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**ARE HIGHER EDUCATION AND ACADEMIC RESEARCH A PUBLIC
GOOD OR OF PUBLIC RESPONSIBILITY?**

REVIEW OF THE ECONOMIC LITERATURE

Final Draft*

Alain M. Schoenenberger**

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** Eco'Diagnostic, Geneva (schoenenberger@ecodiagnostic.ch), also University of Geneva and University of Neuchâtel, Switzerland.

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Introduction

Research and education are at the core of the Knowledge Society. Knowledge production and transmission are vital for a modern society and therefore receive increasing attention from policy makers. However, growing demand for State funding does not remain unchallenged as budget constraints push governments to reduce public spending and to increase the efficiency of public policies. The present review of the economic literature on academic research and higher education policy puts therefore its focus on the question to what extent and in what ways government should intervene in these areas. We shall give an overview over the existing economic literature as well as the available empirical data with regard to efficiency in academic research and higher education policy. Efficiency is however not the only concern of public policy. Knowledge production and transmission being at the core of our society and its economic system, redistribution policy and social cohesion considerations play also a crucial role. Equity considerations are important and dealt with along efficiency aspects in the vast literature on higher education. We shall accordingly extend our review of the economic literature to present the main results of the literature on the social impact of different policy solutions.

There are a variety of economic aspects of higher education and academic research: Education and research consume resources. The economic study of the choices made in allocating resources, which are limited by nature, to various, potentially unlimited needs, plays an important role in policy analysis. Limited public resources to finance higher education and academic research, in face of other priorities, incite governments and universities to look for private funds. The availability of private funds depends however to a great extent on profit considerations (rewards, returns on investment, etc.). The economic analysis of these conditions provide some insight into how private financing can be brought in and what effects it is likely to have on higher education and society. Tight state funding may also mean higher fees for the students, which may influence negatively on access to universities.

If education increases skills, competence and income, then education will necessarily affect the distribution of income. Therefore the issue of access to (higher) educational services, which may be correlated to income, occupies an important place in the equity debate. Often efficiency and equity criteria conflict with each other, and there is no general consensus about their relative importance.

In the first section we shall give an account of the theoretical background regarding the debate about the opportunity of public or private provision of goods and services, at the core of which is the notion of "Public Goods" which generally calls for State provision. While the concept of "Public Goods" provides the basic foundation for State intervention (and thus public responsibility) *within a market economy, there are also concerns about government failures, which are taken up briefly in the concluding remarks, indicating that government provision are not always better than market solution.*

The following second section will deal with the nature of higher education and the universities as the main institutions for higher education and academic research. We shall shed some light on the role, which universities play in our society and try to give a definition of higher education and academic research in view of the subsequent analysis.

Section three will give an overview over the economic literature dealing with the social and economic impact of higher education, whereas section four presents issues on the provision and finance of higher education. Section five will deal with the question whether academic research is to be considered as a public good, while section six will address the question of government intervention in research.

1 Public vs. Private Provision

The opportunity of state intervention in (higher education) can be judged on efficiency grounds. The economic literature differentiates between two types of efficiency: allocative and productive efficiency. The criteria of allocative efficiency requires that given resources be allocated between alternative uses in a way that maximises social welfare, i.e. taking into account all the positive and negative externalities. According to the criteria of productive (or X-) efficiency society should produce a given level of output with a minimum of resources, or maximum output for a given level of input. Both types of efficiency are fostered by a competitive environment, which would be favoured by market provision. Market provision, however, is hampered by a number of market failures. These market inefficiencies as well as concerns about equity provide the basis for government intervention..

1.1 Theories of Market Failure

According to standard economic theory perfect markets exist only in case of rival consumption and rival production in the absence of externalities and under the condition that all economic agents are perfectly informed. The existence of non rival services, the presence of external effects, which are not dealt with by the markets, and asymmetry of information justify government intervention, such as regulation, government provision, production, and finance. Obviously there are no perfect markets in the real world, and government interventions should be judged in comparison to market outcomes in the absence of State interference.

1.1.1 Public Goods

So called “public goods” cannot be provided at all or not in sufficient quantity by the market because of two characteristics, which are distinct and need not coincide:

- **Non-rivalness in consumption**, i.e. the existence of a beneficial consumption externality: According to Samuelson (1954) “*collective consumption goods [are goods] which all enjoy in common in the sense that each individual's consumption of such a good leads to no subtraction from any other individual's consumption of that good. Ordinary private consumption goods can be parcelled out among individuals*”. In his comments to Samuelson's seminal contribution Margolis questions the existence of collective consumption goods. The facts show that common public services such as education, hospital and highways, where capacity limitations and congestion arise, are usually rationed. Possibly the only goods which conform to Samuelson's definition are national defence and the traditionally cited lighthouse. According to Musgrave (1969), non-rivalness “*does not mean that the same subjective benefit must be derived, or even that precisely the same product quality is available*” (e.g. the services rendered by a police station, a regional public good, depend on the distance of the consumer to the station). Undoubtedly the feature of non-rivalness is not an absolute but progressive one (cf. Blaug, 1970). The consequence of non-rivalness of collective consumption goods is the “*impossibility of decentralised solution*” or in other words that “*no decentralised pricing system can serve to determine optimally the(se) levels of collective consumption*” for it “*is in the selfish interest of each person to give false signals, to pretend to have less interest in a given collective consumption activity than he really has*” (Samuelson, 1954).
- **Non-excludability from consumption**: The second characteristic of public goods is non-excludability which hampers the truthful revelation of preferences. Exclusion may not be possible for economic reasons. This is the case where exclusion, which forces the revelation of preferences and thus helps to avoid the need for political mechanisms of preference determination (van den Doel and van Velthoven, 1993), is available only at a high cost compared to the benefits provided by the good. Exclusion may also not be feasible technically, because it is not possible to identify the consumer given the available technology. In a number of cases it is however quite easy to prevent other consumers

from consuming the public good by denying entry or by charging an entrance fee (bridge, theatre up to the capacity limits). Exclusion can be imposed by the producer, or alternatively the consumer is able to choose the quantity of consumption.

Public goods in Samuelson's sense are pure public goods because they satisfy two conditions simultaneously – consumers cannot be excluded nor can they exclude themselves. It is however important to note that the existence of non-rivalness in consumption does not necessarily mean that exclusion is impossible, and the existence of rival consumption does not always mean that exclusion is possible. Public goods can thus be classified according to whether or not producers are able to exclude consumers, and whether or not a consumer himself can choose to consume the goods. The following table presents the typology of pure and impure public goods according to Riker and Ordeshook (1973). The pure public goods introduced by Samuelson are those shown in the bottom right-hand corner. All other public goods are “impure”, as in one form or another they come with private as well as public elements, which is for example the case of education (not mentioned in the table).

Table 1: Typology of Pure and Impure public goods

	Consumer able to choose amount of consumption		Consumer unable to choose amount of consumption	
	Utility increased by consumption	Utility decreased by consumption	Utility increased by consumption	Utility decreased by consumption
Consumer can be excluded from consumption	Recreation area Roads Cable television	Polluted beaches	Civil liberties Fire department	Infectious diseases Military draft
Consumer cannot be excluded from consumption	Lighthouses Knowledge	Airport noise	Public order National defence Pollution or floods control	Air pollution Floods

Source: derived from Riker and Ordeshook, 1973, p. 261

1.1.2 Merit Wants and Merit Goods

The concept of merit goods has been introduced by Musgrave (1959). He defines it in the following terms: “Such wants are met by services subject to the exclusion principle and are satisfied by the market within effective demand. They become public wants if considered so meritorious that their satisfaction is provided for through the public budget, over and above what is provided by private buyers. The discussion on public goods is based on the assumption that the goods should be supplied in line with individual preferences. Some critics would feel that preferences should be imposed with certain limits by a chosen elite. Society may wish to interfere with individual consumer preferences, be it because its members are better educated, possess greater innate wisdom”, or belong to a particular party or sect. (Musgrave, 1969). This concept is somewhat in contradiction to the foundation of welfare theory assuming that each individual is the best judge of his/her own welfare and thus maintaining the view “that all allocation, whether to private or to social goods, is to be made in line with consumer preferences. [...] This excludes neither some degree of delegation of decision making (be it to legislators or civil servants), nor implementation through a more or less imperfect mechanism of decision by voting [...] but it differs fundamentally from an alternative that postulates some elite or central authority (benevolent or not) which knows best, and imposes its preference on the individual. (Musgrave, 1969). Musgrave suggests two ways out of the contradiction: a) The imposed choice is justified as an aid to the learning process to obtain the necessary information for a rational choice. The imposed choice would then in the long run be compatible with the objective of an intelligent choice. b) Merit goods could be explained by interdependent utilities, especially regarding the consumption of basic commodities. Social philosophy may dictate that the freedom to tolerate inequality in the

distribution of income and consumption is purchased at the cost of subsidies, which assure equality in the consumption of necessities. The possibility remains of course that choice is to be imposed *per se* (see section on non economic objectives). As noted by Cullis and Jones (1998), this boils down to two difficult questions, one concerning information and the other rationality. Concerning the latter, Mishan (1981) points out that the value judgement that individuals generally are the best judges of their own welfare could either be a judgement of fact, a judgement of morality (it is appropriate to act as if individuals are the best judges of their own welfare) or a judgement political expediency (it is politically expedient to act on the assumption that individuals are the best judges of their own welfare). From a public choice perspective – aiming to analyse political phenomena and institutions in economic terms – the problem could be treated on the basis of equal access and the social decision-making process. If one believes that the social decision-making processes is fair, then one would expect that citizens are willing to accept the possibility that at least some policies emerge which will be contrary to their best interest (Littlechild and Wiseman, 1986).

1.1.3 Externalities

Another approach to the classification of impure public goods focuses on spill-overs that stem from the provision of the good. Public goods are indeed a special form of consumption externality, since the producer of such goods does not only benefit himself but also benefits others, who can use positive spill-overs for free. An externality is present when the utility of an individual depends not only on the goods and services the individual purchases and consumes but also on the activity of some other individual. The same applies to production externalities. The activity of consumption and production may either increase overall welfare (positive externality) or may reduce welfare (negative external effect). The distinct feature of an external effect, which is not compensated for or 'internalised', is the interdependence among individuals (or firms in case of production) that occurs outside the price mechanism.

For example, education may improve an individual's earning potential, but at the same time it may facilitate basic research, creating non-rival and non-excludable knowledge or information, which benefits others in the community. Such development, in terms of culture or technology, may then bear public good characteristics. Recognition of the private-public mix means that goods can be viewed as having private benefits as well as external effects, which bear the characteristics of public goods (Evans 1970).

Measuring spillover and private benefits is a problem that is tackled in cost-benefit analysis, but the estimation of social benefits is not without significant problems. Most social benefits cannot be measured directly, in the absence of prices and an estimate of the quantities. For instance, the ratio of spill-over to private benefits would give an indication of the extent of the externalities, i.e an indicator of the private-public mix and the degree of publicness. Weisbrod (1988) for example tries to use the manner in which goods are financed as an indication of the public-private split of services provided by non-profit organizations. The more public good effects there are, the less may organisations finance themselves through sales, as there are no direct property rights to goods that can be enjoyed on a non-excludable basis. Instead the organisation will to a larger extent rely upon donations, gifts or grants to finance the provision of goods or services. This split may be thought symptomatic of the mix between public good output and private good output. The more an organization relies upon gifts, grants and donations, the more eligible it may be to benefit from subsidies.

2 The Universities

Universities are the primary producers of higher education and academic research. We shall therefore give a short account of the literature dealing with the universities' role in society and point out their mission as it was defined in 1998 by the World Declaration on Higher Education. This will eventually lead us to a definition of higher education and academic research which will serve as a basis for further analysis.

2.1 The Universities' Role in Society

Johnson (1974) distinguishes four functions of the universities: First, universities are seen as a symbol and repository of 'civilisation', defending and contributing to the advancement of civilization, *“through either or both setting standards of taste [...] and enabling the rest of population to increase its productivity, income and command over consumption goods. In this sense a university is a public good, like good weather or pleasant geography”*.

Second, they are a home for research *“which is a public good in the strict economic sense, that once produced they can be used by anyone without precluding use by others”*. Third, universities are an information storage, both physically in books and in embodied form of learned men, and finally, as a clearly recognized function, they are the place where young adults are being taught. Bear (1974) analyses the university (or any other higher education institutions) as a multi-product firm. Outputs produced by the university includes a variety of components, including:

- increments in human capital which provide a yield appropriable by the individual and a stream of benefits to society as a whole; or, in the words of Attiyeh (1974), educational and informational output, which refers to *“increases in student's knowledge and skills, which increase their productivity and their ability to earn income, and the reporting of student's attributes and educational attainments to students themselves and to prospective employers, which may facilitate more rational choices and hiring decisions”*¹;
- entertainment services consumed currently and privately by students during the studies;
- increments in the stock of research, i.e. increases in theoretical and empirical knowledge and the creation of new concepts and products which may directly or indirectly increase the economy's productive capacity.

Typically, universities produce simultaneously teaching and research services. Why are those services not produced in separate institutions? Research activity ensures that the teacher is up to date with the latest developments in his field, whereas teaching activity keeps researchers familiar with the basic principles of a discipline which is broader than their specific field of interest. In other words, a positive correlation between the quality of the teaching and productive research activity is expected, as one activity has an external effect on the other². In consequence, the quality of the transfer of technology and knowledge is enhanced. In terms of costs, the same inputs (e.g. the library, or the academic staff) are shared in two production processes, leading to economies of scope. Economies of scope exists when the costs of producing two (or more) outputs jointly is inferior to the sum of the costs of producing them separately. Economies of scope may also exist within the university because of the subject mix in teaching as students need to share a common set of knowledge. On the other hand economies can also be achieved in specialising in one or more disciplines, without providing necessarily tuition in all disciplines (see optimal subject mix, in Johnes, 1993).

By definition higher education takes place after primary and secondary education. Consequently, teaching and research in universities or similar institutions of higher education is based on the knowledge transmitted from lower levels of education. Historically, our universities have developed from small institutions for the elite of the society, the members of which could afford studying a relatively small number of abstract disciplines (philosophy, mathematics, theology, medicine, etc.) to institutions with a much larger number of students and disciplines. Some disciplines have a higher market value than others in terms of expected earnings, availability of jobs, etc. The mission of the university has changed fundamentally; its prime mission seems to be today to provide a certain level of education that is demanded by

¹ The second part of the definition is considered by Attiyeh as a separate output, yet the informational output seems to be complementary to and derived from the human capital output.

² See Barnett (1992) for a critical appraisal of the links between teaching and research activities. Institutions of higher education do not need to conduct research in order to justify the title "institution of higher education". Although research and higher education seem inseparable, that does not mean that either institution or their staff are obliged to conduct research. Staff do however need time and resources to keep up with their field of study.

the economy, and possibly to fulfil thereby also the aspiration of the majority of the students to an attractive job and comparatively high earnings.

According to de Groof et al. (1998), the university discharges three core functions:

- a) Conduct of scholarly and scientific research: The university plays a central and vital part in the education of students, in the training of researchers and in the transmission and preservation of fundamental knowledge; in principle, no particular discipline should be excluded from the support which underpins free, disinterested investigation (compared to applied, and profit driven research);
- b) Dispensation of learning on a scientific, rational basis, providing high-level academic and scholarly education: The ideal would consist in the transfer of research-generated new knowledge and technique to the minds of student. But how far "academic education" can be distinguished from "education at an academic level" with the advent of "professionally oriented" courses within the university;
- c) Provision of services: Rendering expert and specialist services to the wider community (to governments or to the private sector, including the labour market).

2.2 World Declaration on Higher Education: The Mission of Universities

The World declaration on higher education for the twenty-first century adopted in 1998 by the World Conference on Higher Education (UNESCO) in Paris provides a mission statement on which all participating countries have agreed. The Declaration recalls the principles of the Charter of the United Nations, the Universal Declaration of Human Rights and other universal principles on political, economic, social and cultural Rights.

Box 1: World Declaration on Higher Education for the Twenty-first Century

Article 1 of the Declaration defines the mission to educate, to train and to undertake research:

(a) educate highly qualified graduates and responsible citizens able to meet the needs of all sectors of human activity, by offering relevant qualifications, including professional training, which combine high-level knowledge and skills, using courses and content continually tailored to the present and future needs of society;

(b) provide opportunities ('espace ouvert') for higher learning and for learning throughout life, giving to learners an optimal range of choice and a flexibility of entry and exit points within the system, as well as an opportunity for individual development and social mobility in order to educate for citizenship and for active participation in society.

(c) advance, create and disseminate knowledge through research and provide, as part of its service to the community, relevant expertise to assist societies in cultural, social and economic development, promoting and developing scientific and technological research as well as research in the social sciences, the humanities and the creative arts;

(d) help understand, interpret, preserve, enhance, promote and disseminate national and regional, international and historic cultures, in a context of cultural pluralism and diversity;

(e) help protect and enhance societal values by training young people in the values that form the basis of democratic citizenship and by providing critical and detached perspectives to assist in the discussion of strategic options and the reinforcement of humanistic perspectives;

(f) contribute to the development and improvement of education at all levels, including through the training of teachers.

On equity of access, Article 3 stipulates :

(a) admission to higher education should be based on the merit, capacity, efforts, perseverance and devotion, showed by those seeking access to it no discrimination can be

accepted in granting access to higher education on grounds of race, gender, language or religion, or economic, cultural or social distinctions, or physical disabilities.

(b) ... access to higher education should remain open to those successfully completing secondary school, or its equivalent, or presenting entry qualifications, as far as possible, at any age and without any discrimination.

The funding of higher education requires both public and private resources. The role of the state remains essential in this regard.

(c) The diversification of funding sources reflects the support that society provides to higher education and must be further strengthened to ensure the development of higher education, increase its efficiency and maintain its quality and relevance. Public support for higher education and research remains essential to ensure a balanced achievement of educational and social missions.

The principles of the Declaration admit private sources of funding, but recognize that public support for higher education and research remains essential. There seems however to be a tendency to move away from collective support for higher education given an increasing appeal of the market. Economic competition on a global scale and reduced public financing (in face of other priorities) could however favour the type of skills and disciplines which permit those who acquired them to get the best returns, lower costs and greater profit on the market.

2.3 Higher Education

Education can be defined as the increase of the stocks of skills, knowledge and understanding possessed either by individuals or by society as a whole. The economics of education concerns the manner in which choices affecting this stock are made, both by individuals who demand education and by the teachers and institutions, which supply it. According to Blaug (1976) the birth of the economics of education can be traced back to Theodore Schultz who delivered in 1961 his lecture on Investment in human capital to the American Economic Association (Schultz, 1961)³. This early literature is about the nature and the financing of education services in general, without distinguishing the formal levels of education. It has concentrated on the role of education as investment in the future, analysing its rate of return compared to alternative investments. However, not only the return of education provides utility, but education has also a consumption element (the pleasure to learn).

An important argument for state intervention in education are its positive external effects. Although there is a considerable number of positive externalities cited in the literature, it is hard to estimate their practical significance due the fact that the majority of the effects are not measurable and that their link to specific levels of education cannot easily be identified.

In economic terms university education can be regarded *“as some mixture of current consumption (i.e. an enjoyable way of passing a few years before assuming adult responsibilities in the economy), the formation of consumption capital (i.e. the development of more sophisticated standards of taste and more discriminatory capacity for choice among consumption alternatives later) and the formation of production capital ('human capital'), i.e. the capacity to contribute more productive services to the economy, and hence to earn more future income, than would be possible in the absence of university education”* (Johnson, 1974).

2.4 Academic Research

Research is aimed at making discoveries or inventions and thus at producing knowledge. Knowledge is a largely non-excludable and a partially non-rival good, and is therefore widely considered to be a public good by the economic literature (Callon, 1994). It is furthermore

³ See also Wiseman (1959) and Becker (1964).

cumulative, for existing knowledge not only serves as consumption, but also as an intellectual input, spurring the production of new knowledge. Basic or fundamental research aims at producing basic knowledge that allows a fundamental understanding of the laws of nature or society. Applied research and development aims at producing knowledge that facilitates the resolution of practical problems. Tasse (1992, cited in Foray, 2004) distinguishes an additional class of activity consisting in the production of “infrastructure”, i.e. sets of methods, scientific and engineering databases, models, measurements and quality standards that support and coordinate the investigation.

In academic research openness and the free circulation of ideas are the rule. Describing the normative structure of science, Merton (1973) set forth the norms of the “Republic of Science”: communalism, universalism, disinterestedness, originality, skepticism. Science is thereby rooted in the public sphere: the 'communal ethos' stresses the cooperative character of research, considering that the accumulation of reliable knowledge is an essentially social process. The universalist norm requires that scientific work and discourse be open to all persons of 'competence'. The full disclosure of findings and methods form a key aspect of the cooperative, communal program of inquiry. Full disclosure also procures legitimacy based on 'organized skepticism', which demands that all contributions to the stock of reliable knowledge be subjected to trials of replication and verification.

Box 2: The Origin of the Norms of “Open Science”

Throughout the Middle Ages experimental science was a very secretive undertaking and shaped by a political and religious worldview which strongly refrained from disclosing to the “vulgar multitude” knowledge that might bring power over material things. The emergence of “Open Science” was due to information dissymmetry in the European system of court patronage, which made it difficult for the patrons, who were sponsoring scientific activities, to judge their clients' abilities. They therefore resorted to a system of open communication of findings and peer review, which guaranteed a certain degree of quality control. Based upon this system of “Open Science” a new “academic market” emerged later in the nineteenth century among State funded universities engaging in inter-institutional competition. The particularity of the “academic market” lies in the fact that it uses primary, non monetary incentives, such as reputation, to steer the allocation of resources. It thus guarantees the quick dissemination of newly created knowledge, without reducing the incentives for doing research.

Although the norm of 'openness' in the scientific context has led to considerable social benefits as well as to an acceleration of the research process thanks to rapid replication and swift validation of novel discoveries, the emergence of 'openness' is not endogenous to the development of science. The institutions of open science are independent, and in some measure fortuitous, social and political constructs, and as such the result of exogenous social processes. This implies that the institutions of the 'Republic of Science' might not resist to institutional change if it is brought about without the necessary circumspection.

Source : David (2004)

Academic science based on the rules of the “republic of Science” is described by some authors as the first mode of knowledge production. They argue that, since scientific research is becoming more and more application oriented and is increasingly driven by commercial interests, a new mode of knowledge production (“mode 2”) has emerged which is challenging the norms and practices that have traditionally protected academic openness and autonomy (Gibbons et al., 1994).

3 The Social and Economic Impact of Higher Education

Education has an important social and economic impact, as one of its functions is to prepare children and students for the labour market. From an individual perspective, future earnings are therefore a powerful guide, along personal and non economic criteria, for choosing the level of education and the subjects of study. Participation in higher education however not only

has an impact on the welfare of the individual, but also influences on economic growth and the welfare of the nation. On one hand the existence of private benefits supports the view that education is of private responsibility. On the other hand the existence of externalities or social returns associated with the educational attainment of individuals may explain collective concern about education justifying government provision and finance. The question is further complicated by equity considerations, as education is an important factor determining social mobility and the distribution of resources within society. Before we address the issue of how and by whom post-secondary education should be financed, we shall therefore give a review of the different contributions relating to the social and economic impact of higher education.

3.1 Individual vs. Social Benefits

Estimating the private and social returns to higher education is crucial in answering the question whether higher education is a public good and therefore of public responsibility. The arguments in favour of state provision of education rely on the belief that the market for educational services fails when left to its own device. According to Blaug (1970), however, *“education is not a pure public good because at least some of the economic benefits of education are personal to the educated, and the economist as economist simply has no case to make for state provision of education. His case is one of public subsidy to education and to be sure this is enough to explain State involvement in educational planning”*:

Whereas Human Capital Theory provides a solid basis for estimating private returns of education, it is widely acknowledged that the benefits of individually acquired education might indeed spill over to other individuals in the same firm, industry, city, region and economy. Channels for such types of externalities include the possibility that educated workers may raise the productivity of their less educated co-workers, that there may be external effects from technical progress or knowledge accumulation, or that an environment with a higher average level of human capital may entail a higher incidence of learning from others. Investment in human capital may also have an external social impact which can in turn have indirect economic effects: for instance, more education has been found to be associated with better public health, better parenting, lower crime, wider political and community participation and greater social cohesion (OECD, 1998). The existence of a linkage between educational achievement and its spill-overs is often considered as an *a priori* by theorists and policymakers, although the difficulties of actually verifying the size and the impact on economic growth and the social returns to education are formidable.

In general, average private and social internal rates of return to education immediately following compulsory schooling are relatively high. This suggests that there are strong incentives for the average student to engage in further education. The excess of private returns over estimated social returns suggests that government policy is set to internalise a substantial part of any externalities that may be associated with post-compulsory education. Furthermore, the large gap between the estimated rates of return of education and the risk-free interest rate on the financial market point to super-normal returns to investment in human capital. This may point to temporary excess demand for higher educated workers, with market forces being expected to eventually drive down the returns to rates that are similar to those on alternative productive assets – though this transition might take a long time⁴. Relatively high returns may in fact indicate under-education, at least until the returns from education have reached the returns of comparable alternative investment in the long run. They could however also reflect economic rent related to a scarce resource, namely ability and motivation of individuals, with the internal rates of return for the marginal student being lower than for the average student. If there is a shortage of highly educated persons per se, then policy should

⁴ Similarly, over-education may also persist in the long run and have an adverse effect on individual productivity. Over-education can be defined in three ways: as a decline in the economic position of educated individuals relative to a historically higher level; as under-fulfilled expectations of the educated with respect to their occupational attainments; or as the possession by workers of greater educational skills than their jobs require (see Tsang et al., 1985).

aim at expanding capacity in post-compulsory education as this would result in high returns at the margin for both individuals and society. On the other hand, if high average rates of return are due to a shortage of abilities, capacity expansion and stronger private incentives to acquire post-compulsory education may not result in high rates of return at the margin for individuals or for society at large.

Private and social returns to education may however vary across the different levels of studies. Bear (1974) for example argues that there definitely is a *“difference between the public goods generated by primary and secondary education, on the one hand, and higher education, on the other. The principal public benefit of the former is that it enhances the ease of communication in society – that the ability to read, write and perform elementary arithmetic calculations, taken together with the inculcation of a common cultural heritage, permits a member of the society to communicate with others and that such ease of communication is a benefit that cannot be withheld from some subsets of society and granted to others. But once this abilities are reached – and surely this occurs prior to higher education – it is questionable that the ease of communication is enhanced by further education.”* According to this view higher education would have a lower public to private benefit ratio than say primary and secondary education.

3.2 Individual Earnings and the Labour Market (Human Capital Theory)

Human Capital Theory, founded by Schultz (1960) and Becker (1962), perceives of education as an investment of current resources, including the opportunity cost of the time spent as well as any direct costs incurred by education, in exchange of future, higher earnings. According to the theory, the demand for education derives from the optimal investment decisions of rational individuals which will engage in an additional year of schooling and education as long as its (internal) rate of return – the rate which equates the present values of benefits (earnings) and costs – is superior to market interest rates (opportunity cost of financing).

Box 3: The Economic Benefit of Additional Human Capital

The pre-tax wage premium earned by tertiary graduates is substantial in all countries for which data were available, but particularly high in the United States, France and the United Kingdom. Investment in upper-secondary education is also associated with significant wage premia over lower-secondary education, especially in the United States and Canada. This wage pattern is broadly the same for both men and women, although education wage premia tend to be somewhat smaller for women. In several countries, the pre-tax education wage premium has tended to rise since the early 1980s, suggesting that the significant expansion in the relative supply of educated workers (reflecting fast increases in post-compulsory school enrolment) has failed to keep up with an even stronger increase in relative demand.

In most countries the earnings of tertiary-educated men and women increase more sharply with age than is the case for less-educated workers.

More education means also a stronger foothold in the labour market and thus lower risk of unemployment. The reduction in risk is particularly large for those investing in upper-secondary education, whereas the gap in unemployment rates between upper-secondary and university-educated workers is comparatively small.

Educated workers are more likely to participate in the labour market, and their active working life is generally longer than that for those with lower educational attainment. With very few exceptions, the participation rate for male graduates of tertiary education is markedly higher than that for upper-secondary graduates.

Progressive income taxation reduces the return to human capital investment. On the other hand, public financial support for education in the form of free or heavily-subsidised tuition increases the incentive to invest in education by lowering the cost of investment. Student loans and grants alleviate financing constraints and often involve a significant subsidy

element. Finally, the length of study periods influences financial rewards from human capital accumulation.

Source: Blöndal et al. (2002)

The estimation of the return to schooling and education has been the subject of considerable debate in the economic literature (Harmon, C. et al., 2003). Standard multivariate regression analysis for the UK suggests a return to a year of schooling in the UK of 7-9% for men and 9-11% for women. These figures appear to be at the upper end of returns in Europe, whereas Nordic countries in particular have low average returns. The Harmon survey of the literature concludes that the evidence on private returns to the individual is compelling. Despite some of the subtleties involved in estimating the returns on educational investments, there is an unambiguous positive effect on the earnings of education. Moreover, the size of the effect seems large relative to the returns on other investments. One might be tempted to conclude that this high return implies that private returns largely exceed the benefits to society (social returns), so that there is little argument for the taxpayer to subsidise individual study. Partly however, the relatively high private returns on human capital investment are due to the fact that government typically provide most of the financing of educational services.

In the debate on how higher education should be financed, Human Capital Theory not only serves as an argument in favour of limited government spending, but also accounts for the way demand in education is derived from labour market demand through the individuals' anticipation of future income. It therefore also serves as a justification for the shift in government intervention from subsidising institutions to subsidising individuals in order to allow for the allocation of public resources in accordance with market needs.

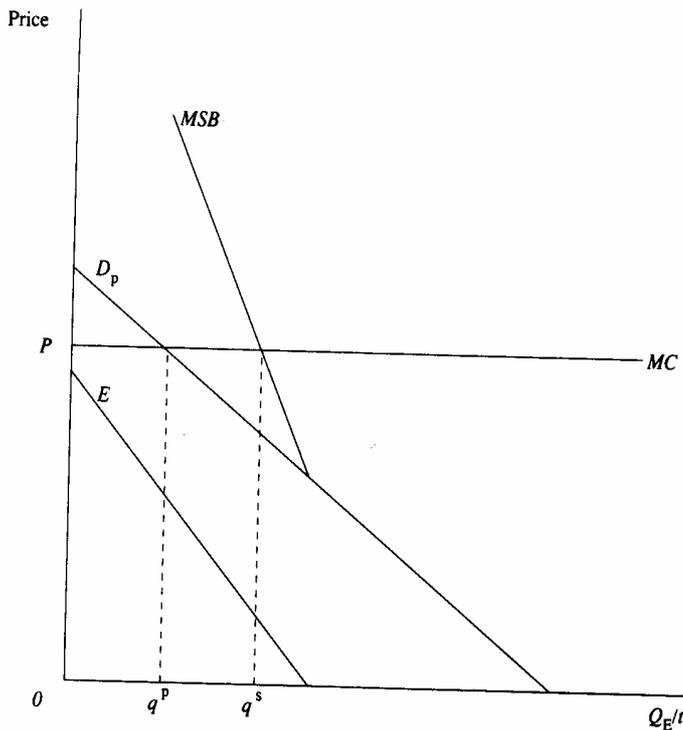
3.3 Positive Externalities

In Figure 1 the market demand curve for education is shown as D_p . It reflects the private benefits that students believe they will enjoy as a result of education. These may be viewed as the 'private return' on education and they depend in part on the income differential that students expect to receive during their working life as a result of education. If, however, there are other benefits (external benefits) contingent upon education, the social benefits from education will differ from the private benefits. The value of external benefits to others in the community is given by the line E , which shows what the rest of the community would pay for the various levels of education Q_E/t . Adding vertically the values of E to the private demand gives the line MSB . There are positive social benefits from education over and above the private benefits.

According to Cullis and Jones (1998), the external gains that arise from education may include the benefits to others (spillovers) arising for example from: a) the research undertaken in educational establishments; b) the cultural environment and the heritage for future generations; c) the screening device which education provides for the labour market to determine the quality of labour; d) the improved decision-making of voters and the behaviour of educated citizens, etc.

Blaug (1970) made a comparative list of factors found in the literature (many of which he questions) to distinguish the social rate of return on education from the private rate of return. Some of these factors (e.g. cultural environment and heritage) have the characteristics of a public good; that is, they can be consumed by one individual in society without reducing the amount available for consumption by others. Indeed, it is for this very reason that it is often supposed that the market will not properly internalise such factors in the decision-making calculus of individuals. In Figure 1 private demand at price P is only q^p , and thus inferior to the socially optimal output q^s (i.e. the point at which the marginal social benefit (MSB) is equal to the marginal cost (MC) of education).

Figure 1: External Effects of Education



Source: Cullis and Jones (1998, p. 51)

3.4 Signalling Hypothesis

Investing in (higher) education, individuals not only raise their productivity in working life, as stated by Human Capital Theory, but education also seems to provide them with a signal to potential employers about their innate productive capabilities and other factors, largely independent of education, as predicted by the “screening” hypothesis (Arrow, 1973). From this point of view, higher wages of those who go longer to school are observed not because education has increased their productivity, but primarily because the schools have identified those individuals who are the most productive, due to their motivations and ambitions. Both screening and human capital views are consistent with the empirical evidence which suggests that earnings are strongly associated with the level of education. There is a general agreement that some of the returns to education are the result of increases in skills and some are a result of screening; but there is some disagreement about the relative importance of the two views. Some studies show that wages do not depend closely on the subjects studied; this would suggest that content (skill formation) does not matter much. Weiss (1995), for example, studied low-skilled workers in a manufacturing plant and found that long-run success depended not on any particular skill but on social characteristics like reliability, low level of absenteeism and punctuality. This might be different for very highly skilled labour performing difficult and complex tasks.

The Signalling Hypothesis may not only explain a part of the private returns to education but also account for social returns, as the identification of capable individuals serves the information of employers on the labour market, thus reducing transaction costs and making the labour market function more efficiently.

3.5 Macro-Economic Performance

There are several theoretical and empirical approaches to modelling the linkage between human capital and macro-economic performance (see Box 3 below for an overview). Sianesi

and Reenen (2003) conclude their recent literature survey on the macroeconomic return of education with the following statement: *“taking the studies as a whole, there is compelling evidence that human capital increases productivity, suggesting that education is productivity-enhancing rather than just a device that individuals signal their level of ability to the employer [...] Barro style regression suggest that increasing school enrolment rates by one percentage points leads to an increase in per capita GDP growth of between 1 and 3 percentage points.”* The results of the ‘New Growth’ approaches point to even larger effects, which however seem to be implausible, severe methodological problems casting doubts on the interpretation of the evidence. Two robust qualitative results are however worth mentioning:

- The impact of increases in the various levels of education depend on the country's development. While primary and secondary skills appear to have larger effects in the poorest and intermediate developing countries, it is the tertiary skills that are important for growth in OECD countries.
- Human capital has indirect effects as well, e.g. by stimulating the growth of other productive inputs (physical capital, technology or health), which in turn foster growth and discourage negative factors, such as population growth and infant mortality.

Box 3: Methods for Measuring Macro-Economic Returns of Education

Macro Growth Regressions

Macro Growth Regressions exploit cross-country variation in factor productivity or growth rates between countries or regions. Empirically, it is often not possible to distinguish between the neoclassical framework which tries to explain the contribution of human capital to the long run level of per capital output or the 'New Growth Theory' which emphasises the endogenous determination of the long run growth rate (human capital accumulation producing directly or indirectly new knowledge and technology, generating external effects and/or being co-determined by the growth process). Besides the usual problems relating to the quality and the availability of comparable data, an important methodological problem in estimating growth equation is the possibility of reverse causality, for education could be, in part at least, the result of (anticipated) economic growth. Most of these analyses group developing and developed countries together, and most regressions are informal ad hoc regressions, sometimes termed 'Barro regressions' (Barro, 1997), where the choice of explanatory variables, including educational variables, is largely driven by results presented in the literature and *a priori* considerations.

Internal Rate Method

The Internal Rate Method evaluates the private and social profitability of the educational investment. The concentration on private returns may well lead to an underestimation of the full returns to society if education has the characteristics of a public good. Social rates of return include all direct costs of schooling (and not just those borne by the individual) and are calculated on the basis of pre-tax (instead of post-tax) earnings. According to OECD (1998), social rates of return are consistently found to be lower than private ones. In general, differences between the social and private rates of return in different countries appear to be due exclusively to differences in the direct cost of schooling. The estimated social rates should be regarded as a lower bound of the full returns to education, as all costs of education are well included whereas broader non-employment personal benefits are excluded (social or political gains, lower risk of unemployment, etc.).

Wage Regressions
Wage regressions are largely used in calculating the returns to education at the micro-level. Their aim is to identify educational externalities by isolating the impact of the average education level of a region on the wage of the individual.

3.6 Non-Economic Effects of Education

There is no clear distinction between economic and non economic objectives: In a narrow sense, economics can be seen as the analysis of choice in allocating resources to (material) needs. From this perspective non-economic effects of education are similar to external effects or social benefits which are not internalised by markets, and constitute public goods. If economics is however about the allocation of resources in general, i.e. education expenditure, teachers, etc., and human welfare, a whole range of further factors should be included in the analysis. Indeed, a great number of social, political or other factors, which are usually considered as non economic, might as well indirectly influence the performance of the economy. For example. studies have shown that education tends to be correlated with better health, lower crime, political and community participation and social cohesion.

Figure 2 depicts three circles of well-being. Well-being includes economic well-being but also extends to the enjoyment of civil liberties, relative freedom from crime, enjoyment of a clean environment and individual states of mental and physical health. Growth in economic output enlarges the range of human choice (e.g. work, leisure or political and cultural activities) rather than serving as a goal in itself. The realisation of human capabilities is vital for a broader notion and measure of human and social development. Human well-being is more than the sum of individual levels of well-being since it relates to individual and societal preferences regarding equality of opportunities, civil liberties, distribution of resources and opportunities for further learning.

Economic well-being – flowing from economic output – is an important component of well-being. However, gross domestic product (GDP) has significant limitations as a measure of economic output. GDP captures current production of those consumption and investment goods and services accounted for in the National Accounts but excludes non-market household activity (such as parenting) and activities such as the conservation of natural resources that contribute to future well-being through net additions to the capital stock of society. Aggregate measures of output and income, such as GDP, also fail to reflect social preferences concerning equity goals.

GDP also includes activities, which do not contribute to well-being. So-called 'social regrettables' arise from outcomes such as pollution, crime and divorce. Social regrettables also comprise outlays and expenditures, which do not directly contribute to well-being but are nevertheless deemed to be necessary, as for example national security.

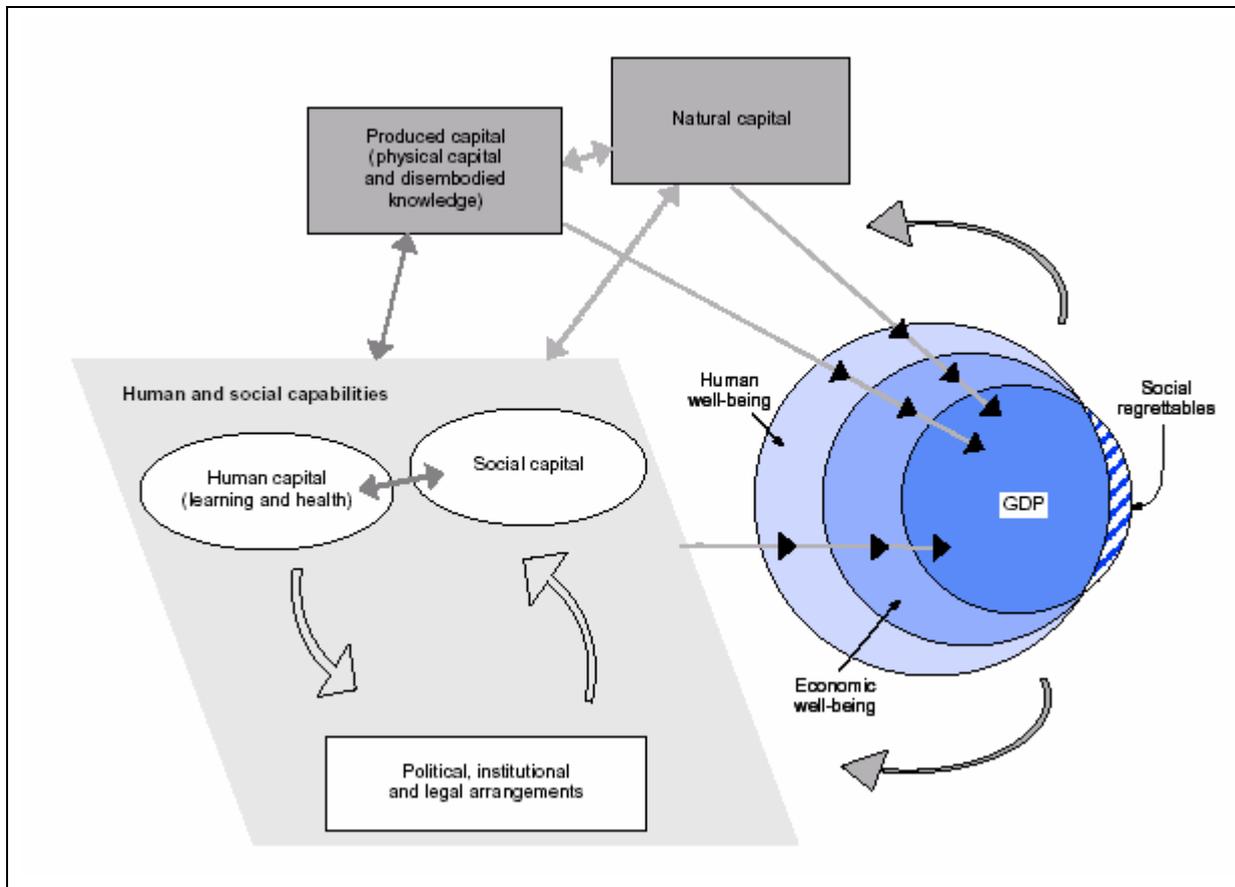
Figure 2 shows on the input side natural and physical capital as well as human and social capabilities. Human capital stands for the knowledge, skills and health embodied in individuals⁵. The complementary social capital refers to networks as well as shared norms, values and understandings that facilitate co-operation within or among groups. Education and learning can support habits, skills and values conducive to social co-operation and participation. Good quality institutions, a highly-skilled labour force and the prevalence of norms and networks facilitating social co-operation underpin higher levels of investment in physical capital and can potentially enhance strategies to renew the natural environment. Another important input to well-being and economic performance is health, which in turn is linked to age, lifestyle, social status, learning and the extent of social ties and inter-personal support. Indeed, some economists view health as being part of human capital.

Furthermore, welfare benefits that are not captured in the models and data of economists may include the immediate consumption benefits and long-term effect on life satisfaction (Temple, 2001). For instance, Blanchflower and Oswald (2000) estimated happiness equations, i.e. regressions that relate survey measures of well-being to individual characteristics. The authors find that educational achievements are associated with greater happiness, other things being equal. If individual's education has positive effects on the well-being of others, self-interested individuals may tend to under-invest in education from a social point of view. Some authors

⁵ OECD (2001) defines human capital as the knowledge, skills and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being.

argue that the social (non economic) benefits are large, possibly larger than direct labour market and macro-economic effects (Wolfe and Haveman, 2001).

Figure 2: Inputs to Human Well-being and their Inter-relationship



Source: OECD (2001)

Box 4: Social Cohesion and Social Capital

Closely allied to the concept of social capital is the notion of social cohesion. Defining social cohesion as *“the shared values and commitment to a community”* Jenson (1998) has identified five important dimensions: belonging, inclusion, participation, recognition, and legitimacy. More cohesive societies are more effective in realising collective goals because they are better at protecting and including individuals and groups at risk of exclusion. Ritzen (2001) states: *“The objective of social cohesion implies a reconciliation of a system of organisation based on market forces, freedom of opportunity and enterprise, with a commitment to the values of solidarity and mutual support which ensures open access to benefit and protection for all members of society.”* These understandings of social cohesion describe outcomes or states of social harmony, which are the result of various factors, including human and social capital. Hence, social cohesion is a broader concept than that of social capital.

3.7 Access and Equity

Blaug (1970) discusses in greater length some of the non economic-objectives of (primary) education. Among the objectives frequently cited are equal educational opportunity and social cohesion. Blaug comments on three different interpretations of educational opportunity:

- (a) equal amounts of education,

- (b) education sufficient to bring everyone to a given standard,
- (c) education sufficient to permit everyone to reach their endowed potential.

The first interpretation has never been put into practice for all levels of education. The second would justify compulsory attendance, but is of no help in making decisions above the minimum prescribed level of education (primary and first level secondary school). Higher education, of a certain standard, requires individual capacities which are not distributed equally among the young population. Typically, only a fraction of the population concerned is enrolled in post compulsory education (upper-secondary and tertiary education). The implications of the third meaning are quite far-reaching. If the central goal of education were to allow all individuals to develop to their full potential, its realisation would not remove differences between individuals in educational achievement and the associated benefits. Nor would it necessarily mean access for all to the same educational experiences. However, it would imply access to skill development that would enable each individual to develop his or her full potential.

In practice, it will often be unclear whether differences in educational outcomes reflect variation in “full potential” or differentially effective provisions. Considerations of equity in education therefore address outcomes as well as access (Blöndal et al., 2002). The question is not whether outcomes vary but whether they do to an extent that is unreasonable and whether the distribution of outcomes is equivalent in groups between which it is not reasonable to expect differences. In post-compulsory education, the equity issue arises in a quite different form because of the extent of individual variation in participation. Two equity issues should be addressed, i.e.

- a) the extent to which the expansion of post-compulsory education has enhanced equality of opportunity in access; and
- b) the distribution of costs and benefits of public spending on post-compulsory education.

Over the past 30 years participation rates in post-compulsory education have increased rapidly. Thus, on average in OECD countries, nearly three-quarters of the younger cohort aged 25-34 have completed upper-secondary education, and one-quarter have completed tertiary education. Conversely, among those currently aged 55-64, less than half have completed the upper-secondary phase of education, and only one in seven has completed tertiary education. Much of the progress is attributable to women catching up with men – the attainment levels of younger men and women aged 25-34 are now very similar. For those aged 55-64, only 6% of women (compared to 12% of their male counterparts) have university degrees and 38% have upper-secondary qualifications (compared to 50% of the men); Evidence from a number of countries suggests that the minority of young people who fail to complete upper-secondary education tend to come from less affluent backgrounds. The participation of young people in tertiary education is highly correlated with the educational attainment of their parents. In many countries, those whose parents have completed some tertiary education are about twice as likely to participate in tertiary education as those whose parents lack upper secondary education qualifications.

There is a large agreement that family, social and home backgrounds are important in explaining educational achievements. Many studies point to the importance of factors such as the support, aspirations and work habits which parents provide to their children. Bourdieu uses the term “cultural capital” to describe the habits or cultural practices based on knowledge and demeanours learned through exposure to role models in the family and other environments. Cultural capital – which is one dimension of social capital⁶ – refers to the resources residing in families which allow individuals to attain a particular social status. It also represents the collection of family-based resources such as parental education levels, social class, and family habits, norms and practices which influence academic success. The higher the expectations of parents (particularly those of the mother), the lower is the probability of dropout.

⁶ Social capital refers to the resources gained through social ties, memberships of networks and sharing of norms.

Bowles and Gintis (2001), reviewing the evidence of the literature published since the publication of their book "Schooling in Capitalist America in 1976", confirm their thesis that "parental economic status is passed on to children in part by means of unequal educational opportunity, but that the economic advantages of the offspring of higher social status families goes considerably beyond the superior education they receive". In other words, "parental income and wealth are strong predictors of the likely economic status of the next generation (Bowles and Gintis, 2002)

4 Provision, Production and Finance of Higher Education

Governments devote an increasing share of GDP to public education. According to the estimate of Tanzi and Schuknecht (2000) public expenditure in education as a percentage of Gross Domestic Product (GDP) rose in the developed world from 0.6% around 1870 to 6.1% in the 1990s. Higher education absorbed a constant share of 1.1% between 1970-72 and 1993. The growth of expenditure reflects growing school enrolment including at higher levels of education, and reflects government decision to finance an increasing share of spending at all levels.

Today, in most developed countries secondary education is free, and higher education institutions are predominantly funded and managed by the government. Students receive free or nearly free education that in theory is available to all according to their academic merit. With universal secondary education and growing enrolment in largely publicly financed universities, education tends to absorb an ever greater share of public resources. Tanzi and Schuknecht note that, despite declining birth rates, there will be pressure for reform in the educational sector to improve its quality and cost effectiveness.

Higher education institutions are facing a changing environment and increasing pressures in a number of areas, including labour market, cost and finance, technology, globalisation, enrolment, etc. Recent developments include:

- increased competition among institutions, including appearance of for-profit organisations in lucrative areas of higher education
- use of market or quasi-market mechanisms (student as purchaser of services, supply by university)
- impact of information and communication technologies (e-learning, distant learning, etc.)
- greater trans-national mobility and education
- demand for greater transparency and accountability for efficiency and cost-effectiveness as well as quality assurance.

Those changes partly result in income diversification and cost-recovery strategies, which come with specific risks and consequences.

Whereas, due to social benefits as well as efficiency and equity considerations, some state financing is largely admitted by the literature, one of the main questions regarding the provision of education is whether and to what extent educational services in general and higher education (universities) in particular cannot be left to the market. Thereby a distinction needs to be made between production and financing. While there is wide consensus that higher education should in part be financed by the State (and be it only in order to guarantee equal access), this does not necessarily imply that the production cannot take place within private institutions operating in a market environment.

4.1 Production vs. Financing

Musgrave (1969) distinguishes clearly between 'public provision' and 'public production'. Public provision refers to situation where certain goods are furnished to the consumer free of

direct charge and through the budgetary process. Public provision may take the form of public purchases from private firms, or public production. Public sector provision has two components, namely production and finance.

The arguments in favour of state provision of education rely on the belief that the market for educational services fails when left to its own device. Blaug (1970) however argues that:

- Education is not a pure public good, but a quasi-public good, because of indirect benefits for society, which do not vastly exceed the direct personal benefit.
- Arguments about parental ignorance in education, i.e. the view that the inability of uneducated parents to appreciate the advantages of schooling and education would allow for State intervention, quickly boil down to philosophical differences about the role of the State (in relation to the family);

Positive externalities and consumer ignorance may therefore serve as a ground for State intervention in education, yet both arguments would justify State involvement in education but not necessarily State ownership and State finance.

For Stiglitz (2000), under a system of privately financed education, children might receive an insufficient education as some parents may not be as altruistic. There is a wide belief that children's access to primary and secondary education should not depend on their parent's financial liabilities. In consequence, the state should provide the financing for the primary and secondary levels of education (provision could still be private). Concerning higher education a fundamental difference is that students are able to judge whether the returns to further education warrant further investment. Then, government's role would be to ensure access, so that students have the financial resources to go to universities, i.e. presently the government greatly subsidises higher education, untargeted, charging in public universities typically tuition fees which are a fraction of the total cost, gives grants and/or provides loans to student who meet eligibility criteria based on financial capacity or needs, and allow tax credits or deductions (income tax).

4.2 Criteria for the Provision and Financing of Higher Education

The four main criteria for the provision and financing of higher education are the maximisation of positive externalities, an access policy which allows for a certain degree of equity, the private finance of private returns, as well as considerations of market responsiveness.

For Pusser (2003), the most salient question is how higher education's contributions to the public good can be ensured if non-profit public production gives way to a for-profit market: *"The fundamental mission of for-profit market production is to create private benefits for the producers and their customers. The historical mission of non-profit production has been to create both public and private benefits. Non-profit institutions have been centres of public social and political efforts to achieve integration and the equalization of access to education. It is not at all clear that those goals can be realized through for-profit production [...]. The adoption of market initiatives may also produce expectations of greater choice, competition, and an increase in the public benefits from higher education."*

Empirical data indicates that the beneficiaries of government spending on post-compulsory education tend to come from relatively well-off families and have high income prospects (Blöndal et al., 2002). One reason why the expansion of post-compulsory and higher education has not significantly improved equality of opportunity could be that compulsory education has not succeeded in sufficiently reducing the link between basic educational attainment and children's parental background. This would point to the importance of intervention at an early stage when children's cognitive and non-cognitive abilities are being developed so as to equalise their chances of taking advantage of post-compulsory education. The regressivity of the post-compulsory financing system could be reduced by increasing tuition fees. However, this would reduce the financial gains from investing in tertiary education and might have adverse effects on the access of people from disadvantaged backgrounds to

higher education. An accompanying expansion of students' access to loans to finance their education could offset such effects, and the experience of countries that have combined an increase in tuition fees and an increase in student loan facilities suggest that there are no significant adverse effects on participation.

With regard to equity considerations it is often argued that education must not be distributed according to purchasing power, but with reference to differences in capacities to learn ('meritocracy'). However, capacities to learn depend to a large extent on home background and the educational background of the parents, which reintroduces the influence of income. Pure meritocracy therefore requires positive discrimination in favour of children with less than average abilities. Blaug (1970) for example argues that 'free' State education is not the only or even most effective way of equalizing educational opportunities. Possibly, the most effective way of dealing with inherent disadvantages of children from low-income families is by direct financial aid in the form of grants, bursaries, scholarships, loans and educational vouchers.

4.3 Modes of Providing and Financing Higher Education

The main distinction that can be made with regard to financing higher education is the one between public and private funding. Public funding can take place either by financing or subsidizing institutions of higher education or in form of individual subsidies paid directly to students. Private funding can come from students and their families, from philanthropists (endowments or current contributions), or take the form of commercialisation of certain aspects of the institutions or the curricula. Financing higher education in a larger sense does not only cover the maintenance of institutions and the dispensation of education, but also the living expenses of students. In addition, for a cost-benefit analysis, one would also have to take into account the opportunity costs due to foregone earnings by the students engaging in higher education.

While free, merit based State provision of higher education has been the rule over the last decades in a lot of industrialized countries, budget constraints coupled with increasing participation in education have lately fuelled debates about the shifting of costs from government spending to private finance, especially by students and their families. With regard to the issue of public vs. private finance and/or production, Musgrave (1969) notes that:

- Private finance by prices and user charges is easily applicable when the good is excludable and rival, whoever, public or private, is responsible for the production;
- Public finance by taxation, grants and subsidies is likely to be significant when a good is non-rival and/or is the source of significant externalities (and in case of redistributive policy);
- Private production under competitive markets generally assures X-efficiency and allocative efficiency generated as a result of profit maximisation; private production of a (natural) monopoly is usually subject to regulation;
- Public production in case of rival and excludable goods is more difficult to justify, unless the project is large and indivisible (sunk costs) or private production would confer political and economic power to some individuals. Moreover, public production can be justified when it is aimed at exploiting economies of scale so that additional activities can be added with little or no marginal cost. Another, non economic argument concerns the 'quality' aspects, which are difficult to measure, of some activities that would be lost with private production.

Table 2 offers a synthetic view on types of goods and forms of provision. Categories 1 and 8 are the extremes. Of course each type of good can be matched with one or more or all forms of provision, and some goods may have more than one characteristic. Most researchers would probably consider education as a quasi-public good (type C), provided that the externalities are significant, or possibly associate it to type F. Therefore, mixed finance would be advisable, coupled with private or public provision. Education services are non-rival up to the limits of the places available in the universities, and they present further characteristics of a public good

because of the existence of external effects which benefits society as a whole. Their consumption is in principle excludable.

Table 2: Provision, Financing and Type of Goods

Type of goods	Forms of provision
	Public provision
A Public (non-rival, non excludable)	1 Public sector production without user charges
B Club/toll (non-rival to a congestion limit, excludable)	2 Public sector production with user charges
C Quasi-Public (rival, excludable; significant externalities)	3 Public production with user charges and vouchers or grants to consumers
D Common pool (rival, exclusion possible or difficult, if absent leading to congestion/exhaustion/extinction)	4 Public contracts to private producers to supply goods and services to the government for user charge or 'free' disposal
E Private (rival, excludable)	5 Public contracts to private producers to supply goods and services to the government for user charge or 'free' disposal and grants to producers or consumers with vouchers or grants to cover charges
F Merit wants (lack of appropriate information and/or complex assessment for the typical consumer)	6 Public/private mixed production with private finance and/or government grants finance
	7 Voluntary, non profit production with private finance and/or government grants finance
	8 Private sector production with private finance
	Private provision

Sources: Paul, S., *Privatisation and the Public Sector, Finance and Development*, vol. 22, 4, 1985, also reproduced in: Cullis and Jones (1998, p. 100).

There is a variety of ways to shift costs of higher education away from the State and the public sector or to increase the efficiency of its production by introducing market mechanisms:

- **Cost-recovery strategy:** Tuition fees allow to charge students for their education. Students are willing to pay for their studies provided that their anticipated benefit from additional education exceeds the amount of the total cost. The risk of this strategy is to reduce access for low income and less advantaged students. Students from low-income background may respond to higher tuition by dropping out or by increasing private sources of income (wages, savings), which can only be a supplement and bears the risk of negatively affecting the students' performance. Well-off students, however, may increase resources from family and friends.
- **Grant and loan schemes:** Today governments typically finance higher education by funding both institutions and students (grants, loans), but this model is not necessarily sustainable because of the fiscal pressure nor fair as it is regressive. It is frequently argued that public funding may be not only insufficient to develop higher education in face of increasing enrolment but also inefficient. Private financing and/or privatisation might be a solution to solve this problem. Enhanced grant and loan schemes targeted at low income students could thereby be used to address problems of access. Increased government funding of grants may however be in contradiction with a cost-recovery strategy in the face of budget constraints.

Capital market: Loans from private markets are generally not available to students because of imperfect capital markets, risk aversion or for cultural reasons. There may be indeed good reasons why individuals do not invest as much in education as they would like under a market regime (private or public production with private finance), even to the point where private return equals the cost of capital. They may lack access to funds to finance their education. Private lenders are not for the most part willing to lend to finance education, for several reasons:

Because of asymmetric information it is quite hard for the lenders to know the capabilities of the student, his/her ambition and the intended career path, including the uncertainty the student may face (future earnings, unemployment, etc.). Asymmetric information leads to the well known problem of adverse selection. The premium demanded by the lenders to compensate the risks tends to deter some students with high potential and to attract students with lower potential. The average student will be therefore of lower quality, and the premium would have to be adjusted upwards to reflect the overall deterioration of the students seeking financial help, deterring even more students from taking out loans. Furthermore there may be difficulties in collecting the payments: lenders may have difficulties to locate the students, which tend to be more mobile than less educated persons. Additional difficulties arise from uncertainty with regard to the value of the investment and the capacity to repay, the illiquid nature of investment in human capital which cannot be sold and from the absence of collaterals, in particular in case of poorer students.

Nevertheless, some loan models have been proposed or have been operating on a purely private basis in the United States (Lleras 2004, chap. 4 and 9). The design of those income-contingent loans (ICL) may vary (1) according to the income on which the estimate of contingent payments and the percentage paid is based, (2) the period over which the repayment would be based and the forgiveness conditions, if any (3) the interest rate of the loan, (4) the collection method and (5) the buyout conditions. In order to take into account the risks of default by low income life long earners, third parties or the high income students could be asked to subsidise them.

Lleras (2004) proposes the introduction of human capital contracts (HCC), "*in which students commit part of their future income for a predetermined period of time in exchange for capital for financing (higher) education*". This proposal is not new as in its simplest form, Friedman (1955) already suggested to create a financial instrument that would allow investors to buy part of a student's future income, referring to vocational and professional schooling because of the relatively small external effects compared to the private benefits that the individual receives and compared to general education for citizenship (primary and secondary schooling). Recent changes in the financial system in the 1980s and 1990s create new opportunities for HCC, i.e. the creation of mutual funds and the securitisation of assets. The possibility of grouping assets together and selling them in parts changes fundamentally the bilateral relationship between investor and individual in a multilateral relationship. Investors would be clustered into mutual funds and those funds would be invested in a very important number of students assembled through securitisation, spreading the risks among the investors and the students.

Some of the difficulties related to financing higher education through the capital market could also be overcome by a government policy providing guarantees for study loans. This would however affect the government budget.

- **Income diversification:** Recognizing that the students are not the only beneficiaries of institutions of higher education, but that the industry equally has an interest in certain aspects of education or in having a privileged access to the students, parts of the institutions or the curriculum can be subjected to commercial contracts. Another way to tap into new financial sources is to encourage alumni to donate to their *alma mater*. Policy measures to encourage such donations may include tax exemptions.
- **Voucher systems:** A publicly financed and operated system can be inefficient because the students cannot effectively influence operational decisions, except for adopting a strategy of exit (not attending). Allowing for competition by admitting private institutions to the market of higher education and thereby increasing the choices of the students could be a policy option. However, private universities are only a part of the solution. Expensive institutions end up being attended by a small elite and cheap universities end up with students that were not admitted to the better public institutions. Another policy option would be to increase the financing of the students rather than institutions: Vouchers may

increase competition among all accredited public and private institutions (Levin, 1992). For instance, Mixon and McKenzie (1999) study the management behaviour in private and public universities. They find that the non-transferable property rights (regarding public owned firms) reduce the incentives to police and detect managerial (in)efficiencies in public universities and that managers therefore face incentives to create internal decision-making processes which increase job security and tenure, along with other non-pecuniary sources of income and utility. The average tenure, for example, of public university presidents is about five years longer than their private counterparts.

In a survey contribution on the so-called emerging market for higher education, Pusser (2003) is however rather sceptical about the existence of such a market, arguing that the three fundamental assumptions that shape the prediction of an emerging competitive marketplace for higher education are not necessarily valid:

- a) higher education institutions operate in an market environment.
- b) lack of institutional efficiency and productivity generates demand for market solutions and that market-like behaviour will increase efficiency and productivity.
- c) market approaches will produce at least the same quantity and distribution of public and private goods as generated by the present system.

4.4 Recent Developments

Over the last two decades there have been fundamental changes in the way universities are organised and financed. Increasing participation in higher education has lead to growing government spending, which conflict with budget constraints. Thus there has been considerable pressure to limit government expenditure as well as to improve the cost-efficiency of higher education. In a number of countries reforms have been carried out, which are aimed at making the university system more efficient by reorganising the way universities operate and interact with government. At the same time there has been a tendency to shift costs from government to students and their families by raising tuition fees. The theoretical basis of this shift is provided by Human Capital Theory, which considers higher education primarily as a private investment.

4.4.1 Organisational reforms

At the core of the present reforms, which are often inspired by NPM principles, are increased competition among institutions and stronger market-orientation. The relationship between governments and institutions of higher education is being contractualized: universities are given more financial autonomy by means of global budgets, yet as a counterpart they have to commit themselves to fulfilling a certain number of objectives, while a number of quality indicators are used to compare their performance against other universities. The reforms are aimed at setting up a market of higher education on which the different institutions compete with each other. This is believed to reduce present inefficiencies in the sector.

There is some debate on whether the universities really have more autonomy in a market system, as it is often argued by advocates of the reforms. A number of authors point to the fact that aspects of decentralisation are accompanied by tendencies toward centralisation, especially within systems which prior to the reforms were relatively decentralised. Thus Musselin and Mignot-Gérard (2003) argue that in France, which used to have a highly centralised system of higher education, the reforms aimed at decentralising the system did not lead to a shift of real decision making power away from the central administration: There is not only extensive regulation reducing the leeway of the universities in conducting their operations, but the central administration continues to intervene in the system by setting specific objectives, the fulfilment of which entitles the universities to extra government financing. Charlier and Mons (2003) note that in Belgium, where the universities used to have a lot of autonomy, the discretionary power of university presidents has decreased in the wake

of the standardisation of higher education. The presidents' task increasingly consists in carrying out the orders of the central agency. Deer (2003) in turn notes that the separation of strategic decision making and operational management has allowed the British government to make budget cuts more easily, delegating the operational aspects to the universities. Deer also points to the increasing centralisation of decision making processes within the universities and their bureaucratisation due to these changes. Altbach (2003) makes out a certain tendency of uniformization among universities which see themselves more and more as actors on a global market: in order to be recognized as world class universities, they are trying to imitate prestigious U.S. universities like Harvard or Berkley. The question whether the market-oriented system leads to increased autonomy of the universities or whether it favours the uniformization of higher education is crucial with regard to the tendency towards increased "client orientation".

Increased autonomy and market orientation of universities combined with budget cuts can lead to growing commercialisation of higher education as the universities seek to tap new sources of finance. Commercialisation may not only touch the way tuition is financed (e.g. in the case of study loans from private institutions), but can have an impact on different aspects of university life: Thus Shaker and Doherty-Delorme (1999) cite a number of contracts securing exclusive rights for particular brands to be present on campuses in Canada and the U.S. In addition they mention a number of university departments and programmes named after large companies. Commercial ties can however go further than catering or advertising: Companies directly influence the content of university courses through sponsoring (Bok, 2003) or through special contracts which guarantee them direct influence on the curriculum (Shaker and Doherty-Delorme, 1999). Different authors point to the problem that commercialisation of universities leads to conflicts of interests between the rules and standards of academia and those of private enterprises (Shaker and Doherty-Delorme, 1999; Anderson, 2001; Bok, 2003).

4.4.2 Larger "cost-sharing"

Johnstone (2003) notes that *"the burden of higher educational costs worldwide is shifted from governments or taxpayers to students and families"*. The increasing participation of students and their families in financing higher education is also referred to as *"cost sharing"*.

Measures to increase "client orientation" are supported by the argument that publicly financed and operated systems may be inefficient because the students cannot effectively influence the decisions, except by withdrawing from the system (exit strategy). A solution to this problem consists in introducing a market mechanism to regulate the relationship between universities and their students. This means to increase tuition fees as a contribution of the financing of the education and as an incentive for the students to behave efficiently. Higher tuition is based on the assumption that it would induce students and their families, and thus the consumers of higher education, to make more conscious choices, which is thought to increase the efficiency of the education system. Furthermore, diminishing State subsidies for higher education is sometimes seen as a means of reducing the number of long-term students who are remaining in the system only to profit from the benefits related to the status of a student (Johnstone, 2003).

Yet, the students need to have the necessary financial power in order to constitute a demand. An option would be to shift financial resources to students by means e.g. of a voucher system, of increases in grants and/or loans. Public financing would then operate through the students instead of subsidizing institutions. There are at least two additional reasons which are put forward in favour of increased private funding of higher education. First, according to Human Capital Theory, private benefits of education prevail. Accordingly, government funding should be reduced to cover only the positive externalities of education. Second, due to the over-representation of students from high income families within the higher education system, free provision of higher education is seen as counter-productive from the point of view of equity. Need-based subsidizing of low-income students would be a better solution to improve their access to education, while higher-income students would be asked to finance their studies themselves.

4.4.3 The Socio-Economic Impact of New Modes of Financing Higher Education

Increases in tuition fees are often accompanied by loan schemes, which allow the students to borrow the money they need to finance their education. There are a number of studies from countries where “cost sharing” has already been in place for a while (e.g. United States, United Kingdom, New Zealand and Australia). One concern of these studies is to measure the financial impact on students: Baum and O’Malley (2003) for example report an increase of the median loan taken out by undergraduates in the U.S., from 9 500 USD in 1997 to 16 500 USD in 2002 (plus 74% in 5 years). In New-Zealand the average annual loan rose from 3 628 NZD in 1992 to 6 135 NZD in 2002, while the cumulative debt rose from an average of 5 525 NZD in 1993/94 to 12 643 NZD in 2001/02 and 13 680 NZD in 2002/03 (NZ 2003). Callender (2003) in turn notes that since the British government has replaced grants by study loans, more and more students are indebted and that the average debt level is increasing. Baum and O’Malley (2003) point to the increasing credit card debts among students in the United States, the study loan debt making up for only about half of the total debt burden of students.

Some studies challenge the assumption that students are well informed economic actors, able to judge the costs and future returns of education. King and Frishberg (2001) for example find that 78% of the students in the U.S. underestimate the cost of their debt, especially those with a large debt burden. At the same time, future salaries were overestimated by more than 30% on average. According to another study (Baum and O’Malley, 2003), 54% of the former students participating in the study would borrow less for their studies if they could decide again. 34% found that the debt burden causes them more hardship than they had expected, whereas 59% said student loans were worth incurring because of the career opportunities provided.

Other authors investigate the socio-economic impact of a system with high tuition fees combined with a loan system. According to Johnstone (2003), empirical research on the effect of both tuition and need-based financial assistance on student enrolment behaviour in the US support the conventional wisdom that net price - that is, the combined effect of tuition fees discounted by financial aid - has little effect on middle and upper middle income students. However, it can have a measurable discouraging impact on low-income youth, an impact that is only partly offset by increasing need-based aid. An overview of different studies shows that discriminatory effects have been identified mainly in systems where repayment is independent of actual income. In Australia, for example, where repayment is contingent on income, such effects are rare (Chapman and Ryan, 2003a, 2003b). In New-Zealand, average repayment time is much longer for women and some ethnic groups (NZ, 2003; Pearse, 2003). Pearse cites data which suggests that the average projected repayment time is about twice as long for women as for men (29 years for women compared to 15 years for men). It takes Maori students 12% longer on average than European type students to repay their loans, whereas average repayment time for students from other ethnic groups is up to 43% longer. Baum and O’Malley (2003) note in their report of the National Student Loan Survey, conducted by Nellie Mae, the largest private provider of study loans in the U.S., that the 2002 data shows for the first time a difference in perception of debt burden between low-income student borrowers and others. Students from low-income backgrounds reported feeling more burdened than the average student borrower. King and Frishberg (2001) show that lower-income students are more likely to have to borrow to pay for college and that they also take larger loans than the average student.

It is also argued that differences in the attitude to debt have an impact on students' decision whether to take out a loan. Reporting on research about the attitude to debt among school leavers and further education students in the UK, Callender 2003 points out that students with debt tolerant attitudes were more likely to participate in higher education than students more reluctant to incur debts. She also identifies the social groups which were the least debt tolerant: Muslims and Sikhs; black and minority ethnic groups; persons with family responsibilities, especially lone parents; older respondents; and those from lower social classes. It is interesting to note that the more debt averse population comprises the lower social classes and other groups with under-average access to higher education. The findings

thus seem to indicate that higher tuition combined with a loan system can have a negative impact on equity. Data from the U.S. indicates that debt-averse lower-class students frequently opt for relatively cheap low-status *Community Colleges*. At the same time there seems to be an increasing tendency among students from well-off families to avoid low-status institutions and to seek access to prestigious universities instead (McPherson and Shapiro 2000). The authors of the 1998 Nellie Mae report also identify “loan fear” among certain ethnic groups and lower social classes as a reason not to participate in higher education (Baum and Saunders, 1998). Thereby, it has to be kept in mind that students from a lower-class background usually have either to borrow higher amounts of money or to attend lower-status colleges, which in itself accounts for a certain degree of social stratification within the higher education system, regardless of any cultural bias against debts.

There are concerns in Australia and New Zealand that higher university fees have an effect on emigration. One study indicates that a large number of indebted medical professionals choose to emigrate to countries where they can earn higher wages, in order to pay back their debt (NZUSA and NZNO, 2003). Pearse (2003) notes that former students choosing to emigrate are likely to have a debt higher than average. More research is needed to investigate the effects of student debt and globalisation on migration and the labour market. Labour market effects should also be analysed with regard to their impact on government’s ability to hire qualified professionals. The American Bar Association for example estimated that study loan debts keep up to 66% of law students from choosing a public career, because the salaries are too low to pay back the loan within reasonable time. In fact, overall tuition for legal studies in the U.S. has more than doubled between 1992 and 2002 (ABA, 2003).

5 Is Research a Public Good?

The non-excludability, non-rivalness and cumulateness of knowledge is usually invoked in order to justify public intervention and spending on research. In analogy of the analysis of private and public goods, there are two questions related to the characteristics of research activities, namely: is research a public good? and if so, what are the corrective actions the government should take if the market, left on its own, cannot provide the optimal quantity of research activities?

Research or the production of knowledge as an economic good is non-excludable, in the sense “that it is difficult to make it exclusive or to control it privately (Foray 2004). Even if kept secret, information and knowledge escape from entities producing them and can be used freely by rivals, which benefit from positive externalities without financial compensation. In addition, knowledge, once produced, economic agents are not rival users, as there is no need to produce for an additional user a copy of the knowledge. Knowledge is also cumulative as it is likely to spur new ideas and new goods. However, the public characteristics and cumulateness of knowledge are not absolute, as the access to and the use of knowledge is limited when the costs of accessing, reproducing and transmitting it are high.

Knowledge, and thus research results, may in fact have some of the characteristics of a private good: in the case of trade secrets, for example, or when a company is the only entity capable of appropriating the short term benefits of newly produced knowledge. Thus, Cohen et al. (2000) find that the key appropriability mechanisms in most industries are secrecy, lead time and complementary capabilities, as opposed to institutional appropriation mechanisms such as patenting. Studying the appropriation mechanisms, Callon (1994) notes that knowledge can to a certain extent be appropriated by choosing a support which does not lend itself readily to dissemination (e.g. by not encoding it in text) and argues that, based on the fact that scientific knowledge usually is encoded in a language specific to the field of study, scientific knowledge is only to be considered a non-rival good within a limited community of people who have made the necessary complementary investment to understand it in its context.

Given that research and knowledge have public good characteristics, potential shortcomings in the production and dissemination of knowledge provide a theoretical basis for corrective action by the State.

Nelson (1959) notes that, since the marginal cost of use of knowledge is nil, maximum efficiency in its use implies that there should be no restrictions to its access and that the price of use should be equal to zero. However, producing knowledge and doing research come with a cost, and can be even very costly. In order to achieve maximum efficiency in the allocation of resources to create new knowledge, knowledge should be priced highly enough to cover all the costs of the necessary resources. This dilemma is aggravated by the cumulativeness of knowledge: the more knowledge is likely to spawn the production of new knowledge (and the higher therefore its potential value for society), the more wasteful is the effect of rationing it by price (Foray, 2004).

The positive externalities represent insofar a problem for society as potential producers of knowledge might be discouraged to invest in research, if they do not expect to be able to appropriate a sufficient share of the benefits allowing them to gain a comparative advantage. The consequence would be some under-production of knowledge. In addition, since R&D spillovers are a key source of productivity growth, secrecy can be seen as a source of economic inefficiency, because it reduces its potential of spurring the production of knowledge (Griliches, 1992). Cooperation as a solution to this dilemma is not likely to be chosen by market agents because each of them would like to reap a competitive advantage and because transaction costs are usually very high.

Nelson (1959) argues that in face of positive externalities it is crucial for a company investing in R&D to be able to capture a large portion of the externalities. This is especially the case with large, many-product companies. R&D externalities are therefore a source of economies of scale, putting smaller companies at a disadvantage, which can have negative effects on competition. Later Nelson (1993) notes however that size is not in all industries a prerequisite for a company to be a capable innovator. Other aspects which enhance a company's commercial ability to engage in basic research are strong vertical linkages with its suppliers and a constant supply of human capital through a university system responsive to the company's needs. In some sectors, university or public laboratory research also plays an important role in companies being able to innovate.

6 Government Intervention in Research

The problem of economic inefficiency due to R&D externalities may be addressed by the State through subsidies, direct government production or the definition of intellectual property rights:

- In the case of State subsidies, society bears (part of) the cost of knowledge production. In return, anything that is produced is the property of society as a whole and cannot be privately controlled.
- Direct government production, in turn, is suited to large scale projects which ask for a high level of concentration of resources and centralization of decision making. In this case, knowledge access might not be granted to a wider public (cf. military research).
- By the definition of intellectual property rights, it is intended to facilitate the creation of a market to stimulate private initiative. Access to new knowledge is open, yet its use is restricted by exclusive rights which enable the inventor to set a price for its use. Intellectual property rights generally comprise patents, copyright and registered designs (Foray, 2004).

All three approaches have their own shortcomings:

In the case of public subsidies or private sector patronage systems, mechanisms of allocating research grants do not lead to the optimal result, due to circuits of positive feedback (reputation increases the probability of receiving a new grant which increases reputation even

more) (David, 1994). Assessing the quality of research has in fact been a growing concern in the context of budget restraints and managerial attempts to improve research quality by channelling scarce public resources to the most performing institutions and researchers. Nowotny et al. (2003) have identified three major shortcomings of such output-related funding: distortions are produced by scholars who orient their publishing behavior according to the indicators, e.g. by publishing their research in ever smaller bits and thus artificially improving their records. Another problem lies in the disciplinary approach of peer-review, which works as a bias against interdisciplinary research, and a third criticism is that research management mechanisms encourage researchers to adopt an industry-style attitude, which favors the fast delivery of safe and predictable results over the pursuit of new, ground-breaking research, which is more time-consuming.

In public production systems government failures are likely to occur, which reflect the difficulty of administrators to assess the quality and the relevance of their research. Furthermore, public procurement may create distortions in industrial competitiveness. Furthermore, as David et al. (1999) note, publicly funded contract-specified R&D may substitute for some of the private investment which the firm would have performed otherwise in a competitive bid for a related government procurement contract.

In the case of the private property approach, intellectual property rights determine monopoly prices that create distortions in the market, leading to non-optimal dissemination of knowledge. Furthermore, so-called “*hold-up*” patents can be used to fend off competitors. Extensive patenting can thus become a substitute for investing in R&D (Bessen and Hunt, 2004a; 2004b). Furthermore, there is large evidence that patent protection does not advance innovation in a substantial way in most industries, pharmaceuticals being an exception (Cohen et al., 2000). Nelson (1959) also points to the fact that there is a large contradiction between the granting of private monopolies to further research and the concept of a free enterprise economy.

6.1 Financing Research: Public or Private Funding?

In OECD countries, the private business sector spend two thirds to three quarter of total expenditure in R&D, 65% in the EU, 71% in Japan and 73% in the United States (figures for 2002). From 1996 to 2002, the share of the private sector had remained stable for both Japan and the United States, while it had increased by 2 percentage points in the EU. The rest of R&D expenditure was mainly carried out in the government sector (EU: 13%; US: 8% and JP: 10% in 2002) or within the higher education system:, i.e. in 2002 EU: 21%; US and Japan 15% (Eurostat, 2003). While government budgets directed at research as a percentage of GDP had decreased in the EU throughout the nineties, there had been a slight increase since 2000. The US had seen a similar development at a somewhat higher level, whereas in Japan public R&D budgets had notably risen from a much lower level, thus approaching the level of the EU (Eurostat).

Government spending on research is not limited to the public sector. Governments also subsidize private research and development (R&D). Another form of government support of private R&D are tax relieves. There are also considerable differences among countries as to the objectives and modes of administering research funds (e.g. block grants vs. project related funding for university research). Generalization across disciplines is also impossible due to the fact that different fields of research face different socio-economic realities: in some fields (e.g. pharmaceuticals) there is large industry demand for academic research, in some other fields there is considerable demand from the government (e.g. environmental studies), while demand in certain fields (e.g. literature or philosophy) cannot readily be grasped in economic terms (Bok, 2003).

The economic justification for government support is linked to the presence of two important market failures associated with R&D activities: First, imperfect appropriability conditions imply that the private rate of return to R&D is lower than its social return. Therefore, private sector

investment in R&D tends to be below the socially optimal level. Second, risk associated with research requires a high risk premium (Link and Long, 1981). Consequently, smaller companies or new entrants in a particular field have difficulties to find appropriate private funding (Guellec and van Pottelsberghe, 1997). However, it is crucial from the economic point of view to know whether public spending on research is a substitute or a complement to private investment in R&D. There is evidence that public research activity induces industrial R&D spending in some industries (cf. Jaffe, 1989; Jaffe and Trajtenberg, 1996). In a review of 33 econometric studies addressing the question of complementarity or substitution David et al. (1999) note that one third of the cases report that public R&D funding behaves as a substitute for private R&D investment, complementarity thus appears to be somewhat more prevalent.

One approach to deciding whether research should be funded by the public or the private sector is the application of the “public good” criteria, based on the differentiation between “public financed universities and research institutes – dedicated to the creation of new knowledge as a public good – and industry, which [is] to produce marketable goods financed by private capital” (Krull 2004, p. 34). Already Nelson (1959) noted however, that the line between basic and applied research is hard to draw. Forty years later, Krull (2004) argues that while there had indeed been a dividing line between basic research and industrial innovation until the 1970s or the early 1980s, the borders between the two domains have nowadays lost importance: *“especially in biotechnology, the computer sciences, and materials research, innovation has turned into a simultaneous, interactive process. Private investment in publicly funded research laboratories, joint ventures between directors of research institutes and major companies, the outsourcing of long-term research activities by industrial R&D divisions, the establishment of joint professorships for entrepreneurship – these are just a few of the changes occurring at the public-private interface, which require not only new regulatory policies, but also new approaches to the production and distribution of new knowledge.”* (Krull 2004, p. 34)

Another instance of how the differences between basic research and industrial innovation are increasingly blurred is the growing *“commodification”* of knowledge produced as a result of university research: Etzkowitz and Stevens (1998) point to the importance of the Bayh-Dole Act of 1980 allowing US universities to patent the results of research. According Press and Washburn (2000) this change in legislation has had a huge impact and has boosted university patenting. Thus, results of at least in part publicly funded research do not necessarily remain in the public domain any more (see also Bok, 2003).

Recently, budget constraints have led to increasing commercialisation of research. According to Nowotny et al. (2003) it has taken two main forms: First, public funding being insufficient, researchers have increasingly resorted to alternative sources of funding. Second, universities and other public research institutions have become more aware of the value of “intellectual property” generated by their research. Thereby, university research is increasingly valued in terms of immediate market return. The economic exploitation of “intellectual property” challenges the idea of science as a public good: If “intellectual property” is considered to be a valuable asset, it cannot be given away “freely” by open publication in peer-reviewed journals. Thus, the commercial orientation of research threatens the institutions of Open Science (Nowotny et al., 2003).

Anderson (2001) argues that increasing entrepreneurial *“academic capitalism”* could lead to a loss of research integrity, because conflicts of interest arise between the rules and standards of academia and those of private enterprises. Similarly, Bok (2003) warns that the commercialisation of research, teaching and other university activities might draw the institution away from its core mission.

The increasing market orientation in university research poses yet another problem: strong linkages between academic research and industrial innovation have an influence on the balance between basic and applied research: *“basic research is often associated with long-term inquiry, whereas applied research is more likely to address immediate needs and problems”* (Etzkowitz and Stevens, 1998). In this view, basic research is the long-range investment that ensures continuity in the expansion of human knowledge; corporate interest in

problems of an applied nature shortens the perspective and relevance of research solutions. The very reason that universities' research has value to the corporate sector is that it takes a broader view of research problems than is typical in corporate research laboratories."

6.2 Private Property Rights or Open Systems of Knowledge Production and Dissemination

There are two major justifications for the attribution of Intellectual Property Rights (IPR) to those who are producing the knowledge: encouraging research by improving the appropriability of the benefits of innovation and facilitating the circulation of knowledge by encouraging its disclosure and providing a standardized way of publishing it. There are however some drawbacks: IPR constitutes a market inefficiency insofar as the price of the good will be above the marginal cost of its production (Dixon and Greenhalgh, 2002), in other words as the value to society of an additional unit of knowledge is greater than its marginal production cost, expanding that knowledge would increase the welfare of society. Another negative aspect are the transaction costs which are generated by patenting: registration procedures, costs of enforcement. These may however be outweighed by the role which IPR play in promoting the codification and dissemination of knowledge. While the overall social usefulness of the patent system has already been called into question half a century ago by Fritz Machlup and Edith T. Penrose (Machlup and Penrose, 1950; Penrose, 1951; Machlup, 1958), there is growing concern nowadays that the patent system has in fact become an unnecessary burden for society (Foray, 2004).

Collective organization of knowledge production is not confined to the public sector. There are also other forms of organisation which are neither private nor controlled by the public sector, as for example user groups or other collective actions. For such forms of public, but not government administered, ownership and production, the term of "*comedy of the commons*" was coined – as opposed to the tragedy of the commons with regard to traditional common property, such as community grazing land or common fishing grounds, which typically fall prey to overuse. Rose (1986) argues that a "*comedy of the commons*" arises where open access to a resource leads to scale returns – greater social value with greater use of the resource. Arrow (1971) points to the potential of "*collective action*" to compensate for market and State failures. Bowles and Gintis (2002) point out that community governance is not a substitute for effective government, but rather a complement. They stress the importance of an appropriate legal and governmental environment for their functioning. Institutionalizing open systems of knowledge production and dissemination (an example of which is "*Open Science*" as incorporated by Merton's "*Republic of Science*") is today seen as a promising alternative to maintaining a burdensome patent system (Foray, 2004).

7 Concluding remarks

The theory of market failure has largely been applied to higher education and the university. Markets are unsatisfactory when benefits are non rival and/or non excludable, property rights are not assigned, transactions are costly and information is limited. However, in some sense, no markets are perfect, and this would always justify some forms of government intervention. Implicitly, imperfect markets are compared to perfect state interventions and allocations, which are as fictional as is the competitive ideal. Government failures may well occur and be very large depending on the institutional organisation and the political system. Wolf (1987) points out many deficiencies of public sector activities: e.g. on the demand side the short time horizon of the elected politicians, the separation of the costs and benefits of decision - either on the micro-level favouring special interests or on the macro-level through the redistribution of income -, the bias of individual preference for increased public sector activities (i.e. lower tolerance for the shortcoming of markets), or even biased information provided by self-interested members of the public sector. Non-market supply may be criticised also on several grounds as public sector output is produced under near monopoly conditions and cannot be

rejected, governmental output is often produced in an inefficient manner (Niskanen,1971), notably by bureaucrats and government interventions come often with unintended costs and large unanticipated side effects. No doubts that a great deal of government's outputs are not well defined and their measurement are complex and difficult. The relationship between inputs and outputs is vague, uncertain or even unknown, and government outputs, services in general, are not produced mechanically. All those factors may contribute to explaining growing government interventions and an increasing (relative) size of government.

The comparison of public sector and market activities is made with reference to the neoclassical firm and economics which are the dominant one. A fundamental value judgement is that it is individual preferences that should matter; there is no superior organisation of society which is more than the sum of its individual members. In traditional public finance literature, the theory of market failures can be viewed either as a description of the responsibilities of the State – which of course falls short of reality considering the large number of government activities which could be performed at least as well as if not much better by the (imperfect) market, or as a normative proposition where government should act – being of course aware that today's governments do also provide and finance largely private goods and services. Blankart (2001) that market failures may indeed explain part of the activities of the State, but that they do not constitute a necessary nor sufficient condition for political decisions and actions. Market failures may be a reason for political decisions, but collective decisions are also taken for other reasons.

Economic analysis privileges the efficiency criteria over equity considerations. In traditional public finance and economic theory, equity is an exogenous notion, that is defined by the political system (Blankart, 2001). The recent alternative approach tries to define equity and distributional justice endogenously by two economic motives: individuals are willing to contract a collective insurance which compensates possible income losses in the future, and redistribution may also prevent social unrest and revolution. Equity and justice may be defined by rules determined beforehand by consensus and written down in Constitutions and specific laws. Whatever approach is chosen, equity matters to society, and society's legitimate pursuit of economic efficiency must take it into account, as well as other "non economic" factors, when deciding on the financing, provision and regulation of higher education. The ability to empirically measure the non economic contributions of higher education is weak. Economic analysis and theory put forward some convincing arguments in favour of at least government regulations, if not financing and provision of higher education. However, it cannot deliver a definitive answer to the question as to what extent higher education and academic research is of public responsibility. The consensus around the role of higher education as service to society is more likely be achieved through political and policy debate.

The fundamental arguments for public provision coupled with public funding are that it offers the greatest influence over the institution and its activities and that it is the organisational type best suited to the rapid expansion of higher education. Public supply also provides the most direct mechanism for the production of public goods and benefits that would not be produced if consumer demand were insufficient to generate private non profit or for-profit provision or if private provision led to an undersupply of those goods and benefits. Faith in the market and its potential role in reforming the provision of higher education is based in a fundamental tenet of market ideology, that competition creates efficiencies, productivity gains, and cost savings. However, there is so far very little empirical evidence to support this efficiency effect. In addition, contemporary literature on the need to adapt to changing demands through market solutions does not sufficiently account for the evolution of the non-profit institution as the dominant form for the provision of postsecondary education. Nor does contemporary research sufficiently explore the relative inability of market-based, consumer-driven systems to produce opportunities for universal access and the redress of social inequalities. There is also a great deal of uncertainty over how competition would affect educational quality.

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