

Chapter 9

Financing the Research University

Research universities are expensive because large investments are needed to develop, support and nurture such universities. Many global research universities have an annual budget of more than US\$1 billion and employ more than 10,000 people—they are larger than many large corporations. As we have focused on public research universities, a portion of the cost of running a university is expected to be borne through public funds (in private universities, the counterpart may be philanthropic funds). However, the allocation of public funds for universities has decreased worldwide. Consequently, even for a public research university, the financing has to be a combination of public funds and funds raised through fees and other sources.

Financing research universities is a complex topic; different countries have tried different approaches at the country level, while universities have pursued their own strategies for financial sustainability. In this chapter, we provide a brief, general discussion on the financing of research universities. A research university needs yearly support to finance its primary missions of education and research; activities for these two missions indeed consume most of the expenditure of a research university. Besides yearly financing for the education and research missions, the infrastructure of a research university also needs financing. We discuss the financing of these in different sections. We discuss the

financing of the education and research missions separately, as they have different purposes and often are supported separately, even though it is often hard to fully separate the costs on these two missions. To begin with, we present a brief discussion on the source of money and the expenses in a research university in India so as to get a perspective of financial matters.

For the simplicity of discussion, we do not discuss the financing of other aspects of a research university: its third mission and outreach and other services it may provide. We assume that these activities are mainly self-supporting. We also do not discuss the raising of funds from alumni and philanthropists; it is a major activity in many universities, particularly in private universities in USA. In India, this aspect is still at a very nascent stage, though the new NEP envisages a greater role of private philanthropic funds for universities.

9.1 INCOME AND EXPENDITURE OF A RESEARCH UNIVERSITY

The main sources of annual income for a research university are grants from the government, tuition and other fees, sponsored research projects, income from endowment (which is typically small in the Indian context and for most public universities), income from other commercial activities, and so forth. To understand the sources of income in a research university, a rough income break-up of an older IIT (older IITs generally have about 500 faculty and about 8,000 students) for a recent year is shown in Table 9.1. We present the income for a year which is meant for regular, recurring or operating expenses; the funds for capital expenditure are separate and not included in the discussion here.

The main operating budget of the institution, which is based on funds from the government and internal sources such as tuition fees, is about ₹520 crores (approximately US\$70 million). This covers the salaries of all staff and expenses on the regular running of the institute. As we can see, the government grant is more than 80 per cent of the income from internal sources and the government (which we call base funding). The income from

Table 9.1 *Sources of Income of a Premier Engineering Research Institution*

	₹ (crores)
Internal and government sources	
Tuition fee	45
Hostel and other fees (income from lands and buildings)	15
Interest (from corpus and investments)	15
Government grant	425
Miscellaneous (rent, guest house, fines, etc.)	20
Total income from internal sources/government	520
External sources	
Sponsored research projects, fellowships, etc.	300
Other external income	5
Total external income	305

Source: Author.

tuition and other fees is less than 10 per cent and that from the corpus is less than 3 per cent. In other words, the base funding for the institute predominantly comes from the government. In general, tuition fee still accounts for a small fraction of the total operating budget of public universities, though it varies from state to state (Agarwal 2009).

We can also see that, being a top research institution, it gets substantial income from research funding agencies, companies (consulting and other contract work) and other external sources. These funds are to be used for the purposes specified in the project proposals and can be considered as the research funding of the institute. In this particular year, the research funding is more than half of the base funding.

The base funding can be used to estimate the cost of education. A simple method is to take the total base funding and divide it by the number of students to get an estimate of the cost per student per year. This method provides only a very rough

estimate, as parts of the main budget are also used for supporting research. However, separating teaching and research costs is extremely tricky, as faculty and resources, such as a library, that are supported by this budget are used for both teaching and research. However, for many public universities, it is assumed that the base funding is for education and general infrastructure and that much of the research is supported through external research grants. With this assumption, the rough cost of education can indeed be obtained from the base funding and total number of students. As is evident, education is highly subsidized in this institution.

Let us look at the rough expenditure of this institution. Expenditure from sponsored project funds is handled differently than that from the base funding, as these funds are not part of the operating budget and can be used only in the manner specified in the proposal for the project. Hence, expenditure from these two funds has a different pattern. Both are shown in Table 9.2.

Table 9.2 shows that almost 60 per cent of the funds from the government and internal sources (base funding) is used for salaries and pension, and more than a quarter of it is used for the maintenance and running of facilities (water, electricity, security, etc.).

Just about 6 per cent of the budget is used on PhD students—this can be considered as direct support towards the funding of research in the base funding. The rest of the expenditure on research is from the sponsorship of research projects.

More than half of the funds from research projects is used to procure equipment needed for research. Further, a good portion of these funds is used to pay staff hired specifically for the project. A substantial portion of these funds is used for supporting travel. Only a small amount is used to provide stipends to PhD students. (The expenditure from these funds is different from the external income, because the income for projects may be for more than a year and funds from a year are often carried over to the next years for expenditure.)

Table 9.2 *Expenditure Pattern in a Premier Engineering Institution*

	₹ (crores)
From internal and government funds	
Faculty/staff salaries, allowances and benefits, including travel	195
Pension and benefits	105
PhD student stipend and other allowances/expenses	35
Other academic expenses	20
Administration, including security, facilities, taxes, power, water, etc.	120
Repair and maintenance	30
Library	15
TOTAL: From institute funds	520
From external source funds	
Faculty salaries, allowances, and benefit	0
Other staff salaries, allowances, and benefits	35
PhD student + other student stipends and expenses	5
Equipment	125
Travel and related expenses	50
Other expenditures	15
TOTAL: From project funds	230

Source: Compiled by the author.

The aforementioned example from one major research university gives an idea about the income and expenditures in various research universities across India. A general pattern can be expected in many public universities: most of the income from government grants and fees are used for running the institution, including the salaries of the regular staff. In fact, the yearly budgetary support for a university is based on these committed expenses. Government funding is the dominant component in the base funding, though there are some state universities where this is not the case.

The research grant funds of this institution are quite high, as it is one of the top institutions in the country. The research grants vary drastically from university to university. As we have seen in Chapter 1, the average sponsored research funding is just about ₹20 crores per university for the top 100 universities and about twice this amount for the top 25.

The funding model of IIT-Delhi is quite different from that of other public universities. In its model, education is expected to be made self-sustaining eventually. The government may provide some funds for research and for the infrastructure. Therefore, in the base funding, tuition fee accounts for about 60–80 per cent of the revenue, and direct annual support for education from the government is minimal. Some funding is provided by the government to support research—the model for providing support for research is that the government provides a grant equal to research funds raised by the institute, with some yearly limit.

9.2 FINANCING EDUCATION

Higher education is expensive, as it is still a people-based service. It is largely provided by highly educated and talented faculty, who are supported by teaching assistants, lab staff, instructors, etc., who are also skilled personnel. Further support is provided by administrators and other specialized staff involved in managing education, other functions and the infrastructure of the university. The costs of skilled human resources continue to increase faster than other costs, leading to an increase in the cost of university education globally, often at a pace faster than inflation.

This increase in cost is even more prominent in research universities, mainly because these universities require highly talented research faculty—who conduct high-quality research and provide high-quality teaching—to be recruited and compensated attractively for retention. Another reason is that the quality of education these universities aim to provide includes engaging with research and the latest technologies. Hence, the expenditure on labs and facilities is also significantly higher in

such universities compared with other universities, as the latest technologies often require significantly more investments compared with established technologies, which often have become commodities.

How should the high cost of higher education be supported? In our discussion here, we primarily focus on the financing of undergraduate programmes. These are indeed the most sought-after programmes and degrees and are often perceived as necessary qualifications in today's world. The cost of education can be viewed as follows (Taylor and Morpew 2013; Winston 1999):

$$\text{Cost} = \text{net tuition fee} + \text{general subsidy}$$

In other words, the cost for higher education has two major components: the tuition fee paid by students and the general subsidy provided to all the students by the university through grants from the government, funds from donations and returns from endowment, income from other services, and so forth.

Traditionally, the net tuition fee (i.e., tuition fee charged minus scholarships and discounts given by the university) has been a small fraction of the cost; in many countries, education was either free or had a minimal tuition fee. However, the situation has changed a lot worldwide. The current situation is that a significant fraction of the cost is covered by tuition fee, and the general subsidy is reduced.

With the tuition covering an increasing portion of the cost and the cost of education continuing to increase, there is a need to ensure that access to higher education is not denied due to the lack of financial resources. This has necessitated the need for financial support to students, so that access to higher education is not limited to only those who can afford it and its benefits are not denied to students from financially weaker backgrounds. This support is therefore an integral part of the financing of higher education in a university. We discuss each of these aspects of financing education.

The level of subsidy and the costs students have to bear through tuition fee rest a lot on how higher education is viewed by society and governments. Hence, we start with a small discussion on the public-good nature of higher education and the phenomenon of cost increase in higher education.

9.2.1 Is Higher Education a Public Good

In economics, a public good is nonexcludable, that is, we cannot exclude some people from using it, and nonrivalrous, that is, consumption by one individual does not preclude consumption by another. On the other hand, a private good is one which provides positive benefits to only some people. The provider of private goods can exclude some people from it, and consumption by a person necessarily means that it cannot be consumed by another. The question we discuss here is whether higher education is a public good. Much has been written on this topic (e.g., Marginson 2011; Tilak 2009). We discuss it very briefly to reflect a widely prevailing view.

Education, in the sense of individuals gaining knowledge, is a public good, because anyone can get it and one person gaining knowledge in no way precludes others from acquiring it. However, education might not technically satisfy the economic definition of public good when delivered through institutions that limit the number of students admitted; students gaining admission exclude others from getting admitted, because seats are limited and other students cannot get them once they are filled.

However, in a broad and general sense, a public good is considered as one that is beneficial or useful to the society in general, or whose consumption by individuals leads to substantial benefits to the society, besides benefitting the individuals. On the contrary, the benefits of someone consuming a private good accrue largely, and possibly substantially, to the individual, even though the society may also benefit from the individual consuming it. When discussing higher education, the general notion of public and private goods is more suitable.

The reason for examining whether something is a public good or not is essentially to know who should pay for the good. A public good is expected to be paid through public funds, while individuals are expected to pay for private goods. Therefore, if education is a public good, then the government providing funds for it is clearly justified and expected. On the other hand, a government can be challenged for supporting a private good through public funds. Hence, from a public policy perspective, identifying whether something is a public good or not is important. Note that this is not a binary situation; in the complex world of today, some goods provide both public and private benefits. In such cases, discussion can help decide the level of support a government should provide, that is, the situation is not that either the government or the individual pays, but that it can be a combination of the two.

In modern times, basic education is a public good; it has huge benefits to society. A literate population leads to better citizens, a more efficient supply of services and communication, economic and overall development of society, and so forth. Basic education is widely accepted as a necessity for modern societies. In fact, in many countries, it has become a fundamental right, and children must necessarily be given basic school education.

The views regarding the nature of higher education, whether it should be treated as a public or a private good, are not as clear as those for basic education. For such a discussion, higher education and higher education institutions (HEIs) should be considered separately, as HEIs also engage in many other activities, including research and community outreach. Higher education essentially means the granting of degrees by HEIs to students who complete the requirements for the same and demonstrate that they have developed the required knowledge and skills for the degree. When discussing whether higher education is a public good or not, we discuss only about degrees that an individual gets and which are provided by an HEI, and the HEI incurs some cost for providing that higher education.

In earlier times, higher education was generally seen as a public good by most countries when fewer people opted for it. Having

a more educated citizenry was considered good for the country, and the development of more skilled people was seen as beneficial to economic development. Higher education was also expected to provide leaders in various fields for tomorrow, besides many other benefits. The private benefit was often not substantial; indeed, employment needs often did not require higher education degrees. Hence, for a long time, higher education was considered a public good (Tilak 2008).

Two key factors have impacted the argument. First, public resources required for supporting higher education increased substantially with the massification of education. Second, many analyses have shown that higher education hugely benefits an individual, and those with degrees earn substantially more than those without and generally have a better quality of life. In other words, the private benefit of higher education is substantial—a view that is also reflected in the fact that students strive to get admission in the best universities because they know that education from these universities often leads to well-paying employment opportunities and provides long-term benefits in their careers. These two key factors have minimized the support for considering higher education as a public good: countries do not have the luxury of providing full budgetary support for larger numbers, and the fact that higher education provides private benefits is seen as a good justification to reduce the support.

However, higher education continues to provide large benefits to society, sometimes called externalities. These include producing a more informed citizenry, helping in the economic development, particularly for knowledge-based industries, developing leaders for tomorrow, improving cultural and political scenes, and so forth.

Given that higher education provides substantial private and public benefits, it is now treated in most countries as a mixed good or quasi-public good, and the broad trend is to have the beneficiary (i.e., the student) pay a good portion of the cost for the education. The same trend holds in India also: students are

expected to pay a larger share of the cost for education, though earlier the tuition covered a smaller portion of the budget (Tilak 1993, 2008).

The new NEP of the Government of India recognizes that education has a high return on investment for individuals who gain from it in the form of increased earnings over their lifetime, as well as in the form of better health, better social and professional networks, increased life expectancy, etc. The NEP also points out that there are many societal benefits of education in the form of a more productive workforce, improved capacity of the society to innovate and participate in knowledge-based economy, lower crime rates, better public health and awareness, etc. (NEP 2019).

Clearly, if students are made to pay a larger portion of the cost of education, higher education will become less accessible, something that goes against the public-good nature of higher education and can lead to the denial of rightful opportunity for some. Consequently, the implementation of this view of tuition fees covering a substantial portion of higher education costs would necessitate some form of support to students from financially weaker backgrounds so that they have access to higher education.

9.2.2 Higher Education Cost Increase

Higher education costs have increased steadily and substantially over the years, often significantly faster than the increase in the inflation or income level. This increase has necessitated the increase in tuition fee for students, sometimes causing unrest.

An explanation for the increase in higher education costs rests on the basic economic constraint that, within the existing technology for delivery, a service/quality can only be improved by incurring extra costs (Archibald and Feldman 2008). In other words, depending on what it can afford to spend on education, which depends on the total revenue it generates, a university chooses a quality level that it can support with this level of funding.

If the university wants to improve the quality of education, then it must be ready to incur higher costs, that is, it must necessarily increase its revenue.

The traditional economic view is that cost reduction (for a quality level) takes place with changes in technology, which increases labour productivity. This increase in productivity also leads to higher wages for workers, though the productivity benefits are much more than the wage increase. Productivity gains are hard to achieve in services that do not render themselves easily to the use of technology for improving productivity, like producing a play or a concert. Hence, services such as higher education, where technology (including processes and methods) has remained unchanged for decades, cannot improve productivity; they can only do so by lowering the quality. However, they still have to compete within the larger economy for human resources and hence have to increase wages. Consequently, in higher education, the cost increases as the human resource cost increases, but without getting any productivity benefits, as technology is still the same. This is sometimes called the ‘cost disease’ of such services—incurring higher costs but without any productivity benefit (Archibald and Feldman 2008).

This explanation for the increase in costs is based on the assumption that technology cannot be used to improve productivity in the case of higher education. This has been the case in higher education for decades, or even centuries. However, with the development of alternative methods of education delivery, particularly Internet-based delivery, it is hoped that the decrease in costs can be managed. However, benefits of these new technologies are still to be realized, and costs of higher education still continue to increase.

Another reason for the increase in the costs of higher education in a research university can be attributed to the nature of such universities. Research universities desire global prestige, which often requires higher investments in more costly disciplines, the latest technology, the latest infrastructure, and so forth, which

then increases the cost of education (Archibald and Feldman 2008).

Considering the nature of higher education, which suffers from the cost disease, the reduction in costs results in a corresponding reduction in quality. This can be in the form of an increase in the student–faculty ratio, thereby reducing the attention each student gets. Otherwise, it can be through reducing expenditure by increasing the hiring of part-time or guest faculty for teaching. The reduction in costs may also result in the reduction of non-teaching staff, thereby increasing the administrative load on the faculty and consequently reducing the time the faculty spend on academics. Consequently, forced approaches for cost reduction, for example, reducing subsidies without increasing tuition fees, may result in the lowering of education quality. Though low tuition fees are desirable and demanded by students, it should be understood that reductions in tuition fees should not result in cost reduction and are compensated by non-tuition revenues and grants; otherwise, quality will suffer.

9.2.3 Tuition Fee

In earlier days, higher education in many countries was supported mainly by the government through public funds. This situation has changed dramatically; higher education is now supported in part by a student (and the student’s family) and in part by the government in most countries. This widespread shift has taken place in countries regardless of their political systems and ideologies. Some of the main reasons why most countries, even with different political and economic systems, have reduced their subsidy for higher education are as follows (Marcucci 2013):

- Enrolments in higher education have increased worldwide, and massification of higher education has happened, or is happening, in almost all countries. Massification of higher education is a well-documented phenomenon with many different reasons, including the demographic shift and increased

complexity of the modern world requiring higher education for career advancement. With increased enrolment, the costs of subsidizing education have become much more significant.

- Budgetary pressures on governments have increased, with many competing demands on governmental funds for public services, including primary and secondary education, health, infrastructure, defence, and so forth. Consequently, providing allocations for higher education has become more challenging.
- The per-student cost of education has increased substantially over the years, as discussed earlier.

Perhaps, the main reason for governments reducing support for higher education is the change in the perceptions of governments and societies regarding higher education. As discussed earlier in the chapter, higher education is now treated more as a private good, with the recipient benefitting from it significantly more. Hence, it is expected that the beneficiary should pay more.

The student share of the cost of education is the tuition fee charged to students. The tuition fee means the fee for covering portions of the cost of education. For charging a tuition fee, two policies are commonly used: tuition fee for all and dual-track tuition fee (Marcucci 2013). In tuition fee for all, a common approach is to levy the fee upfront, at the beginning of the semester or academic year. This model is most commonly followed; it is easy to understand and simple to administer, and its accounting is also straightforward. The tuition fee level may change from university to university and even from programme to programme in a country such as USA, where there is no country-wide authority under which higher education comes. In countries where higher education is largely centrally funded and some central agencies are there for funding, fees may be uniform across universities, or adjusted for programmes (e.g., more fees for professional programmes) or for income.

The tuition fee payment may also be deferred, a model followed in Australia and UK. In this model, sometimes referred to as the Australian model, all students have to pay a fixed fee.

However, the upfront payment to the university is done by the government on behalf of the student, and the student is assumed to have taken a loan for the fee amount. The student has to repay this loan after getting employment, as a tax on the income if the income exceeds some threshold.

The dual-track tuition policy model is for charging different fees for different categories of students. One approach is to have some university seats on a reduced or zero tuition fee and charge full tuition fee to the rest. The subsidized tuition seats are often given based on merit, although they can be easily given on some economic criteria or merit-cum-means criteria. In this approach, the seats without any tuition reduction are sometimes called self-sponsored or self-financing seats, as they often charge the full cost of education.

Another approach for the dual-track tuition policy model is to have different fee levels for different students depending on their home state or country. For example, most state universities in USA have one fee structure for in-state students and another for out-of-state students. Similarly, many universities in the European Union (EU) and UK have some tuition fee for EU citizens and a much higher tuition fee for non-EU students. In Australian universities, the fee for international students can be many times the fee for Australian citizens. In some of these, one fee is regulated and often subsidized, as governments financing the university want a lower cost of education for their citizens. The second track fee may be deregulated and even be 'profit making' in that the fee charged may be higher than the cost of education; the surplus may be used to subsidize the education of citizens or the research function of the university. A good discussion of models existing in different countries is given by Johnstone and Marcucci (2010).

The dual-track approach is also indirectly employed by encouraging the growth of private universities and colleges, which are not under the control of the government and hence beyond any government policy for fee regulation. This approach leads to an elite public and mass private model of education (Marcucci

2013). In this model, the public universities financed by the government provide elite education to a relatively smaller section of students at a highly subsidized rate. Most of the students study in private institutions by paying the fees stipulated by the institutions, which often have minimal subsidy. This approach is followed in some Latin American countries such as Mexico and Brazil. In the last few decades, this model has spread widely in India, and currently, a majority of students get their undergraduate education from private colleges and universities, which charge fees to fully cover the cost of education.

In India, no uniform model for tuition exists. In private universities, effectively all seats are self-financing, although some scholarships may be provided for deserving or meritorious candidates. In affiliated colleges (which do not have degree-granting powers) the fee is generally regulated by the affiliating university; often, the fee is kept artificially low to keep education affordable, but as discussed earlier, forced lowering of costs results in the lowering of quality in higher education—something that is widely believed to be the prevailing situation in India. Public universities also have no uniformity, and the sponsoring government generally fixes fees, often on a university-by-university basis. Therefore, each state can fix the fee differently in each of its universities. In some central government-sponsored institutions having some overarching, common governing structure (e.g., the IITs with an IIT council, which has a say in common matters such as admission, fees, and so forth), there is a uniformity of fees. The dual-track fee system also exists, wherein some seats have tuition fees regulated by the government or the affiliating university, while others are self-financing seats. The deferred fee approach is not in use.

9.2.4 General Subsidy

Higher education is mostly a loss-making enterprise. A basic anomaly in the economics of higher education is that universities offer their primary service, namely education, at a price lesser than the average cost of production (Winston 1995, 1999).

There might be education providers for which this might not be true (e.g., for-profit colleges/universities), but this is almost universally true for research universities, including the well-known private not-for-profit research universities in USA. Most provide subsidies for education. (An analysis suggests that in USA, the average subsidy in public institutions is about US\$7,000 and the average educational cost is almost US\$10,000, while in private institutions these figures are US\$5,000 and US\$16,000, respectively [Winston 2004].)

The subsidy provided broadly has two components: a general subsidy given equally to each student in the university and a student aid awarded on a per-student basis depending on the student's merit, need or a combination of both. The student aid is generally quite visible, because these schemes are publicized, which individual students can avail. The general subsidy, on the contrary, is hidden and actually very hard to determine and quantify, and a student does not 'apply' for this subsidy—all students get it by virtue of studying in the university. Often, however, the general subsidy forms the dominant component, and for a research university, it is often even higher than for other universities. Here, we discuss the general subsidy; student aid is discussed later.

The difference between the yearly expenditure on education and the total revenue from fees can be considered as the bulk of the general subsidy. There are, however, some other components in general subsidy, in particular the cost of the infrastructure. However, accounting for the cost of capital or infrastructure is quite challenging (Winston 1998). In most public universities in India, the cost of the infrastructure is accounted for separately and not included in the regular annual budget, and for most public universities this cost is absorbed entirely by the university and is not even reflected in the per-year expenditure or costs.

The key question regarding the general subsidy is what are the sources of funds to support this subsidy. For public universities, the subsidy is financed largely through government grants

and other funds. It should be noted that as tuition plus subsidy must cover the cost of education, the fixing of these two cannot be done independently; if the support from the government is reduced, the tuition fee might need to be increased. In India, the general subsidy from government sources for public universities has been reducing, and a greater portion of the costs are borne by the student through the fees (Varghese and Panigrahi 2019).

Subsidies have an important role in education. First and foremost, the tuition fee for education gets reduced due to these subsidies—the higher the subsidy, the lower the tuition fee. Furthermore, as discussed earlier, generally, the higher the cost of education, the higher the quality. Therefore, higher subsidies often imply higher quality of education for the same level of tuition fee. With higher subsidy, the student demand is likely to increase, which allows universities to be more selective in admissions, which enhances the quality of input and thereby further improves the quality of output.

The general subsidy level also has an implication on the student decision-making process. Students are generally most influenced by tuition fees and the level of scholarship or fee reduction that is provided. However, rationally, they should pay close attention to the total cost of education relative to the tuition fee being charged, as the cost of education impacts the quality. Though general subsidy is often not visible, in various ways, the total cost of education and the general subsidy factor in student decisions; this is the reason why many major research universities, which often provide high levels of general subsidy, are sought after for undergraduate education.

The general subsidy is the cost of education per student minus the tuition fee. Unfortunately, determining the cost of education is not easy (Winston 1998). For a teaching-only university (i.e., where only one service is provided, namely, teaching), it is possible to get a good estimation of the cost of education by looking at the total expenses and the total number of students being taught. However, determining the cost is extremely challenging in a research university engaged in providing multiple services,

including teaching and research. This is mainly because many of the resources or inputs used for these services are common, with faculty resource being the primary among them. Apportioning portions of these common resources to different services or activities to separate out the cost for the education service is extremely challenging.

Given the challenges in separating the costs of shared resources among teaching and research, often, governments supporting the university consider common resources, such as buildings, faculty and regular staff, and so forth, as primarily supporting education, and the annual expenditure of the university for faculty, staff, the running of the campus, and so forth (i.e., the base funding) as expenditure for education. If this approach is used, the cost of education can be determined using the total number of students enrolled in the university and the total expenditure, except for direct research expenditure incurred from research grants.

9.2.5 Student Financial Support

As discussed, the tuition fee for students has increased with cost sharing for education. A clear risk of this approach of having students pay a larger portion of the cost is that students from poor economic backgrounds can be denied access to the education because they are not able to afford it. Higher education is widely perceived to be the route to moving up in life, and therefore, closing that route for the people who have the maximum need to move up cannot be accepted. In other words, given the increase in the cost of education and that a larger fraction of this cost is covered through tuition fees, financial support systems for students are essential to ensure that higher education is accessible to all who want it. Hence, most countries provide financial support to students, largely with the broad goal that those seeking higher education are not denied due to the lack of funds.

The support generally has two forms: student loans and student grants. We discuss both of these briefly here. We discuss support to ensure access to education but not scholarships given

based on merit, because the purpose of the latter is to attract meritorious students to join the university.

9.2.5.1 Student Grants

Financial constraints are known to be a significant hindrance in the pursuit of higher education for students from poor economic backgrounds, though other factors also might limit access to higher education by this section. There is a broad consensus regarding the need to provide grants to cover tuition and other costs, so as to increase access to higher education by students from poor economic backgrounds.

Student grants are conceptually simple. Students are given some financial aid based on some criteria regarding their socio-economic background; this aid can be used to cover parts of the tuition and living expenses. The aid received is a grant, which does not have to be returned. These grants may have different names (fellowships, tuition waiver programmes, etc.) and may be supported through different agencies such as the university itself or some other body outside the university (government schemes, philanthropic schemes, etc.).

One grant scheme often discussed, but not widely used, is the voucher scheme (Marcucci 2013). In this, the government gives out vouchers to a targeted group to increase access to higher education. The student can then use the voucher on any approved higher education provider. A key challenge with vouchers is that targeting seems difficult; often, other groups benefit, and hence these vouchers do not always increase access to higher education.

Although financial grants help in improving access, other factors also come in the way of access to higher education by students from poor economic backgrounds. One key factor is access to information about not only financial aid schemes but also benefits of higher education. Studies indicate that students often overestimate costs and understate benefits (Ziderman 2013), resulting in inappropriate decisions about higher education by students and their families.

India has many such programmes for student grants. In most public universities which have substantial fees (many public universities have minimal fees), many scholarship schemes are available for needy students. There are many scholarship schemes for students also by state and central governments—a summary of the schemes is given in Narayana (2019). Apart from government schemes, philanthropic organizations also give grants to students for higher education (e.g., the Vidyadhan scheme of the Sarojini Damodaran Foundation offers scholarships for higher education to thousands of students from poor economic backgrounds.)

Universities often have fee-waiver programmes generally tied to the income of families of students. An example of such a scheme is one used in IIT-Delhi. The financial model of IIT-Delhi is that the recurring cost of education is borne mostly by a student. In this model, the tuition fee has to be higher than that in other public universities where the government might provide higher subsidies. Three levels of fee waiver are provided to ensure that access is not denied to any eligible student: full fee waiver, half fee waiver and quarter fee waiver. The criteria for each of these levels are tied to two factors: the income level of the family and the fee paid by the student in high school. Therefore, students whose family income is high, or those who paid a high fee during their schooling, are deemed to have the capability to pay the full tuition fee. Other students whose family income is less than some threshold and the school fee was less than a certain level can apply for fee waiver. (A challenge in India is checking for income levels, because, traditionally, income reporting is not considered good. By putting the second check, the scheme reduces the scope for misuse.) This scheme has been very successful and has been converted into a state government programme, wherein students studying in any higher educational institution are now eligible for the fee-waiver scheme.

9.2.5.2 Student Loans

Unlike targeted student grants, student loans are mostly general schemes available to all students. Consequently, they are generally

government-sponsored. Education loans to students are different from the commercial loans given by banks for all sorts of purposes. Students might not have collateral to offer, and the asset being created by the loans is human capital, returns on which are unpredictable. Hence, they need government sponsorship.

One of the most effective loan schemes is the one used in Australia and also in UK and some other countries, which is sometimes called the Australian model. In this approach, the government pays the university directly the subsidy for education, which is considered as a loan to a student. The student is required to start repaying it a few years after graduation. This recovery is through an additional tax, and it is levied only when (and if) the income is above a certain level. In other words, until the graduated student earns 'enough', the loan does not have to be repaid. Effectively then, the unpaid portion of the loan becomes a grant to the student. The government has to suitably plan for this and recognize that some of the loans will have to be written off.

This model is widely appreciated because it not only provides support for students but also addresses the issue of government support to universities for education. Loans given to students actually become a grant supporting the education mission of a university. Moreover, the university is completely shielded from formalisms of loans and its recoveries. The implementation and accountancy of this scheme requires suitable structures. In England, this has been done by creating a separate student loan body, initial capital for which has been provided by the government (Bolton 2019). In Australia, the grant is currently directly administered by the government.

Another model for providing student loans is the one followed in USA. The loan is given to a student by a commercial bank and subsidized by the federal government to the extent that the government pays interest on the loan while the student is in college and for a short grace period after that. No support is provided for the principal amount. As the loan is guaranteed, the government provides a safety net for lenders, though not for students,

who are expected to pay back the loan and are not absolved of it even in bankruptcy (Williams 2013). This model, where the lender's risks are mitigated while the student remains indebted, has many economic and social consequences and has already led to the student loan crisis in USA: the average debt at graduation time has gone up many times to more than US\$30,000, the total education debt is set to cross US\$2 trillion, and an estimated 40 per cent of students may default in the coming years. A lot has been written about this in the US context, in both the popular press and research journals. Suffice it to say that this model has some inherent difficulties.

In India, there is a government scheme for providing higher education loans. In this scheme, commercial banks give out higher education loans to students at their standard commercial rates. Loans up to some amount are to be given without any collateral, generally on the personal guarantee from parents. For loans to students from financially weaker backgrounds, the government provides subsidy for the interest for the period of study plus 1 year. Similar schemes are employed in countries like China, Korea, and Canada (Zideman 2013). In India, while the total value of education loans disbursed continues to increase, the number of students taking loans has been declining, per reports in the press. The default rate of education loans is also high among the different retail loan categories (around 11%). (Interestingly, in the 1960s, when there were government loan schemes, recovery rate was very low—estimated to be less than 15% [Tilak 1993].) An analysis of the student loan scheme in India is provided by Krishnan (2017).

9.3 FINANCING RESEARCH

Research is expensive. The costs can be daunting even without counting the cost of the regular faculty who lead much of the research but whose salary may be covered as part of the education cost. The research cost includes the cost of PhD students, staff hired specifically for the research project, labs and equipment,

library facilities, travel support, fieldwork costs, administrative support needed for managing research projects, and so forth.

How is the research of a university to be funded? Using tuition fees to cover parts of research costs further increases the cost of education, and it also does not seem fair to charge for education and use portions of that to support research. Hence, research should be supported by other funding sources. Indeed, that is the case in public universities: research is largely supported through funds from research-granting agencies funded by the government and the industry. (In some countries, while tuition fee for citizens is subsidized, the fee for foreign students is high, and parts of it are used to cover some proportion of research costs.)

In this section, we briefly discuss some funding methods for research. However, before that, we discuss whether research is a public good or not. If it is a public good, the claim for public funds is justified.

9.3.1 Is Research a Public Good

As discussed earlier, higher education was previously considered as a public good, but it is now increasingly considered as a mixed good with substantial private benefits. Hence, students are asked to pay a larger portion of education costs. Universities also engage in research and have to spend resources to support the research. A natural question then arises: is research a public good?

Research, fundamentally, is about creating new knowledge for a better understanding of the world or for economic exploitation. The output of research endeavours is generally scientific publications, which may include data, development of prototypes, and so forth. If the research is published, which is still the predominant, preferred and most respected channel for academicians, the new knowledge contained in the research paper is available to the entire world, with no restriction on its access or use. Further, use by one does not exclude anyone else from using it. Therefore, this research is not executable and is nonrivalrous and is truly

a public good. In fact, knowledge can be considered as a global public good (Stiglitz 1999).

Research by a private company might not be fully a public good, because the company is not obliged to publicly share the knowledge its researchers create. Often, however, even when researchers share their research results as patents, which provides an exclusive right to the inventor of its use for some time, such research still has many public benefits and can be considered as an impure public good (Stiglitz 1999). (That is why while corporate research is generally not supported by public funds, often, governments provide some tax and other incentives to corporations for research.)

We can consider research being conducted in research universities as a public good, and therefore, support for it should be provided through public funds. Furthermore, basic research, which historically has had a huge impact on the world and continues to have large social benefits, due to its nature, is not an activity in which private companies can invest much, as it is hard to keep its benefits private, and hence the government must invest in it to obtain the social benefits that such research provides (Nelson 1959).

However, with any claim on public funds, the next question pertains to the value of research and the benefit it brings to the society or public—this type of analysis finally decides how much of public funds should be allocated for research. There is no clear-cut answer to this dilemma; it depends on the country's context. For developed countries, research is critical for their economies, because their developed and technologically advanced corporations depend on innovations and new knowledge. In countries such as India, there is a need for research, but the amount of research that needs to be done is debatable. The amount of research that should be done in universities, which are generally not mission-oriented, is sometimes even more questioned. However, given that the modern world is complex and rapidly changing, it is clear that countries such as India need to do more

research. There are many reasons to have strong research support for universities, as discussed earlier in Chapter 2.

The new NEP of the Government of India recognizes that in the modern world, heavy investments in research are essential to tap the economic opportunities of the knowledge-driven era. It notices that levels of research investment in India have dropped and are well below those of other countries and makes a case for increased investment in research and innovation. It recognizes that in universities, there is a lack of funding for research, as well as a lack of a research mindset, leading to young minds not opting for careers in research or going overseas for such careers. It proposes establishing a national research foundation whose goal would be to strengthen a culture of research in the country, and which would fund research in universities using peer-review-based best practices for competitively supporting good research proposals (NEP 2019).

To support research through public funds in research universities, an approach used by some countries, including India, is as follows. A basic budgetary support is provided to public universities for education, which (along with tuition fees and other incomes) covers the operating costs of the university, including the salaries of faculty and staff, much of the costs of maintaining and running the infrastructure and the university, as well as the costs of resources that also help the research endeavours, for example, the library, some labs, etc. In other words, some amount of research costs, particularly those of shared resources like the library, faculty, etc., are also covered in the budgetary support for education. Direct support for research projects is provided through research-sponsoring agencies, which are funded through public funds. This competitive and open approach for research funding ensures that public funds are being used for research that is considered of high quality and high value. By having targeted research programmes for funding, this mechanism also allows the government to direct public funds towards areas that it deems more important.

9.3.2 Funding Research

As discussed earlier, as research is considered a public good, most countries provide support for research in universities through funding agencies that support research projects. Some industries might also support focused research projects, although the bulk of the research in universities is funded through research-funding agencies supported by the governments.

However, research takes place outside of sponsored projects as well: not all research in a university is sponsored through research grants. There needs to be support for this type of research also. Even when research is supported by a research grant, the grant generally only covers direct costs involved in conducting the research project, such as equipment for the project, human resources employed on the project, and so forth. However, executing a project also incurs some indirect costs or overheads. These are expenses not directly attributable to specific projects but are needed nonetheless to support research—such as administrative costs for research, space, utilities, security, maintenance, and so forth. These indirect costs of conducting research are referred to as ‘overheads’. Research overheads have increased over the years due to the increased cost of various support activities, the need for more oversight, and so forth. (Brown [1981] and Ledford [2014] discuss these issues in the context of USA.)

However, research overheads provided for by sponsoring agencies often do not adequately cover the actual overhead costs of executing a research project. As computing overheads is complex, most countries fix some percentage to be awarded as overheads. Japan has 30 per cent, while the EU has 25 per cent (Ledford 2014). In USA, the rate is negotiated by each university separately to reflect the different circumstances of different universities. In India, it is generally 20 per cent or less, with a modest overall cap.

Hence, the full research overheads of sponsored projects often do not get covered. Further, as discussed, some research is not funded through research projects, but which a university must

encourage and support. The question then is how the balance cost of research should be supported in public universities. One method is that some of the balance cost is absorbed by the education support provided—common facilities and resources, support for some PhD students, etc.

An alternate approach taken by UK and Australia is to directly finance these other research costs through a government grant for research, which is not an award for a specific research project. A university gets a block grant for research, which is separate from grants for education and sponsored project grants. The quantum of this grant depends on the level of research activity in the university, as well as on the quality and impact of the research. This method for supporting research also lends itself to promoting excellence, because it rewards universities conducting high-quality and impactful research. In both these countries, an elaborate exercise is done every few years to assess the research quality and impact of universities, based on which the annual block grant is given. This is called the ‘Research Excellence Framework’ in UK and ‘Excellence in Research Australia’ in Australia.

In India, the first approach is followed for most public universities—budgetary support provided by the government also covers some research costs, particularly manpower and basic infrastructure. For direct funding of research, some funding agencies provide project-based research funds. However, research funds provided through research agencies are modest, as discussed in Chapter 1. The NEP of the Government of India suggests a significant increase in research funding. It envisages establishing a national research foundation which will provide project-based research funds to universities and will also provide funds for centres of excellence and for supporting research excellence (NEP 2019).

9.4 FINANCING THE INFRASTRUCTURE

Much of the discussion and writing on the financing of universities focus on the recurring expenses for education and research.

The costs of infrastructure (e.g., costs of constructing a building, a facility and a lab) are one-time costs incurred in building the infrastructure. The infrastructure costs can be accounted for in the recurring expenditure using the norms of depreciation (in accounting, depreciation of capital assets essentially provides a way to convert capital expenditure into a yearly recurring expenditure). However, many universities in India do not include depreciation of capital as a recurring expenditure and work largely with recurring or yearly income and expenditure. Often, universities separately account for capital expenditure and also have separate fundraising for capital expenditure for infrastructure. Generally, in public universities, capital and recurring expenditures have to be handled differently; capital expenditure is provided separately by the government. We have discussed earlier the recurring costs of education and research and how they are financed. We briefly discuss the approaches universities follow for financing the infrastructure.

For established universities, much of the infrastructure is already built, and hence the costs are mainly for the incremental addition of infrastructure: a new building for a centre or a department, a new facility, and so forth. For a new university being established, of course, the infrastructure costs are substantially higher, because even the basic infrastructure has to be constructed, land has to be acquired, and so forth. If a new public university is being created, the initial capital expenditure for infrastructure is normally borne by the government creating it.

Financing infrastructure augmentation in existing universities is different from financing the infrastructure for a new university, because already-existing universities have revenue streams and are perceived to have the potential to raise capital. In such cases, different approaches are employed for financing the infrastructure.

The most common approach taken by a public research university for financing any new or additional infrastructure is to request special grants for the same from the government. This is the approach followed in India. The government may require a

detailed project proposal and consider financing it using public funds. As for any public expenditure, funds may be granted if the perceived value being provided to the public is worth the expenditure. Hence, universities often need to explain not only the need for the capital but also benefits accrued from this investment.

The second approach is for a university to use its own accumulated funds for financing the infrastructure. This possibility depends on whether a public university is permitted to accumulate its savings from its income; a major portion of it might be from the grants it receives from the government. This approach is not feasible if there are limits on accumulating funds and the surpluses are adjusted against future grants from the government. However, it is feasible if the university receives grants based on some formula and is allowed to keep any surplus as a saving due to its efficient functioning. Indeed, this approach can encourage public universities to become operationally more efficient.

Another approach for funding infrastructure is to take loans from banks or other agencies for the infrastructure. As universities have strong and predictable revenue streams, securing bank loans is not much of an issue. However, loans from banks need to be repaid with interest, in the form of regular loan repayments to the bank. In other words, the capital is financed through the recurring budget of the university, implying that the tuition fee, which is an important source of revenue, now covers a part of capital costs. However, this approach is challenging, because it might require further increasing the tuition fee, which might not be acceptable.

A part of the special infrastructure that might be for some special R&D initiative can be funded from the research grant obtained for the initiative depending on the granting agency and on whether such infrastructure is permitted. Providing for infrastructure other than the equipment needed for research is generally not encouraged in regular research grants. However, special initiatives or proposals (e.g., for specific centres) may allow for covering a part of the infrastructure cost, with the remaining

being covered by the university through its own internal accruals and other sources.

Another approach is to seek donations from philanthropists, corporations, alumni, and so forth for the infrastructure. Generally, these generous donations are sought for specific infrastructure projects: a new building for a department, a new centre in emerging technology, and so forth. Often, the support provided by a donor is acknowledged by the university naming the building or the asset created in the name of the donor. This public and visible acknowledgment of the support provided by the donor is sometimes a motivating factor for donors. This approach has been championed by old private universities in USA but is now being used in public universities as well.

The capital expenditure on the infrastructure should normally be used to compute the full and actual cost of services the university provides, that is, education, research, and so forth. However, accounting for this has many challenges (Winston 1998), and often, universities do not account for it while determining the cost of education.

9.5 FINANCING A PUBLIC RESEARCH UNIVERSITY

Public research universities need financial support for their two core missions: higher education and research. We have earlier discussed approaches for financing education and for financing research. Here, we combine these concepts for the financing of the research university as a whole.

The most common method of supporting public universities in India is through yearly budgetary support in the form of block grants to universities to cover much of their basic costs. While block grants are easier to operate, it is generally believed that formula-based funding models are more suitable. Such approaches are more transparent and provide a direct mechanism to align universities with government goals of increasing education opportunities and conducting research that benefits society.

For such an approach, it is desirable to separate the funding for the education function from the funding for the research function of a research university, as both serve different public purposes and separating them provides better control over the financing of the two functions.

The NEP also envisages funding for education and research being provided separately by different agencies. It envisages a higher education grants council which would provide the base funding to the universities. Its role would be to provide financial support for education and the running of the university but not for research. This funding is to be predictable and fair, with the university having the freedom to decide the optimal use of these funds. The NEP envisages much of the research funding coming from the national research foundation, which would grant funds for research projects based on peer review, as well as funds for establishing centres and for excellence (NEP 2019).

We propose a simple conceptual approach for the yearly financing of public universities in a country such as India, based on the approaches that exists in various countries and have been discussed above. We assume that the financing of capital expenses would be handled separately, as is often the case.

Moving to formula-based funding from the block grant approach can be challenging and might require a specific method for transitioning. This can be done by having a small block grant component in the yearly support provided to the university, which can also cover any special needs a university might have. With this, the public support for a university is expressed as:

$$\text{Public funding} = \text{block grant} + \text{formula-based yearly support for education} + \text{formula-based yearly support for research}$$

The block grant can be based on some proposal for special needs and historical data or can even be discretionary. We discuss the two formula-based components further.

9.5.1 Funding for Higher Education

As discussed earlier, higher education, particularly in professional disciplines, is now viewed as providing benefits to students and, hence, should be partly supported through the tuition fee. However, higher education serves a public function also; therefore, some subsidy should be provided through public funds. This subsidy is best viewed in terms of per-student subsidy; basing the total funding for education on the number of students directly encourages universities to increase the number of students. With this, the yearly funding for education for a university is expressed as:

$$\text{Yearly support for education} = \text{number of students} \times \text{yearly subsidy per student}$$

A more detailed model is to have separate subsidy amounts for different programmes. This approach is easier to articulate and implement and also encourages universities to expand education (which governments want) and to improve quality (which also governments want) in order to attract the best students.

With this subsidy, the education is effectively covered through the tuition fee paid by students and the yearly grant provided by the government for education. The tuition fee has to increase with the decrease in this subsidy. In fact, even if the subsidy amount remains the same, the tuition fee has to increase to cover the increase in the cost due to inflation and other forces. If the subsidy amount remains unchanged, then the tuition fee increase has to cover the full cost increase (including the portion covered by the subsidy), and hence the rate of increase in the tuition fee might be faster than the rate of increase in the cost of education itself.

This subsidy amount for students can be viewed in two ways: it can be treated as a subsidy or as a loan to a student which the student has to pay later. If it is treated as a loan, then mechanisms to recover it have to be devised by the government, as done in UK and Australia.

Even with the subsidy, the tuition fee might be high enough to be a barrier for many to enrol in education, which must be handled to ensure that access to higher education is not denied to deserving candidates. For this, two types of support must be provided: income-linked fee waivers or scholarships and education loans. The scholarships should take care of students whose families cannot afford to pay tuition fees, and hence they should be income-linked. Education loans are for the rest of the students. Such schemes exist in most countries, including India.

Although the yearly subsidy by the government is a very direct and visible form of subsidizing education, it should be noted that there is another significant subsidy being provided by the government, namely the cost of capital. In countries such as India, where the capital is expensive, this capital subsidy can be substantial. Hence, even if the government does not provide yearly subsidy for education but bears the capital cost, a student still gets a substantial subsidy for education.

9.5.2 Funding for Research

As discussed earlier, much of the research support for universities is assumed to come through research projects, which are funded by various agencies. As discussed earlier in Chapter 1, the research funding available for universities through sponsored research projects is currently modest in India.

However, as mentioned, a university cannot be engaged only in sponsored research, as funding is not always available for all types of research. The academic freedom and ethos of a university should allow researchers to explore even esoteric areas. This needs non-project-based funding for research. Also, as discussed earlier, the funding provided for overheads in sponsored projects often do not cover the actual overhead costs—support for the balance is also needed.

Therefore, there is clearly a need for yearly support for research to a research university beyond the availability of

sponsored research grants. Again, formula-based funding can be most transparent. For education, the formula is quite straightforward, because it is based on the number of students, which is the key indicator for the education function of a university. The formula for research funding will be more complicated, because determining the level of research is not easy. Broadly, the formula can be based on key indicators of the level of research being done in a university. Some of the key indicators are: (a) size of the PhD programme and the number of PhD students graduated; (b) research output, such as publications and patents, and their research impact in terms of citations; (c) impact on industry, innovation ecosystem, economy, and so forth; and (d) research funding received through funding agencies and industry. There can be other indicators, and the weight for different indicators can change with time, reflecting the value associated with research by society.

Applying the aforementioned approach for determining the level of research funding is an arduous task. Also, assessing the level of research for a university can only be done by considering the output and impact over a substantial period. Hence, this formula should not be applied on an annual basis. This exercise should be done every 5 years or so, based on the performance of the university in the previous 5 years. The grant is given yearly; however, the level of grant is decided based on the application of the formula until the next exercise. Hence, universities can predict the research funding for a few years, which is hugely desirable, because many research bets can take many years of investment before the results show and the investment pays off. (It might never pay off, because research is fundamentally a high-risk activity with the chance of impact being very low.)

As this funding is based on research performance, it provides incentives to universities to improve their research. This is desirable, particularly in the current environment of accountability. The funding also rewards the better-performing universities, which can further help them improve their research and become world-class universities.

As an example of this type of funding, let us consider the approach followed in IIT-Delhi. The state of Delhi decided to have a very simple formula for this funding. It chose only the key parameter of research funds raised by the institute from funding agencies and industry and agreed to match the funds raised. This simple model can be applied yearly and does not require an elaborate exercise for assessing research. It is suitable for a state that might have only a few research universities but might not have the necessary infrastructure needed for conducting an elaborate performance evaluation exercise. For a larger system or one at the federal government level, it is better to look at all the key indicators of research activity, as is done in UK and Australia.

9.6 SUMMARY

Research universities are expensive in both of their main functions: education and research. Higher education is now widely considered a mixed good with private and public benefits, while research is largely considered a public good. Hence, research universities get considerable support from public funds globally. In this chapter, we have briefly discussed how the education and research functions of a university can be supported.

Globally, the costs of higher education have increased, partly because it suffers from a ‘cost disease’. Governments have reduced support for education due to the high costs and massification of higher education. This reduction is further supported by the fact that higher education should be viewed more as a private good, because it provides substantial private benefits. Consequently, the share of the cost of education paid by the student through the tuition fee has increased. However, despite the higher tuition cost, a substantial subsidy is provided to students for education in all public institutions and even in many private institutions.

The increased cost-sharing by students has led to a need to provide financial support for students so that access to higher

education is not denied. Financial support is provided mostly through two approaches: grants and loans. Grants are generally for targeted groups and are given to students to defray education costs. Grants are not to be recovered. Student loans are usually available to all students and are often supported in some manner by governments. The Australia model of providing support is to pay universities education subsidy for each student and treat it as a loan for the student, which is later recovered by the government through an additional tax on the student. In India, loans are provided by commercial banks but with some subsidy and guarantees by the government. There are many schemes to provide grants to students from financially weaker backgrounds.

The research function of a university generates public good, because research results in an increase in public knowledge. Hence, research is largely supported by government funds. The most common method of funding research in universities is to provide project-based funding through research-sponsoring agencies, which get budgets from public funds. Sponsored projects form a major portion of the research revenue for most research universities. However, they do not cover all the research expenses in a university. One approach to support these other research costs is to provide a yearly grant to the university for research, based on the research performance of the university. This approach is followed in UK and Australia.

In conclusion, we briefly discussed a conceptual model for providing support through public funds to a public research university, in which education is supported through a per-student subsidy; it implicitly encourages the university to admit more students, thereby increasing the availability of education. Research is supported largely through research grants, which can help in directing research towards areas deemed as more important. Extra support for research is provided to a university based on its performance in previous years, thus helping it achieve excellence and obtain more funds for research.

REFERENCES

- Agarwal, Pawan. 2009. *Indian Higher Education: Envisioning the Future*. New Delhi: SAGE Publications.
- Archibald, Robert B., and David H. Feldman. 2008. 'Explaining Increases in Higher Education Costs.' *The Journal of Higher Education* 79 (3): 268–95.
- Bolton, Paul. 2019, January. *Higher Education Funding in England* (Briefing Paper). London: House of Commons Library.
- Brown, Kenneth T. 1981. 'Indirect Costs of Federally Supported Research.' *Science* 212 (4493): 411–8.
- Bruce Johnstone, D., and Pamela N. Marcucci. 2010. *Financing Higher Education Worldwide—Who Pays? Who Should Pay?* Baltimore, MD: The Johns Hopkins University Press.
- Krishnan, K. P. 2017. 'Financing of Higher Education in India.' In *Navigating the Labyrinth—Perspectives on India's Higher Education*, edited by Devesh Kapur and Pratap Bhanu Mehta. New Delhi: Orient BlackSwan.
- Ledford, Heidi. 2014, November. 'Keeping the Lights On.' *Nature* 515 (7527): 326–9.
- Marcucci, Pamela. 2013. 'The Politics of Student Funding Policies from a Comparative Perspective.' In *Student Financing of Higher Education*, edited by Donald E. Heller and Claire Callender. New York, NY: Routledge.
- Marginson, S. 2011. *Higher Education and Public Good*. Wiley Online Library.
- Narayana, M. R. 2019. 'Scholarship Schemes for Student Financing.' In *India Higher Education Report 2018: Financing of Higher Education*, edited by N. V. Varghese and J. Panigrahi. New Delhi: SAGE Publications.
- Nelson, Richard R. 1959. 'The Simple Economics of Basic Scientific Research.' *Journal of Political Economy* 67 (3): 297–306.
- NEP. 2019. *Draft National Education Policy*. New Delhi: Government of India.
- Stiglitz, Joseph E. 1999. 'Knowledge as a Global Public Good.' In *Global Public Goods—International Cooperation in the 21st Century*, edited by Inge Kaul, Isabelle Grunberg, and Marc Stern. New York, NY: UNDP.
- Taylor, Barrett J., and Christopher C. Morphew. 2013. 'Institutional Contributions to Financing Students—Trends in General Subsidies, 1987–2007.' In *Student Financing of Higher Education*, edited by Donald E. Heller and Claire Callender. New York, NY: Routledge.
- Tilak, J. B. G. 1993. 'Financing Higher Education in India: Principles, Practice, and Policy Issues.' *Higher Education* 26: 43–67.

- Tilak, Jandhyala B. G. 2008. 'Transition from Higher Education as a Public Good to Higher Education as a Private Good: The Saga of Indian Experience.' *Journal of Asian Public Policy* 1 (2): 220–34.
- Tilak, Jandhyala B. G. 2009. 'Higher Education: A Public Good or a Commodity for Trade?' *Prospects* 38: 449–466.
- Varghese, N. V., and J. Panigrahi. 2019. 'Financing of Higher Education, An Introduction.' In *India Higher Education Report 2018: Financing of Higher Education*, edited by N. V. Varghese and J. Panigrahi. New Delhi: SAGE Publications.
- Winston, Gordon C. 1995. *Costs, Prices, Subsidies, and Aid in US Higher Education* (Discussion Paper 32). Williams Project on the Economics of Higher Education. Williamstown, MA: Williams College.
- Winston, Gordon C. 1998. *A Guide to Measuring College Costs* (Discussion Paper no 46). Williams Project on the Economics of Higher Education. Williamstown, MA: Williams College.
- Winston, Gordon C. 1999. 'Subsidies, Hierarchy and Peers: The Awkward Economics of Higher Education.' *Journal of Economic Perspectives* 13 (1): 13–36.
- Winston, Gordon C. 2004. 'Differentiation among US Colleges and Universities.' *Review of Industrial Organization* 24: 331–354.
- Williams, Jeffrey J. 2013. 'The Teachings of Student Debt.' In *Student Financing of Higher Education*, edited by Donald E. Heller and Claire Callender. New York, NY: Routledge.
- Ziderman, Adrian. 2013. 'Student Loan Schemes in Practice—A Global Perspective.' In *Student Financing of Higher Education*, edited by Donald E. Heller and Claire Callender. New York, NY: Routledge.