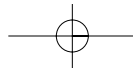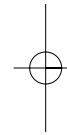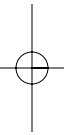# PART II

Transversal topics

3. Changing models and patterns of higher education funding: some empirical evidence

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3.1 INTRODUCTION

Funding is a central issue for higher education institutions (HEIs): not only do the overall level of resources matter for the individual institutions, but also the share of different funding mechanisms (for example, general versus project funds) as well as the allocation criteria.

Thus, for the state, funding is a major steering mechanism for higher education and funding mechanisms are closely linked to general policy choices concerning higher education (Barr, 2004; Jongbloed, 2004). Also, the notion of autonomy and strategic capability of individual HEIs developed in this book requires them to seek more funds – for example, through internal incentives for fundraising or through measures to increase efficiency – as well as to orientate their strategies according to the available funds (for example, focusing on specific research themes or shifting the balance between education and research). However, as we shall discuss later, national systems can allow individual HEIs quite different degrees of freedom in this respect. Moreover, the composition of funds is likely to influence an institution's internal governance, since some instruments, like most grants and contracts, are attributed directly to individual units and thus tend to strengthen their autonomy.

The literature discusses a series of changes in higher education funding during the last few decades (Geuna, 2001; OECD, 2003). From a quantitative standpoint, it is generally affirmed that funding levels stagnated or decreased, especially if compared to the number of students, and that the composition of funding shifted, with a decrease in the share of the general government allocations in favour of project funding from public agencies, tuition fees and private contracts. However, the quantitative evidence of these trends is rather weak, at least at European level. At the qualitative level, the main evolution is considered to be a shift of general allocations

from historical criteria based on past expenditures to mechanisms based either on input criteria (number of students) or on performance indicators (especially for research). Moreover, it is generally believed that tuition fees have increased and have also been largely deregulated.

These changes have been widely documented (see, for example, Geuna, 2001; Jongbloed and Vossensteyn, 2001; Kaiser et al., 2001; Benninghoff et al., 2005) and considered part of the changing paradigm towards a different governance model, where the state uses incentives to steer the behaviour of individual institutions. One good example is promoting better research quality and enhanced efficiency in resource use, rather than to directly intervene in their functioning and internal decisions (Amaral et al., 2002; Teixeira et al., 2004). Caveats have also been repeatedly expressed on the risks of this 'market-like' approach since, on the one hand, this could favour short-term scientific production against long-term results and on the other, there are no conclusive arguments that concentrating funds and research activities would lead to higher efficiency (Bonaccorsi, Daraio and Simar, Chapter 5).

In this context, this chapter has two main objectives. First, we aim to provide an overview of the current state of higher education funding in several European countries and, in particular, the general policy options and the allocation mechanisms used. Second, using the data collected in Aquameth and in the CHINC project, 'Changes in University Incomes: Their Impact on University-Based Research and Innovation', we provide some empirical evidence on changes in funding in some European countries during the last 10 years. This will help to back the qualitative analysis and will also demonstrate the potential of quantitative data at the level of individual HEIs for research in higher education.

The chapter is organized as follows. In Section 2, we introduce the reader to the basic concepts and categories concerning higher education funding, and we review the main allocation mechanisms and their use in the concerned countries. In Section 3, we introduce the main research questions and we provide some information on the data sources and their limitations. In Section 4, we present and discuss the empirical evidence at the level of individual institutions, focusing also on the relative importance of national-specific versus individual HEI-specific patterns and tendencies. We conclude with a general discussion of the main results.

3.2 ALLOCATION MECHANISMS AND NATIONAL DIFFERENCES

This section examines the different modes of funding for higher education, discussing issues such as the importance of the different channels,

the prevalent allocation mechanisms and the changes during the last 10 years. We focus especially on the 11 countries for which quantitative data are presented, namely the Czech Republic, Denmark, France, Germany, Hungary, Italy, the Netherlands, Norway, Spain, Switzerland and the UK.

3.2.1   A Framework for Analysis

Figure 3.1 displays a simple representation of the main funding channels for higher education in most developed countries (Jongbloed, 2004), described in more detail as follows:

1. *Government allocations* These are contributions from the state (national, as well as regional, especially in federal countries such as Germany, Spain and Switzerland, but also to some extent in other countries) which are attributed to the institution for its normal func-tioning, like paying permanent staff and most functioning expend-itures. In most cases these funds are attributed to the institution globally, leaving the decision on the internal reallocation to the uni-versity itself, but there are still cases (as in France) where the state decides to a large extent on the allocation.

   There are a number of possible allocation mechanisms for these funds; a simple categorization includes (Kaiser et al., 2001; Benninghoff et al., 2005; see also Section 2.3):
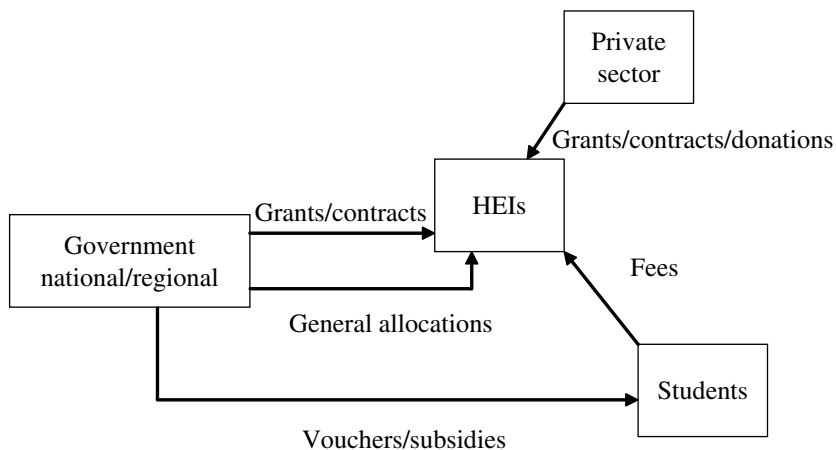

Figure 3.1   Funding channels for higher education

    a.   negotiated allocation based on historical criteria;

    b.   negotiated allocation but based on input or performance indicators; and

    c.   formula-based allocation. In these cases there is a mathematical formula for calculating the allocation for each institution based on a set of indicators.

It is worth noting that, while the allocation is attributed jointly for all institutions activities, in most cases there is a separate calculation for education and research.

2. *Grants and contracts from the government*   This is money for research projects or other specific activities, mostly for a limited period and attributed directly to specific subunits (for example, laboratories). Examples are competitive grants from research funding agencies, European framework programmes and contracts from the government departments (see Lepori et al., 2005b for a more complete discussion of project funding). Generally speaking, most of these funds are attributed to research, but there might also be some service or educational component; note also that there are some borderline cases with government allocation (such as earmarked funds).

3. *Grants, contracts and donations from private companies*   Private charities are a borderline case; in some countries such as the UK, they play an important role in some sectors and in many cases adopt similar competitive procedures to research councils.

4. *Funding coming directly from the students in the form of tuition fees for different courses*   It is useful to distinguish between fees for undergraduate students, which are in most cases fixed by the state, and fees for postgraduate education where institutions have more freedom to set the level. In all countries these fees are to some extent subsidized by the state, especially for those on a lower income.

The choice between instruments and allocation mechanisms – or more appropriately the choice of the mix between the different possible options – is in part the outcome of the historical development of national systems, but it is also largely related to different conceptions concerning higher education's mission, economics, ways to achieve efficiency and, finally, the conception of the relationship and of the respective role of the state and of individual institutions.

3.2.2 The Role of Different Institutional Levels

While we normally equate public higher education funding with *national* funding, we should ensure that other institutional levels and actors are

important as well, particularly regional authorities and the European Union. Therefore, in federal countries, regional authorities are a major source of funds for general government allocations. In the current context this concerns mainly three countries, namely Germany, Spain (Garcia-Aracil, Chapter 11) and Switzerland (Lepori, Chapter 6), but also the UK (differentiation between England, Wales, Scotland and Northern Ireland; DTI, 2002; Benninghoff et al., 2005). At the same time, the European level has increasingly become an important source of funds for grants and contracts (see Section 2.4).

The simple scheme presented in Section 2 becomes more complex when we consider that the state is actually composed of a set of actors at different institutional levels (international, national, regional), which have their own objectives concerning HEIs and provide funds that use different allocation criteria. This fragmentation restricts competition for *some* funding sources – such as regional funds for HEIs – but not for others, such as European funds which are competitively open to all performers in the participating countries. Thus, the idealized view of individual HEIs competing for funds on a national or even European level should consider differentiated approaches, where individual HEIs might decide to focus on different funding sources according to their strength, but also to their institutional positioning and linkages to relevant actors.

However, it is important to underline that in seven of the 11 CHINC countries, general allocations from the central state are still the predominant source of funding. Exceptions are the three federal countries (Germany, Spain and Switzerland), as well as the UK where, as we shall discuss later, general government allocations no longer account for the majority of funds.

3.2.3   General Government Allocations

The general government allocations account for the largest share of funds in all countries (more than two-thirds of total funds for most HEIs in the sample) except the UK (see Section 2.4). Usually, general government allocations are paid as a lump sum, leaving to the HEI management to decide on internal allocation.

Historically, general government allocations were largely based on 'historical' criteria, meaning that the baseline for their calculation was the level of the preceding years (plus some increase).

However, in the last few years non-monetary input criteria such as the number of students or of staff have been introduced to increase transparency in the allocation mechanism and to allow for more flexible allocation (for example, depending on the number of students). Since the 1980s,

a number of countries have also introduced output criteria, which to some extent allow us to take into account the performance of an HEI for its funding. Their introduction was also a way to differentiate research and teaching activities and to steer them separately (this was especially the case in the UK and in the Netherlands; Irvine et al., 1990; Geuna and Martin, 2003). For education, criteria generally included the number of diplomas, study credits and exam successes, and the amount of third-party funding. Even if the political discourse underlines performance-based allocation, output criteria for education are not widely used in most European countries (Jongbloed and Vossensteyn, 2001). In Europe, Denmark is the only country that exclusively uses performance criteria (based on the number of exams passed) in the allocation of educational funds.

For the research component of general government allocations, output criteria are more broadly used. The most common are: the quality of research activities (based on some kind of evaluation such as the Research Assessment Exercise in the UK), the level of third-party funds (such as federal funds for cantonal universities in Switzerland), the number of PhD students, the number of publications and the number of patents. Output-based instruments also take into account management dimensions such as the definition of research plans and priorities (Geuna and Martin, 2003). However, the importance of this kind of allocation should not be overestimated.

While in some countries input and output criteria are used as a tool for negotiating allocations, in other countries at least a fraction of general government allocations is calculated by an explicit formula based on quantitative indicators. Depending on the countries, the formulae have varying degrees of complexity (the UK and the Netherlands have a complex one, which introduces a number of variables that are weighted differently, see Boezerooy, 2003; Benninghoff et al., 2005). Due to the possibility of weighting the variables, the formula instrument is potentially a good instrument in terms of steering. However, formula modifications usually involve a long and difficult negotiation process between the actors.

3.2.4   Grants and Contracts

Grants and contracts include a heterogeneous set of funding instruments that share several common features: first, they are normally attributed to specific activities limited over time; second, the size of a grant is normally an order of magnitude smaller than general allocations; third, in almost all cases they are attributed directly to institutional subunits such as departments, research institutes or even individual researchers. Finally, most grants and contracts are for research activities.

However, diversity also concerns the authority in charge of distributing grants, the type of activity funded and allocation criteria. For public grants and contracts, we need to distinguish between funds attributed directly by the state (for example, from ministries) and public funds managed by largely independent agencies such as research councils (in general, see Braun, 1998; for the Swiss case, see Benninghoff, 2004). Moreover, the European Union as well as some European-level agencies are becoming increasingly important sources for public grants and contracts through the European framework and the structural programmes, but also through agencies such as the European Space Agency (Caracostas and Muldur, 2001). Typical shares of European funds range from 10–15 per cent of public grants in large countries to up to more than 25 per cent in smaller countries (Lepori et al., 2005b). Finally, grants and contracts are directly provided from private companies and some literature on higher education suggests that these funds have (or should have) increased substantially in recent years (Benninghoff et al., 2005).

It is extremely difficult to obtain comparable information on the amount of grants and contracts or on their reallocation among different sources (Lepori et al., 2005b). Information from some countries suggests that their share of research funding increased during the last few decades and that there has been a shift from 'reactive' instruments orientated towards academic output to more proactive instruments aimed especially at promoting research of economic interest and technological innovation (Geuna, 2001; OECD, 2003).

Preliminary findings from comparative research on public project funding show profound differences between the three countries considered (Austria, Italy and Switzerland) in terms of managing agencies, composition of funds and beneficiaries (Lepori et al., 2005). With regard to CHINC countries, most have research councils that fund academic research projects (except Italy and Spain where this function is performed directly by the research ministry and France where it has only recently been implemented).

Issues for higher education institutions relate to the share of these funds in total funding, their repartition among instruments – for example, academic-versus innovation-orientated instruments – as well as between scientific domains and, finally, to their evolution over time.

3.2.5 Student Fees and Loans

Student fees have been one of the most hotly debated issues in higher education funding both in the economics literature and in political circles. Practically all European countries historically had no or very low student

fees, but either have changed this system substantially in the last few years or are reconsidering their position (Vossensteyn, 2000).

Low student fees were related to the democratization and equality of university access. However, data show that even with low student fees, higher education participation is still unequal according to the socio-economic status of parents (OECD, 1998). At the same time, empirical research shows that in countries where fees are high (such as the US and Japan), participation is still high, but the socio-economic profile of participants has changed. Although higher socio-economic groups are not influenced by fee increases, the less favoured socio-economic groups are (Andrew, 1999; Vossensteyn, 2002). It is for this reason that in different countries the discussion on fees is accompanied by a discussion on scholarships and loans (Barr, 2004).

For example, in the UK, the amount depends on students' socio-economic status and their nationality (students from the UK/EU pay much lower fees than students from other countries). For non-European students, the fee level is fixed by the individual institutions and varies from domain to domain (for more details, see Benninghoff et al., 2005: 52). The new Higher Education Act (2004) liberalized fee levels by setting a fee ceiling. At the same time, fees no longer have to be paid at the commencement of studies, but after graduation (ibid.: 52). In stark contrast, German institutions do not charge student fees except reimbursement for some services. While the national government has tried to intervene, the *Länder* have put up more opposition. Therefore, due to the political system (federalism), the *Bund* (national level) has no power to intervene on this issue. Nevertheless, some *Länder* have introduced fees in specific cases (see ibid.: 59).

3.2.6 Summary and Discussion

Table 3.1 shows the important differences between countries in allocation mechanisms, as well as the complexity of these mechanisms in most countries, which cannot easily be reduced to one of the models discussed in the previous sections (for recent reviews, see Kaiser et al., 2001; Leszczensky et al., 2004; Benninghoff et al., 2005; Lepori et al., 2005a). As we shall show later, these differences have to be carefully considered in any comparative analysis of funding of HEIs at the European level.

3.3   RESEARCH QUESTIONS AND METHODOLOGY

The discussion in the previous section and the literature on higher education funding leads to some interesting questions which will be assessed quantitatively. More precisely, we address the three following issues:

Table 3.1   Overview of higher education funding mechanisms in CHINC countries

	General government allocations	Grants and contracts	Student fees
Czech Republic	Mostly input orientated; some output criteria were recently introduced; partly based on a formula	Competitive grant agency	Students don't pay tuition fees, but have to pay for over study, and some charge for exams
Denmark	National funding system. Allocation for education based on output (passed exams); specific allocation for research activities based on a formula (input, output criteria)	Targeted and competitive grants for research activities come from different sources: research councils, EU, foundation, etc.	Studies are tuition free with some limited exceptions
France	Mostly national (but also regional) funding system based on a contract between the state and the university; allocation mechanism based on a 'formula model' which is not mandatory	Recently a national research council has been created. Grants come mostly from EU, public administration, private organizations	Student fees vary from university to university
Germany	*Bund* and *Länder* funding system; mixture of historical, input, output allocation mechanisms (differs from *Land* to *Land*)	Competitive grants come mostly from research council. Contracts also come from foundations	Student fees are still extremely low although it is becoming a political issue
Hungary	National funding system, based on historical criteria	Competitive grants come from research council	Studies are tuition free with some exceptions

Table 3.1 (continued)

	General government allocations	Grants and contracts	Student fees
Italy	Historically input allocation mechanism, with recently an output allocation for research activities (introduction of a research evaluation exercise)	No research council with competitive grant mechanism, but some grants from the research ministry	The level of fees increased in the 1990s from very low levels to significant amounts
Netherlands	Non-competitive lump sum; driven by a formula (historical, input) distinction between teaching and research activities	Grants from research council, EU, administration, industry, etc.	Level of fees is decided by the ministry
Norway	Allocation system based on a combination of historical and strategical allocations, and a formula which takes output criteria into account	Competitive grants are allocated by research council, EU and other bodies. Contracts from industry	Studies are tuition free
Spain	Mostly regional funding system; mostly based on historical criteria; in some regions allocation is based on a formula (input and output criteria)	No national research council to allocate competitive grants, but competitive project funding is managed by the ministry	Universities are free to set the level of fees: the level varies from region to region
Switzerland	National and regional funding system; allocation mechanism is mixed: historical,	A very large research council, as well as some other sources for more targeted research	Students pay some fees, but the level is not high, except for postgraduate studies

Table 3.1   (continued)

	General government allocations	Grants and contracts	Student fees
	input and output (for research)		
UK	National funding system but with regional higher education councils; funding allocation based on a formula – input, output criteria (based on research assessment exercise for research activities)	Research councils (for research activities); contracts from administration, foundation, EU, industries, etc.	Universities are free to decide the level of fees, although the government has fixed a maximum account

1. *Changes in the overall level of funding over time*   While the political discourse and some literature on the subjects speaks of stagnating or even declining higher education funding, both aggregated data at national level (see Section 4.3) and some recent studies (Conraths and Smidt, 2005) point to a more favourable situation.

Even if we accept that the overall volume of funding increased at national level, it is important to understand to what extent there are differences between individual institutions and which could be the explaining factors (for example, if some categories of universities, such as generalist or smaller ones, have experienced more difficult conditions).

Second, it has been repeatedly claimed that the increase in available resources was offset by the larger number of students; thus, we would like to test this hypothesis and to measure the impact of changes in the number of students on the volume of funds of individual institutions. This should also give us some empirical information regarding to what extent the allocation mechanisms are based on student numbers.

We limit ourselves to a measure of changes in the level of funding for the 1995–2003 period, both in constant prices and per student, while we avoid direct comparisons concerning the absolute level of revenues or cost since these are strongly influenced by the subject mix and by differences in price levels between countries (see Chapter 4).

2. *Composition of funding sources*   We examine the composition of revenues according to three main categories:

   a. government allocations;
   b. tuition fees; and
   c. grants and contracts.

The aim is to identify systematic differences between countries and individual institutions concerning these shares. This is impossible to assess using national education statistics, which provide only a distinction between public and private funds (the latest also including student contributions) and thus do not match the categories needed for this analysis.

The main interest lies in identifying the sources of variance in these shares: are they essentially determined by the national context or do we find large differences between institutions in the same country? This should give us some indication of the degrees of freedom that individual HEIs have in fund-seeking and, possibly, some indication of specialization towards research or education. Moreover, we look for systematic differences according some features of HEIs, such as size – larger institutions getting more grants and contracts as an effect of mass – specialization and types of HEI (notably differences between PhD-awarding and non-PhD-awarding institutions).

3. *Changes in composition*   Here, we examine the changes in these shares in the 1995–2003 period for individual HEIs. The aim is first to verify quantitatively the hypothesis of a decreasing share of general government allocation and increasing other sources (tuition fees and grants and contracts) and to assess the magnitude of these changes.

Moreover we look at systematic differences between countries – whether some trends are more pronounced in some countries – and between institutions: for example, whether some categories of institutions show distinct tendencies or whether we observe a tendency to a stronger differentiation or find similar tendencies or even convergence between individual HEIs in their funding composition.

Finally, we examine changes in the share of private contracts, since it is normally assumed that private contracts increased in the last few years due to a stronger orientation of universities towards 'third-mission' activities; we perform some tests to assess these changes quantitatively.

3.3.1   Sources and Quantitative Sample

The analysis presented here is based on quantitative data collected during the CHINC project (Lepori et al., 2005a; CHINC project, 2006). This

project was established and funded by the Institute for Prospective Technological Studies of the European Commission to find evidence for changes in the funding of HEIs over the last 10 years in a selection of European countries and of their consequences for research and innovation activities.

The project was done by a group of researchers from 11 countries, and utilized a combination of quantitative and qualitative methodologies to find systematic and comparable evidence. Quantitative data were collected from 117 institutions and interviews carried out with leaders of 97 institutions. These institutions were selected to address several systemwide characteristics: institution type (PhD awarding versus non-PhD awarding), size and specialization (generalist versus specialist institutions).

Table 3.2 displays some descriptive information on the sample. Note that small countries – especially Switzerland and Norway – are overrepresented, while France and Germany are strongly underrepresented in the sample. Thus, one has to be careful in interpreting averages over the sample or national averages. Of the 117 institutions in the database, nine are non-PhD awarding since CHINC covered not only universities (awarding PhD degrees) but also 'other' HEIs such as *Fachhochschulen* in Germany and *hogescholen* in the Netherlands (Huisman and Kaiser, 2001; Kyvik, 2004). In a number of cases these emerge clearly as a distinct category.

As Figure 3.2 shows, the institutions in the sample are normally distributed according to size, the smallest one (University of Luzern) having fewer

Table 3.2   Sample description, 2002

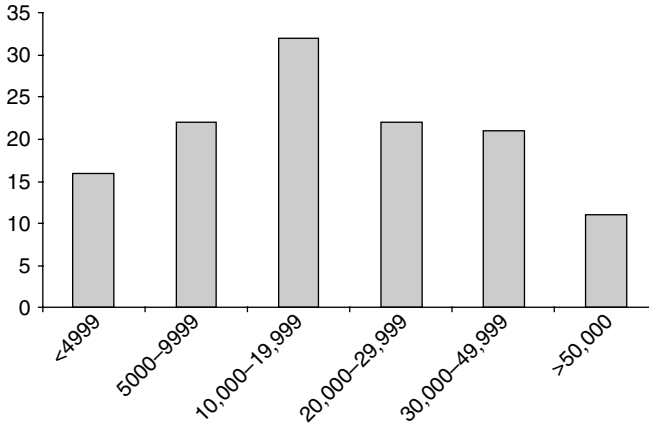|	Number of institutions	Institutions in the sample	Average number of students	Average number of PhD degrees
Czech Republic	64	10	15,397	115
Denmark	55	7	12,147	130
France	105	12	15,954	188
Germany	334	9	20,157	473
Hungary	66	7	14,095	68
Italy	77	14	35,485	119
Netherlands	72	8	16,379	198
Norway	44	10	8357	119
Spain	66	16	40,823	246
Switzerland	19	12	7064	229
UK	90	12	13,337	203
Total	992	117	19,828	191

*Figure 3.2   Institutions in the sample by number of undergraduate
                students, 2002*

than 1000 students while the two largest had more than 80,000 students (the
University of Bologna and the Universitad Complutense in Madrid).
However, all large universities in the sample (with more than 40,000 stu-
dents) come from Italy or Spain.

Due to variation and availability of data, most of the analyses in
Section 3 focus on a specific subsample. French data proved to be unusable
since it proved impossible to obtain figures on salaries of permanent staff
paid directly by the ministry. For Hungary, collecting time-series informa-
tion was problematic due to mergers, and complete data for Denmark were
not available when the analysis was performed. For full details on data
availability and coverage, the reader should refer to the CHINC reports
(Lepori et al., 2005a; Slipersæter et al., 2005).

3.3.2   Data Sources and Limitations

Data on funding and revenues that were collected for the institutions in the
sample are nearly identical with those contained in the Aquameth dataset
(see Bonaccorsi, Daraio and Lepori, Chapter 12, for full details). In short,
the following information was collected:

● total institutional revenues disaggregated by government allocations,
    tuition fees, grants and contracts and other revenues. Institutions
    were also asked to provide a breakdown of grants and contracts into
    subcategories (including private contracts); and
● total institutional expenditures.

Note that investments and capital costs have been excluded because of comparability problems due to differences in legal status, ownership and accounting systems, though we are aware that this is a major limitation. The time coverage for most institutions is from 1994 or 1995 to 2003 (see Slipersæter et al., 2005).

For most countries, data were retrieved from national statistical systems or higher education information systems. In two cases (Italy and Spain) the data came from rectors' conferences, but these manifested problems of coherency (for example, in time series). Finally, for Hungary and France data had to be collected directly from the universities, which compounded the data problems.

These results are noteworthy in the sense that they represent the first time that data have been collected for a sufficient sample of *individual* HEIs in *different* countries and over a reasonable period. At the same time, a number of comparability problems emerged that point to a need for urgent action (see Bonaccorsi, Daraio and Lepori, Chapter 12). A lack of usable data on expenditures in French institutions (since permanent staff are paid directly by the ministry), problems with time series due to mergers and restructuring (especially in the newly integrated countries) and a lack of disaggregated data on grants and contracts (including private contracts) all highlight some data shortcomings. Also, collecting the data from a variety of sources means that the quality and coherency of data varied: typical signs of these problems include jumps in time series for aggregate estimates of total expenditures or systematic and unexplained differences between total expenditures and total revenues.

Finally, collected data suffer from a number of comparability problems related to different accounting systems and practices (inclusion of student services, investments and capital cost accounting, coverage of university hospital costs) as well as differences across national higher education systems or within individual institutions (for example, subject mix). Disentangling these different effects is a huge problem for data analysis. Finally, a major issue affecting both cross-country and intertemporal comparisons is the lack of deflators and purchasing power parities (PPPs) specific to the higher education sector. It is well documented that HEI cost structures differ significantly from the average basket used in national accounts.

To cope with these difficulties, we adopted a twofold strategy. First, we chose indicators that were more robust against comparability problems, for example, those that avoid direct comparisons of funding and cost levels between individual institutions, which can be affected by differences in national accounting systems, the lack of sector-specific PPPs and different subject mixes. Second, we used qualitative information to check and to

explain quantitative results, including descriptions of the national systems available in the literature (see, for example, Amaral et al., 2002), as well as information on individual HEIs collected in CHINC (institution's descriptions; interviews; Salerno et al., 2006).

3.4   HIGHER EDUCATION FUNDING: A QUANTITATIVE ANALYSIS

In this section we present the empirical evidence based on the CHINC data concerning changes in institutions' funding levels and funding composition. We focus on two main issues: disentangling national effects from differences between individual HEIs and, second, examining changes over time. Although the sample is relatively large, it is not fully representative and the coverage of countries is quite different. As such any cross-country comparisons and national averages have to be interpreted with some care.

3.4.1   An Aggregated View at National Level

It is useful first to provide some aggregate information on tertiary educational expenditures in CHINC countries from international statistics (for example, OECD, 2005). We prefer to include the whole tertiary sector (ISCED 5A and ISCED 5B in the classification of educational levels) since the borders between the two domains are somewhat different between countries and can vary with time due to higher education reforms (like the creation of universities of applied sciences). Figure 3.3 shows that for CHINC countries expenditure levels represent between 0.9 and 1.5 per cent of GDP (the exceptional value of Denmark is due to the inclusion of part of the secondary education expenditures). There are, however, significant differences between countries in the share of private sources, which range between less than 10 per cent of the total in France, Germany and Norway to more than 20 per cent in Hungary, Spain and the UK. Note again that private expenditures include both contracts from companies and funds from private households as tuition fees (OECD, 2004). Moreover, Table 3.3 shows a general picture of increasing real expenditures on tertiary education in all considered countries.

These data also show the limitations of available higher education statistics. First, the data are aggregated at the national level and thus do not allow for an examination of institution-specific patterns. Second, the breakdown of funding sources between public and private is insufficient to discuss most of the issues concerning higher education funding.
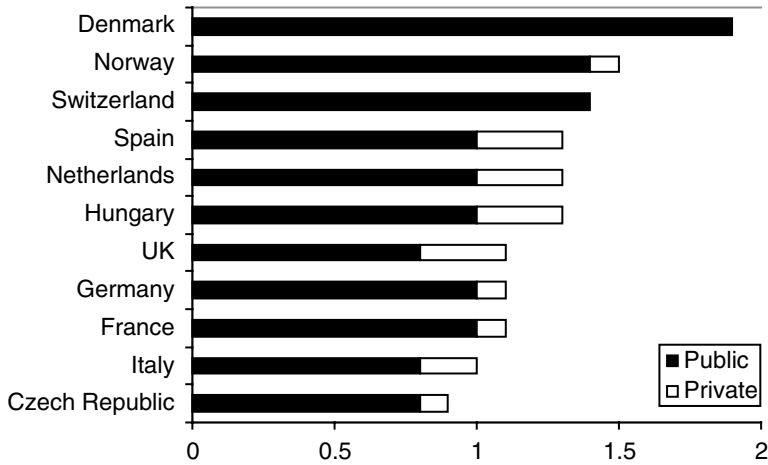
Source: OECD.

Figure 3.3 Expenditures of tertiary education institutions as % of GDP, 2002

Table 3.3 Changes in tertiary education expenditures in CHINC countries, 2003 (1995 = 100, data adjusted using GDP deflators)

	Public	Private	Total
Netherlands	106	NA	NA
UK	106	165	118
Germany	108	129	110
Norway	110	62	103
France	115	103	114
Italy	131	174	139
Denmark	134	482	136
Czech Republic	144	52	118
Switzerland	149	NA	NA
Spain	155	140	151
Hungary	158	174	161

3.4.2 How Have Funding Levels Changed during the Last Few years at the HEI Level?

The CHINC data show a general pattern of increasing total funding across all countries: of the 79 institutions for which we have time-series data, only
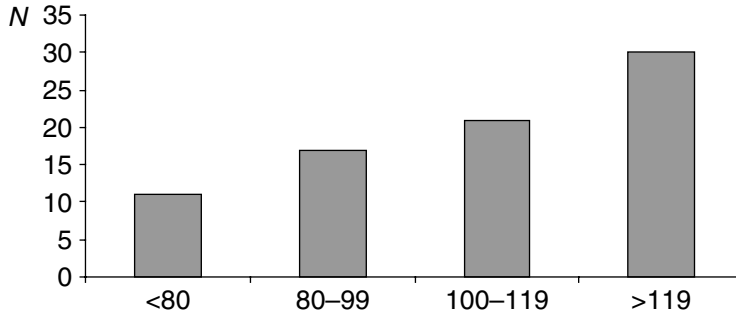
Note: N = Number of institutions in each class.

Figure 3.4   Total real revenue per student, 2003 (1995 = 100)

four had a decrease in total funds between 1995 and 2003, while the average
real increase (unweighted) was approximately 3 per cent per year. Even if
we consider the change in student numbers during this time as a very rough
measure of the educational workload, more than two-thirds of the institu-
tions witnessed an increase in total real revenue per student over this period
(see Figure 3.4).

    These results are open to different explanations. One is that fun-
ding cuts occurred mainly before the period examined here and especially
during the 1980s. A second is that for many institutions, enrolment
growth is effectively over. Thus, Figure 3.5 displays the change in
student numbers versus that in revenue per student. It shows that
approximately one-third of the institutions in the sample witnessed a
decrease in student numbers during this period and these were the insti-
tutions increasing their per-student revenues; at the same time, institu-
tions with a large increase in the number of students did not receive
proportional revenues and thus experienced a decrease in per-student
revenues.

    Note that these results cannot be readily interpreted as an improvement
in the institution's operating conditions or of more resources being avail-
able for research since we should also consider the effect of increases in real
wages for an institution's employees. However, the CHINC data do show a
general increase in academic staff and a remarkably stable ratio of students
to academic staff as well as a general increase in the number of PhD
degrees granted. These indicators point to a somewhat increased research
capability in the CHINC sample during the considered period (Lepori
et al., 2005a).
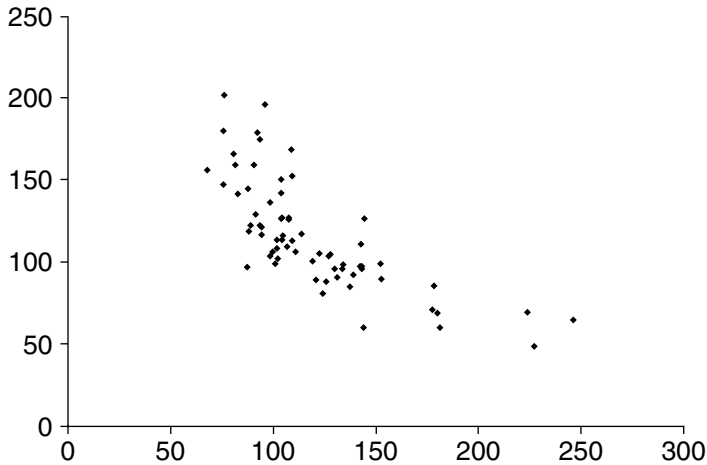
*Note:* X axis: number of students 2003; Y axis: total revenue per student at constant prices 2003.

Figure 3.5   Revenue per student versus number of students (1995 = 100)

3.4.3   Are General Government Allocations Becoming a Less Important Source of Funds?

Figure 3.6 shows the share of government appropriations of institutions in the sample in 1995 and in 2003. Note that in 2003, most institutions lie in the range between 60 and 90 per cent. Moreover, 10 of the 12 institutions below 50 per cent are in the UK. Second, our data confirm a general trend in the share of government allocations decreasing in the other countries, but this is particularly important for the institutions that started in 1995 with a share above 80 per cent. For those starting under 60 per cent, the changes were less dramatic. Thus, except for the UK, all other CHINC countries seem to be converging towards a situation where general government allocations account for about two-thirds of the institutions' revenues.

3.4.4   Are Tuition Fees Becoming a Major Source of Funds for HEIs?

Concerning tuition fees, our data for 2003 show quite distinct national patterns: namely, the share of tuition fees in total revenues tends to be similar for institutions in the same country, while differences between countries are more distinctive. The CHINC study included countries where fees are practically nonexistent, such as the Czech Republic, Germany and Norway, countries where they are set at low levels (the Netherlands and Switzerland)
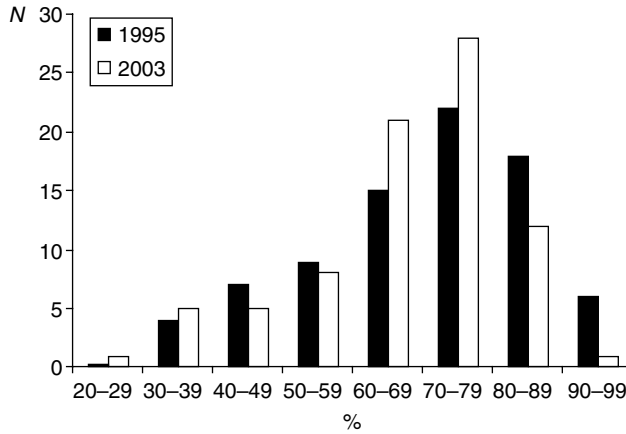
Note: N = Number of institutions in each class. Data for Italy for 2002.

*Figure 3.6   Share of government appropriations as % of total revenues*

and countries where they account for more than 10 per cent of the total revenues for almost all considered institutions (Italy, Spain). Some exceptional values are readily explainable, like the two *hogescholen* in the Netherlands which have a much higher share than universities and the high value of the University of Sankt Gallen in Switzerland, which is a business school with a very large postgraduate activity.

The major exception is the UK, where the share of tuition fees for individual institutions varies between 13 and 33 per cent. Moreover, Figure 3.7, which displays the share of grants and contracts against that of tuition fees for UK institutions, shows a clear negative correlation between them. In all likelihood this is a sign of specialization towards education – especially in the domains where high fees can be charged, for example, for non-UK/EU students or postgraduate education – and also towards research activities, where institutions show competitiveness in acquiring research funds.

Finally, practically no institution in the sample experienced a significant change in the share of tuition fees in the 1995–2003 period. Thus, in quantitative terms, the debate on the level of fees did not have a significant impact on higher education funding during the period considered here.

3.4.5 Are Grants and Contracts Increasing and Concentrating in Some Institutions?

While national patterns are clearly prevalent for tuition fees, for grants and contracts the differences between individual institutions are much larger.
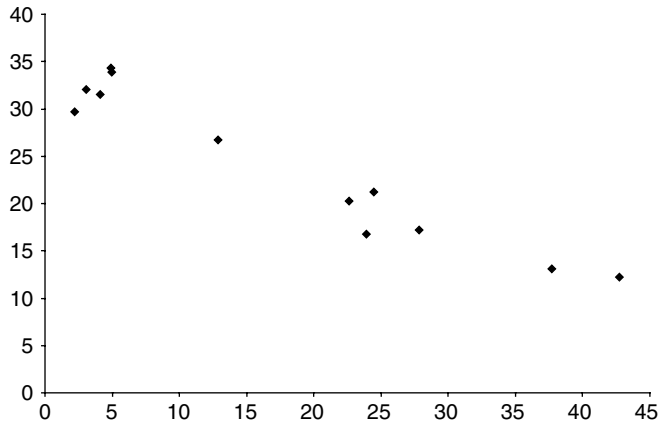
Note: X axis: % of grants and contracts; Y axis: % of tuition fees.

*Figure 3.7   Grants and contracts versus tuition fees, UK institutions
                only, 2003*

Some institutions in the sample earn more than a quarter of their total rev-
enues from grants and contracts while others earn less than 10 per cent from
these sources. In the top list there are some well-known research univer-
sities, such as Cambridge and Imperial College, as well as a number of tech-
nical and general universities. Moreover, the list includes institutions with
very variable size including some rather small ones (see Table 3.4). If we
assume that grants and contracts are roughly linked to the quality of
research – since most such funding is allocated competitively – then there
is no evidence from this sample that large institutions perform better in
research. The strong presence of institutions specialized in technology is
expected since project funds are likely to be more concentrated in these
domains than in human and social sciences.

Perhaps the clearest tendency in funding is the increase in the share of
grants and contracts for almost all of the institutions considered. If we
consider the short time frame the change is also significant, since more
than one-third of the institutions for which we have data doubled their
share of grants and contracts in total revenues between 1995 and 2003.
Also, Table 3.5 plots the change in the share of grants and contracts from
1995 to 2003 against the starting level in 1995; it shows that the increase
was actually largest for institutions starting with a level under 10 per cent,
meaning that there has been no tendency towards concentrating
project funds in some institutions. For example, 13 institutions had a
share above 20 per cent in 1995; of these, four experienced a decrease in

*Table 3.4   Institutions with a share of grants and contracts above 25%, 2003*

Name	Country	% grants/ contracts	Students
Imperial College of Science, Technology	UK	43	7365
Vysoká škola chemicko-technologická v Praze	Czech Republic	42	2229
University of Cambridge	UK	38	16,550
Universitet for miljø og biovitenskap	Norway	33	1986
Roskilde Universitet	Denmark	31	6639
Aarhus Universitet	Denmark	29	20,318
Technische Universität München	Germany	28	18,577
University of Aberdeen	UK	28	10,260
Université de Neuchâtel	Switzerland	27	2681
École Polytechnique Fédérale de Lausanne	Switzerland	27	4707
Norges teknisk-naturvitenskapelige universitet	Norway	26	16,197
České vysoké učení technické v Praze	Czech Republic	25	20,270

Table 3.5   Changes in the share of grants and contracts over total revenues

Share in 1995		Share in 2003 compared to share in 1995			
(%)	*N*	>0%	0–4%	5–9%	>10%
>20	13	4	4	4	1
10–19	23	6	8	4	5
0–9	32	2	11	12	7

this share in period considered, four an increase between 0 and 4 per cent and so on.

As expected, CHINC data show a correlation between the share of grants and contracts and the number of PhD degrees per undergraduate student, since at least in some countries we know that external funds are used to employ PhD students to carry out research (Figure 3.8). However, the most interesting result is that the slope of this relationship differs substantially by country. Thus, increasing the share of grants and contracts seems to have a much stronger impact on the number of PhD degrees in Germany, Switzerland and the UK than it does in the Czech Republic, the Netherlands and Spain. A possible interpretation, which should of course
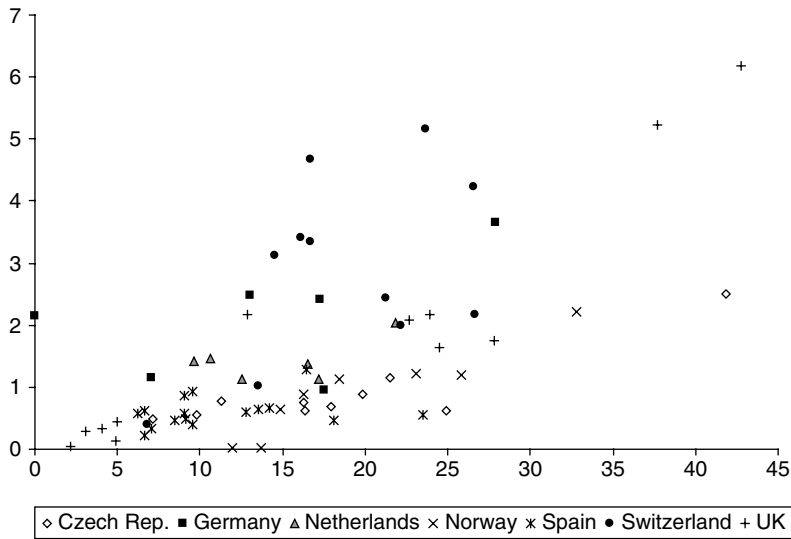
Note: X axis: PhD degrees per 100 undergraduate students; Y axis: % of grants and contracts over total revenues.

Figure 3.8   Relationship between PhD degrees and grants and contracts
for individual institutions in each country, 2003

be checked with more detailed national data, is that in the former countries a larger share of third-party funds is used to hire PhD students.

3.4.6   Are Private Companies Becoming a Key Source of Funds for HEIs?

This is the most difficult question given the scarcity of the available data; only five countries in CHINC managed to provide more or less complete information on private contracts (Germany, the Netherlands, Norway, Switzerland and the UK) and even here the quality and coverage of data are not considered to be good.

The available data show that private funds are a relevant source of revenues (exceeding 5 per cent of the total) for only a minority of the institutions. Most of these institutions are also either business schools or technical universities. As such, the low aggregate importance does not exclude the possibility that private companies are an important source of revenues in specific domains and that, in these cases, they have a strong impact on research.

Changes over time are even more difficult to assess since there are series breaks due to changes in definition and/or in methodology for collecting

data. An increase seems to be in evidence but the quality of data is too limited to draw any firm conclusion.

3.5 CONCLUSIONS

The quantitative data collected for the CHINC project provide some useful insights into the changes in funding for European HEIs over the last decade. However, before discussing these results, it is important to introduce a few cautionary remarks on the quality of the data presented and on the limitations of the sample considered.

Data for the most recent years (2003/02) clearly show the coexistence of national patterns for some categories and of institutional differentiation for others. The level of tuition fees is still essentially set at national level, even in countries such as Italy and Spain where legally there would be some room for differentiation. The major exception is the UK, where the share of tuition fees varies quite strongly from institution to institution. Given that this was the first country in Europe to create flexible fees, we can advance the hypothesis that in the next few years some differentiation will also appear in the other countries.

The UK is also exceptional among the 11 countries considered since it is the only country where the state has ceased to be the main funder of institutions (through general allocations) and where specialization is quite visible. Some institutions have a high share of tuition fees and a small share of grants and contracts, which likely means a specialization in education, while others display the inverse pattern with low revenues from student fees and high share of grants and contracts.

In the other countries, HEIs seem to have a certain degree of freedom in fund-seeking, increasing their revenues from grants and contracts. Differences between institutions in this respect are in fact quite large in all countries considered. What is more, data display an (expected) correlation between the share of grants and contracts and the number of PhD degrees. However, with the same share of grants and contracts, institutions in Germany, Switzerland and the UK have much higher numbers of PhD students than those in the Czech Republic and in Spain. Interpreting these results clearly requires a more detailed understanding of the differences in the production structure of HEIs in different countries (concerning, for example, the composition of third-party funds and the role of PhD students in research).

The analysis of the evolution over time also displays some interesting trends, even if the period (eight years) has to be considered as very short for institutions like universities. Namely, our data show that there has been

no general decrease in the available resources (in constant prices and per student) over the period considered. The number of academic staff per student decreased for half of the considered institutions, but increased for the rest; linked to a general increase in the number of PhD degrees per undergraduate student, these data lead to the hypothesis that there has been no general decrease in research intensity in European HEIs over the last decade, or a shift towards education.

Moreover, our data show a substantial rigidity of the resources with respect to the number of students: thus, institutions that increased significantly their number of students did not receive additional proportional financial resources, while those with decreasing numbers (as, generally, in Norway and Spain) kept a large part of these resources. In a setting where student fees are fixed – and in most countries account for a limited part of revenues – trying to get more students seems not to be a feasible strategy for universities to receive more resources.

Also, in all countries and for most institutions, changes in the composition of revenues have been rather limited: there is some general decrease in the share of government appropriations matched by an increase in grants and contracts, but this shift has not altered fundamentally the structure of funding. At the same time, there has been practically no change in the share of tuition fees. Except for the UK, most countries in the sample seem to have evolved towards a funding model where general government allocations account for about two-thirds of total funds and the rest is provided by grants and contracts and, to a more limited extent, by tuition fees.

Summarizing, our data show a much more differentiated situation between countries and between institutions and a less dramatic pattern of change in higher education funding than normally assumed. Thus, total funds increased in real terms in the 1995–2003 period and probably research capacity also increased somewhat. Moreover, while in all countries there has been a reduction of government allocations as a share of total revenues and a shift towards project funding, no country in the decade considered realized such a radical change in the structure of funding as the UK did in the 1980s.

NOTE

of Budapest, Hungary; the Scuola Superiore, Sant' Anna di studi universitari e di perfezionamento, Italy; the Centrum für Hochschulentwicklung (CHE) in Germany; the Institute for Innovation and Knowledge Management (INGENIO), Spain; and the Science and Technology Policy Research Unit, University of Sussex, UK.

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