources devoted to higher education given, and in this sense the model is a partial equilibrium one. It is implicitly assumed that the higher the total expenditure on higher education, the higher the

human capital accumulation, output and welfare in the economy is. In the most extreme case, we can devote all the resources in the economy to higher education and become very prosperous. However, these resources do not fall from sky and they have costs and alternative usages. For example some part of the resources devoted to public education is directly financed out of tax revenues which are collected from the agents in the economy, and agents make their decisions concerning private education by taking their budget constraint and alternative consumption schemes into consideration. Therefore, instead of a social planner framework, individual choices should be incorporated into the model in order to extend it a general equilibrium framework.

4) The model deals only with the efficient allocation of the higher education resources between the public and private sectors, and it does not address the educational distribution within the society. However, distribution of educational resources has important implications for the efficient allocation of resources between different strata of the society. Moreover, as a natural result of the private benefit of higher education and imperfectness of the capital markets, the distribution of educational services in this period has a great impact in the determination of the income distribution in the next period, this in turn determines the distribution of educational services in the next one and so on. Therefore, the model should be analyzed within the perspective of heterogeneous agent framework which incorporates the distribution of higher education services and income distribution into the analyses, under the additional assumption that the capital markets are imperfect.

5) The model aggregates the universities into two groups with respect to their financial structures. On the other hand whenever we aggregate, we lose some information. Hence, the above structure can be augmented to cover each and every university irrespective of their financial structure, and the distribution of resources to each of them can be determined simultaneously.

CHAPTER 5

CONCLUSIONS

In Chapter II, we present an overview of the issues in education. We discuss the recent developments in Turkish higher education system in Chapter III; and in Chapter IV we propose a model and calibrate it with recent Turkish higher education data in order to determine efficient allocation of educational resources between public and private universities, and we propose a higher education policy regarding the resource allocation in the higher education sector.

The study mainly focuses on the relative efficiency of public and private universities in Turkish higher education system in producing human capital output for the economy in 1998-2002 period, by aiming at to propose a resource allocation policy for the realm of higher education to be pursued by the government. For this purpose, it develops a static microeconomic model, which captures the academic quality and per student expenditure aspects of the public and private sector in producing human capital output. Afterwards, the model is calibrated to Turkish higher education data belonging to four academic years in 1998-2002 period.

The results of the calibrated model have revealed that the resources devoted to higher education are misallocated between the public and private sectors in Turkish higher education system, considering their marginal human capital output contributions to the economy, in 1998-2002 period. We have found that actual spending of the private sector is much higher than its optimum level in each year under consideration. Therefore, per student expenditure in the private

sector is considerably higher than that of the optimum one. It follows that resource usage and per student expenditure of the public sector is lower than its optimum. Therefore, we have shown that the higher education market in Turkey failed to allocate the resources in an efficient way so as to maximize the human capital formation of the economy in the period under consideration. In order to correct this market failure, we propose two solutions both of which support the idea that the resources and resource share of the public universities should have been expanded in 1998-2002 period. Moreover, these practices would have helped to relieve the observed excess demand for higher education.

The first solution proposes that given the total resources available to higher education market are constant, the government should have transferred the full extent of state financial aid granted to private universities to the public sector. Although small, this change would have led to a Pareto improvement in the allocation of the higher educational resources.

The second solution proposes that the resource constraint could have been expanded to a certain level by increasing the share of the higher education budget in the overall government budget. Then, if the public sector were given the entire additional resources available to the higher education sector, Pareto Optimum could have been achieved. As a result, the share of the public universities in the higher education budget should have been increased.

Moreover, one can think of a combination of these two solutions which includes the transfer of the state allowances granted to private universities and the augmentation of the share of the higher education budget in the government budget.

Therefore, in order to maximize the human capital output in the economy and to avoid the misallocation of resources in the higher education sector, government should define and follow a resource allocation policy in the realm of higher education. This study proposes such a resource allocation policy for the area of higher education, which satisfies the above requirements. According to this policy, the government should decide how much aid to grant to private sector by evaluating the expression (ρ^*-ρ) belonging to previous year data. As long as this expression is positive, the government implements the policy s^*. The same procedure applies for the public sector, as well. The government should decide how much allowance to extend to the public sector by assessing the expression (P^*-P). If this expression is positive, the government applies the policy S^*. For each academic year the government should follow this procedure by considering the previous year's data. As a final remark, although the policy proposed does not guarantee the attainment of Pareto optimum outcomes, it guarantees some degree of Pareto improvement given that market outcome is not Pareto efficient.

Human capital is one of the main sources of the growth and development of an economy. Hence, the provision of enough resources and efficient allocation of these resources among the economic units has a primary importance for the well being of the economy. In Turkey, there is an inefficient allocation of the resources devoted to higher education. Correction of this market failure through the implementation of the policy proposed above will increase the efficiency of human capital production process which is carried out by the universities. As a result, human capital accumulation per unit of higher education resource and the total human capital formation of the Turkish economy will be increased.

REFERENCES

Alesina, Alberto; Rodrik, Dani, "Distributive Politics and Economic Growth", *The Quarterly Journal of Economics*, (May 1994), pp. 465-490.

Arslan, Hasan , "Academic Quality Assessment in Turkish Undergraduate Institutions", Michigan: *A Bell and Howel Company*, 2001.

Aukrust, Odd, "Investment and Economic Growth", *Productivity Measurement Review*, Vol. 16 (February, 1959), pp. 35-50.

Becker, Gary S., "Human capital: A theoretical and empirical analysis, with special reference to education", 3rd ed., Chicago: *University of Chicago Press*, 1993.

Becker, Gary S., "Human Capital and the Personal Distribution of Income: An Analytical Approach", Ann Arbor, *University of Michigan Press*, 1967.

Ben-Porath, Yoram, "The Production of Human Capital and the Life Cycle of Earnings", *Journal of Political Economy*, Vol. 74 (August, 1967), pp. 352-365.

Cardak, Buly A., "Heterogeneous Preferences, Education Expenditures and Income Distribution", *The Economic Record*, Vol. 75, No. 228 (March 1999), pp. 63-76.

Catsiapis, George, "A Model of Educational Investment Decisions", *The Review of Economics and Statistics*, Vol. 69, No.1 (Feb., 1987), pp. 33-41.

Council of Higher Education (CHE), "Türk Yükseköğretiminin Bugünkü Durumu", November, 2004.

Council of Higher Education (CHE), *Higher Education Statistics*, 1988-2002.

Chuang, Yih-Chyi; Chao, Chen-Yeng, "Educational Choice, Wage Determination, and Rates of Return to Education in Taiwan", *IAER*, Vol.7, No. 4 (Nov., 2001).

Crean, John F., "Forgone Earnings and the Demand for Education: Some Empirical Evidence", *The Canadian Journal of Economics*, Vol. 6, No. 1 (Feb., 1973), pp. 23-42.

Cohn, Elchanan, "Benefits and Costs of Higher Education and Income Redistribution: Three Comments", *The Journal of Human Resources*, Vol. 5, No. 2 (Spring, 1970), pp. 222-236.

Evetts, Julia, "Equality of Educational Opportunity: The Recent History of a Concept", *The British Journal of Sociology*, Vol. 21, No. 4 (Dec., 1970), pp.425-430.

Erkan, Turan Erman, "Investment in Human Capital: Internal Rate of Return on Education and on the Job Training in the Public Sector of Turkey, 1980-1995", *Master Thesis, Middle East Technical University*, (June, 1996).

Fernandez, Raquel; Rogerson Richard, "Income Distribution, Communities, and the Quality of Public Education", *The Quarterly Journal of Economics*, Vol. 111, No. 1 (Feb., 1996), pp. 135-164.

Fernandez, Raquel; Rogerson Richard, "Public Education and Income Distribution: A Dynamic Quantitative Evaluation of Education-Finance Reform", *The American Economic Review*, Vol. 88, No. 4 (Sep., 1998), pp. 813-833.

Fields, Gary S., "The Private Demand for Education in Relation to Labour Market Conditions in Less Developed Countries", *The Economic Journal*, Vol. 84, No. 336, (Dec., 1974), pp. 906-925.

Frankel, Charles, "Equality of Opportunity", *Ethics*, Vol. 81, No: 3 (Apr., 1971), pp. 191-211.

Garcia-Penalosa, Cecilia, "The Paradox of Education or the Good Side of Inequality" *Oxford Economic Papers*, New Series, Vol. 47, No. 2 (Apr., 1995), pp. 265-285.

Glomm, Gerhard; Ravikumar, B., "Public versus Private Investment in Human Capital: Endogenous Growth and Income Inequality", *The Journal of Political Economy*, Vol. 100, No. 4 (Aug., 1992), pp. 818-834.

Green, S. J. D, "Is Equality of Opportunity a False Ideal For Society", *The British Journal of Sociology*, Vol. 39, No. 1 (Mar., 1988), pp. 1-27.

Güngör, Nil Demet, "Education and Economic Growth in Turkey, 1980-1990: A Panel Study", *Master Thesis, Middle East Technical University*, (July, 1996).

Hanushek, Eric A., "Publicly Provided Education", *NBER Working Papers*, No:8799, (Feb., 2002), JEL No. H4, I2.

Joseph, B. Lawrance, "Some Ways of Thinking About Equality of Opportunity", The Western Political Quarterly, Vol. 33, No. 3 (Sep., 1980), pp. 393-400.

Kesik, "Yüksek Öğrenimde Yeni Bir Finasman Modeli Önerisi: Bütünsel Model", *T.C Maliye Bakanlığı, Araştırma, Planlama ve Koordinasyon Kurulu Başkanlığı*, Yayın No: 2003/ 362.

Kiker, B. F., "Investment in Human Capital", Columbia, South Carolina: *University of South Carolina Press*, 1971.

Kiker, B. F., "The Historical Roots of the Concept of Human Capital", *Journal of Political Economy*, Vol. 74, No. 5 (October, 1966), pp. 481-499.

Kodde, A. David; Ritzen M. M Jozef, "Direct and Indirect Effects of Parental Education Level on the Demand for Education", *The Journal of Human Resources*, Vol. 23, No. 3 (Summer, 1988), pp. 356-371.

Lucas, Robert E., Jr., "On the Mechanics of Economic Development", *Journal of Monetary Economics*, Vol. 22 (July, 1988), pp. 3-42.

Mankiw, N. Gregory; Romer, David; Weil, David N., "A Contribution to the Empirics of Economic Growth", *Quarterly Journal of Economics*, Vol. 107, No. 2 (May, 1992), pp. 407-437.

Oulton, Nicholas, "The Distribution of Education and the Distribution of Income", *Economica*, New Series, Vol. 41, No. 164 (Nov., 1974), pp. 387-402.

Person, Torsten; Tabellini, Guido, "Growth, Distribution and Politics", *European Economic Review* Vol.36, (1992), pp. 593-602.

Rogoff, Natalie, "Public Schools and Equality of Opportunity", *Journal of Educational Sociology*, Vol. 33, No. 6, (Feb., 1960), pp. 252-259.

Romer, Paul, “Advanced Macroeconomics”, *McGraw-Hill Higher Ed*., 2nd edition, 2001.

Romer, Paul, "Increasing Returns and Long Run Growth," *Journal of Political Economy* Vol.94 (October, 1986), pp. 1002-1037.

Rosen, Harvey S., “Public Finance”, *Irwin/McGraw-Hill*, Fifth Edition, 1999.

Saint-Paul, G; Verdier, T, “Distributional Conflicts, Power and Multiple Growth Paths”, *CEPR Discussion Papers*, No. 633, (Feb., 1992), London.

Saint-Paul, G; Verdier, T, “Education, Democracy and Growth”, *Journal of Development Economics*, Vol. 42, No. 2 (Dec., 1993), pp. 399-407.

Schaafsma, Joseph, “The Consumption and Investment Aspects of the Demand for Education”, *The Journal of Human Resources*, Vol. 11, No. 2 (Spring, 1976), pp. 232-242.

Schaar, John H., “Equality”, *Nomos IX*, New York: Atherton, (1967), pp. 228-249.

Schultz, Theodore W., “Investment in Human Capital”, *American Economic Review*, 51 (March, 1961), pp. 1-17.

Solmon, Lewis, “A Note on Equality of Educational Opportunity”, *American Economic Review*, Vol. 60, No. 4 (Sep., 1970), pp. 768-771.

Solow, Robert M., “ A Contribution to the Theory of Economic Growth” , *Quarterly Journal of Economics*, Vol. 70, No.1 (Feb., 1956), pp. 65-94.

Stanley, John, “Equality of Opportunity as Philosophy and Ideology”, *Political Theory*, Vol. 5, No. 1 (Feb., 1977), pp. 61-74.

Student Selection and Placement Center (SSPC), *Higher Education Statistics*, 1985- 2004.

Thurow, Lester C., "Education and Economic Equality", *Public Interest*, 28 (Summer, 1972), pp. 66-81.

Turkish Education Association (TEA), Türkiye'de Üniversiteye Giriş Sistemi-Sonuç Raporu", 2005.

Türkmen, Fatih, "Eğitimin Ekonomik ve Sosyal Faydaları ve Türkiye'de Eğitim Ekonomik Büyüme İlişkisinin Araştırılması", *DPT Uzmanlık Tezleri*, Yayın No: DPT:2655.

Weisbrod, Burton A., "Education and Investment in Human Capital", *Journal of Political Economy*, Supplement, Vol.70 (October, 1952), pp. 106-123.

Welch, F., 1970 "Education in Production", *Journal of Political Economy*, Vol. 78, pp. 35-59.

Westen, Peter, "The Concept of Equal Opportunity", *Ethics*, Vol. 95, No. 4 (Jul., 1985), pp. 837-850.

APPENDICES

APPENDIX A:

SOLUTIONS AND PROPERTIES OF THE MODEL

The closed form the model is given by

$$W=H*f(P/H;\theta)+h*g\ (\rho/h;ß) \qquad \text{(A.1)}$$

together with the conditions

$$f'>0,\ f''<0 \text{ and } g'>0,\ g''<0 \qquad \text{(A.2)}$$

First, we will show that the explicit form of (A.1), expressed as

$$W=H\ ln[(P/H)^{\theta}]+h\ ln\ [(\rho/h)^{ß}] \qquad \text{(A.3)}$$

where

$$f(P/H;\theta)=ln[(P/H)^{\theta}] \text{ and } g(\rho/h;ß)=ln[(\rho/h)^{ß}] \qquad \text{(A.4)}$$

satisfies the properties expressed in (A.2). We start with rewriting (A.3) in a simpler form given by

$$W=H\ ln[(P/H)^{\theta}]+h\ ln\ [(\rho/h)^{ß}]$$

$$=H\theta\ ln(P/H)+hßln(\rho/h)$$

$$=H\theta(lnP-lnH)+hß(ln\rho-lnh)$$

$$=-\ (H\theta lnH+hßlnh)+H\theta lnP+hßln\rho$$

$$=A+H\theta lnP+hßln\rho \qquad \text{(A.5)}$$

where $A = -\ (H\theta lnH+hßlnh)$ is a constant.

Now, we will check whether *P/H* (ρ/h) increases *W* at a decreasing rate. If we keep *H (h)* constant, and investigate the behavior of *P* (ρ) alone, we can obtain

the same results, since change in *P/H (ρ/h)* keeping *H (h)* constant, changes *P/H (ρ/h)* in the same direction. Then, it is found that

$$\frac{\partial W}{\partial P} = \frac{H\theta}{P} > 0 \qquad \textit{and} \qquad \frac{\partial^2 W}{\partial^2 P} = \frac{-H\theta}{P^2} < 0 \qquad \text{(A.6)}$$

$$\frac{\partial W}{\partial \rho} = \frac{h\beta}{\rho} > 0 \qquad \textit{and} \qquad \frac{\partial^2 W}{\partial \rho^2} = \frac{-h\beta}{\rho^2} < 0 \qquad \text{(A.7)}$$

Therefore, we have shown that (A.4) satisfies the properties in (A.1). In words, we have shown that per student expenditures increases the human capital output at a decreasing rate.

Now, we will focus on the problem of the Social Planner which is given by

$$\text{Max } W = H \ln[(P/H)^{\theta}] + h \ln[(\rho/h)^{\beta}] \qquad \text{(A.8)}$$

$$\text{subject to} \qquad P + \rho = C$$

The problem described above can be solved by the Method of Lagrange Multipliers. We can form the Lagrangean by taking *W* as it is in (A.8), as follows

$$L=A+H\theta lnP+h\beta lnr+ (C-P-\rho) \quad \text{(A.9)}$$

First-order-conditions yield,

$$\frac{\partial L}{\partial P} = H\theta/P-\lambda=0 \quad \text{(A.10)}$$

$$\frac{\partial L}{\partial \rho} = h\beta/\rho-\lambda=0 \quad \text{(A.11)}$$

$$\frac{\partial L}{\partial \lambda} = C-P-\rho=0 \quad \text{(A.12)}$$

From the equations (A.10) and (A.11), we obtain

$$\frac{H\theta}{P} = \frac{h\beta}{\rho} \quad \text{(A.13)}$$

The resource constraint implies that

$$P=C-\rho \quad \text{(A.14)}$$

Substituting (A.14) into (A.13), we obtain

$$\frac{H\theta}{C-\rho}=\frac{h\beta}{\rho} \qquad \rightarrow \qquad \rho H\theta = Ch\beta - \rho h\beta$$

$$\rightarrow \qquad \rho(H\theta + h\beta) = Ch\beta$$

$$\rightarrow \qquad \rho^* = \frac{Ch\beta}{H\theta + h\beta} \tag{A.15}$$

then,

$$P^* = C - \rho^*$$

$$= C - [Ch\beta/(H\theta + h\beta)]$$

$$= \frac{CH\theta + Ch\beta - Ch\beta}{H\theta + h\beta}$$

$$\rightarrow \quad P^* = \frac{CH\theta}{H\theta + h\beta} \tag{A.16}$$

Note that, the same results can be obtained also in the following way:

$$W=A+H\theta ln(C-\rho)+h\beta ln\rho \qquad (A.17)$$

By simply differentiating (A.17) w.r.t ρ and letting the result equal to 0, we obtain

$$\frac{\partial W}{\partial \rho}=\frac{H\theta}{C-\rho}(-1)+\frac{h\beta}{\rho}=0$$

$$\rightarrow H\theta/(C-\rho)=h\beta/\rho$$

$$\rightarrow \rho^{*}=\frac{Ch\beta}{H\theta+h\beta}$$

and

$$\rightarrow P^{*}=\frac{CH\theta}{H\theta+h\beta}$$

as we found above. This formulation also allows us to learn whether the optima that we obtained are really maxima. Checking the second derivative,

$$\frac{\partial^{2}W}{\partial \rho^{2}}=\frac{(-1)(-1)H\theta(-1)}{(C-\rho)^{2}}+\frac{(-1)h\beta}{\rho^{2}}<0 \qquad (A.18)$$

We have shown that the bundle (P^{*},ρ^{*}) attains a maxima.

Finally, we will investigate the behaviors of the parameters in the equilibrium

$$\frac{\partial \rho^*}{\partial C} > 0 \qquad \frac{\partial^2 \rho^*}{\partial C^2} = 0 \qquad \text{(A.19)}$$

$$\frac{\partial P^*}{\partial C} > 0 \qquad \frac{\partial^2 P^*}{\partial C^2} = 0 \qquad \text{(A.20)}$$

(A.19) and (A.20) shows that, each component in the optimum bundle increases at a constant rate with a given increase in the resource constraint. This implies that a change in the constraint leaves the share of P^* and ρ^* from the total available resources constant, other thing remaining the same.

$$\frac{\partial \rho^*}{\partial h} = \frac{C\beta(H\theta + h\beta) - C\beta h\beta}{(H\theta + h\beta)^2}$$

$$= \frac{C\beta(H\theta + h\beta - h\beta)}{(H\theta + h\beta)^2}$$

$$= \frac{C\beta H\theta}{(H\theta + h\beta)^2} > 0$$

$$\frac{\partial^2 \rho^*}{\partial h^2} = \frac{-2C\beta^2 H\theta}{(H\theta + h\beta)^3} < 0 \qquad \text{(A.21)}$$

$$\frac{\partial \rho^*}{\partial H} = \frac{-C\beta\ h\theta}{(H\theta + h\beta)^2} < 0$$

$$\frac{\partial^2 \rho^*}{\partial H^2} = \frac{-2C\beta h\theta^2}{(H\theta + h\beta)^3} > 0 \qquad \text{(A.22)}$$

(A.21) and (A.22) implies that while the optimum expenditure in the private sector increases with the number of students in private sector at a decreasing rate, it decreases with the number of students in public sector at an increasing rate.

$$\frac{\partial \rho^*}{\partial \beta} = \frac{Ch(H\theta + h\beta) - C\beta hh}{(H\theta + h\beta)^2}$$

$$= \frac{Ch(H\theta + h\beta - h\beta)}{(H\theta + h\beta)^2}$$

$$= \frac{ChH\theta}{(H\theta + h\beta)^2} > 0$$

$$\frac{\partial^2 \rho^*}{\partial \beta^2} = \frac{-2Ch^2 H\theta}{(H\theta + h\beta)^3} < 0 \qquad \text{(A.23)}$$

Likewise,

$$\frac{\partial \rho^*}{\partial \theta} = \frac{-C\beta\ hH}{(H\theta + h\beta)^2} < 0$$

$$\frac{\partial^2 \rho^*}{\partial \theta^2} = \frac{-2Ch\beta H^2}{(H\theta + h\beta)^3} > 0 \qquad \text{(A.24)}$$

Finally, (A.23) and (A.24) indicates that the optimum expenditure in the private sector increases with the academic quality in private sector at a decreasing rate, while it decreases with the academic quality in private sector at an increasing rate.

The last two results imply that public and private sectors perceive each other as a rival both in terms of student size and academic quality.

The same calculations can be performed for the public sector, as well. The results are presented below.

$$\frac{\partial P^*}{\partial C} > 0 \qquad \frac{\partial^2 P^*}{\partial C} = 0$$

$$\frac{\partial P^*}{\partial h} < 0 \qquad \frac{\partial^2 P^*}{\partial h^2} > 0$$

$$\frac{\partial P^*}{\partial H} > 0 \qquad \frac{\partial^2 P^*}{\partial H^2} < 0$$

$$\frac{\partial P^*}{\partial \theta} > 0 \qquad \frac{\partial^2 P^*}{\partial \theta^2} < 0$$

$$\frac{\partial P^*}{\partial \beta} < 0 \qquad \frac{\partial^2 P^*}{\partial \beta^2} > 0$$

APPENDIX B:

ACADEMIC QUALITY DATA

Arslan[102] (2001) is a comprehensive quality assessment study in Turkish higher education history which covers 64 universities, including all public (except Gebze Institute of Technology) and 12 private universities. The study mainly aims at to "rank" Turkish undergraduate institutions and their academic and professional schools in terms of academic quality.

The study employs two approaches: the reputational approach and the objective quality approach.

In line with the reputational approach a constructed survey instrument was employed, and 72 surveys were forwarded to the rectors, 265 to the deans, 933 to the department chairmen. In addition to this, rectors are asked to evaluate their own universities and schools and to rank the five best universities and the three best schools in their fields.

On the other hand, in line with the objective quality approach objective data indicators consisting of four major parts are employed: (1) student selectivity; (2) faculty productivity; (3) faculty resources; and (4) graduation rate. Moreover, each part was divided into various quality indicator components to assess academic quality in schools and universities. Student selectivity consisted of acceptance rate and OSS (SAT) scores; faculty productivity is composed of published books, published articles, and awarded resources; faculty resources

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consisted of student/faculty ratio, full professor/faculty ratio, and the number of faculty and departments, and graduation rate included five year graduation rates.

Afterwards the data collected is analyzed and each university is given two grades: one for academic reputation (subjective indicators) and the other for objective quality (objective indicators). The academic quality of the university is then obtained by the sum of these two grades. As is shown in Table B.1 below, the subjective and objective indicators account for the 42 percent and 58 percent of the final grade, respectively.

Table B.1 Weights of Indicators in Quality Ranking

RANKING CATEGORY	INDICATOR SUBJECTIVE INDICATORS	INDICATOR WEIGHT SCORE	TOTAL INDICATOR
ACADEMIC REPUTATION	Ranking of the Schools	320	32
	Self Evaluation	100	10
STUDENT SELECTIVITY	OBJECTIVE INDICATORS	160	16
	Sat Scores (Average Score)		
	Acceptance Rate	100	10
FACULTY PRODUCTIVITY	Published Books	40	4
	Published Articles	40	4
	Awarded Resources	60	6
FACULTY RESOURCES	Student/Faculty Ratio	60	6
	Full Professor/ Faculty Ratio	60	6
	Number of Schools and Departments	20	2
GRADUATION RATE	Graduation Rate	40	4

Source: Arslan (2001)

The best 10 universities in Turkey according to Arslan (2001) is shown in Table B.2.[103]

Table B.2 The best 10 Universities in Turkey

1	Middle East Technical University
2	Boğaziçi University
3	Hacettepe University
4	Istanbul Technical University
5	Bilkent University
6	Ankara University
7	Istanbul University
8	Ege University
9	Gazi University
10	Dokuz Eylül University

Source: Arslan (2001)

[103] For full ranking of the universities, and for their objective and subjective indicator grades, see Arslan (2001).