Higher Education (2006) 51: 589–617
DOI 10.1007/s10734-004-1905-y

Towards decentralized and goal-oriented models of institutional resource allocation: The Spanish case

MARÍA JOSÉ GONZÁLEZ LÓPEZ
University of Granada, Department of Financial Economy and Accounting, Faculty of Economics and Business Administration, Campus Cartuja s/n, 18011 Granada, Spain, Phone: 0034958248339; Fax: 0034958246249; E-mail: mglopez@ugr.es

Abstract. The search for more flexibility in financial management of public universities demands adjustments in budgeting strategies. International studies on this topic recommend wider financial autonomy for management units, the use of budgeting models based on performance, the implementation of formula systems for the determination of financial needs of units and the signing of management goal-oriented contracts between decentralized units and the central administration of each institution. In this article we present a descriptive study of processes of internal resource allocation in Spanish public universities, with the following aims: firstly, to know the degree of introduction of normative models of internal resource allocation, the type of mechanisms applied and the variables on which such schemes are based; secondly, to analyse the degree of influence of regional funding models of higher education on the allocation of resources within each university; and, finally, to estimate the degree of delegation in financial management. In general, this study reveals the embryonic state in which Spanish universities are regarding a more strategic distribution of funds within institutions, although we have come across some universities with more innovative approaches to management.

Keywords: decentralization of management, formula funding, internal resource allocation, performance-based financial incentives, public financial management, university budgeting.

Introduction

Spanish University System has experienced a large number of legal and organizational changes since the mid-eighties. The 1983 University Reform Act characterized Spanish Public Universities as public institutions with their own legal entity providing a limited degree of academic, economic and financial autonomy. Although they were defined as self-governing bodies, they have been highly dependent on public funds (in the year 2002, 78% of their income came from public resources – Hernández Armenteros 2004). Therefore, in practice their degree of autonomy has been somewhat limited.

The relationship between universities and government has also been altered. Between 1985 and 1996 a decentralization process took place in which responsibility for public higher education passed from the central government to the governments of the 17 autonomous regions into which Spain is organized. This process produced a favourable climate for the reflection on the best funding mechanisms to introduce a more rational resource allocation. In this direction, in the year 2000, a comprehensive study on the Spanish University System, known as Bricall (2000) Report, was published, in which the need to improve funding mechanisms of higher education was reinforced and also, the new 2001 Law on Universities stated that these institutions could prepare long-term plans which could lead to the approval of agreements and contractual programmes by autonomous governments, in which objectives, funding and performance evaluation criteria were clearly established.

In this context, processes of resource allocation in higher education systems are experiencing important changes. As in many other countries, there is an increasing use of normative and contractual models for public funding of universities. Normative funding models make use of objective and standardized criteria to determine and distribute funds between universities in order to rationalize the process of resource allocation. Contractual models are agreements between the government with authority in higher education and universities about the definition of objectives to be reached by institutions, measures of achievement and resources attached to the improvement of quality. Both types of mechanisms are frequently combined in regional funding models of higher education (see González López 2003).

In the institutional level, internal resource allocation mechanisms are also changing. Many institutions of different developed countries are advancing towards more decentralized budgeting mechanisms (Mims 1980; Hackman 1985; Brown and Wolf 1993; Berry 1994; Otten 1996; Strauss 1996; Aceto et al. 1998; Jongbloed 1998; The University of Birmingham 1998; among others), so that identifiable decentralized units have greater autonomy in the management of their budgets in order to achieve certain goals. The purpose is to combine the strengthening of intrinsic values of institutions with the introduction of some signals to make management units more concerned about changes in the market (Massy 1996). The assumption behind these approaches is that a larger degree of delegation in management, as well as a greater orientation of funds towards results, can lead to an improvement in the quality of universities in the provision of social service of higher

education – as it is stated, for example, in the report published by the Association of European Universities (Jongbloed et al. 2000).

Although this phenomenon has been studied in depth in the United States and in some European countries, the Spanish case has not been exhaustively dealt so far. The main motivation of this research is to contribute to fill this gap and study the implications of these trends towards decentralization in the control of resources. In this sense, we have analysed the mechanisms employed by Spanish public universities to allocate funds internally to their different decentralized management units. Decentralized units in this context are those units having their own structure and specific academic and administrative functions into which Spanish universities are legally organized (departments and centres – faculties, technical colleges and university schools).

We have structured the rest of this paper as follows: in the next section we present the theoretical framework of the study, the research questions and the sources of information we have used; in the three following sections we analyse the data, in relation to the objectives that we had set out. In the last section we present the main implications of the study.

Theoretical approach and data sources

The reform of resource allocation mechanisms in public universities is part of a wider process of change in management in the search for a more efficient use of public funds. As it was stated by the O.E.C.D. (1990, p. 55), ''there can be little doubt that the ways in which higher education institutions receive their funds affect their incentive, and hence influence their internal organizational behaviour and the composition of the academic services they provide''. To this effect, educational policy-makers have been introducing new resource allocation mechanisms (to and within universities) which try to break with traditional ones (incremental funding, line item budgeting, etc.) and use funding as a way to guide educational systems in the desired direction, increase competitiveness and financial autonomy and introduce more market signals (see Williams 1992). Bearing this idea in mind and focusing our analysis in the distribution of funds within universities, the research questions studied in this paper are:

(1) What kind of internal resource allocation mechanisms are in use in Spanish universities and what can we expect from them in terms of improving management?

(2) Can we find evidence of an influence of regional funding models of Spanish universities on the internal mechanisms applied by them to allocate resources between their different academic units?
(3) Are academic units in Spanish universities increasing their financial autonomy through the decentralization of resource management?

(1) The first question is related to the elements of internal resource allocation mechanisms. As in funding models of universities, internal resource allocation methods tend to replace incremental line item budgeting, in which each single item of expenditure of the budget is increased (or decreased) with respect to the budget of the previous year, with models which can be classified into two main groups: formula models and contractual agreements.

First ones calculate and allocate funds according to formulae or procedures based on objective data. They usually determine the need of funds of an academic unit through a simple algorithm which is the product of the volume of inputs or outputs of teaching and/or research activities and a theoretical unitary cost. In the so-called input-oriented mechanisms funds are linked to the inputs used by academic units in their production process which are considered to comprise both resources used to provide the service – personnel, material equipments, etc. – and the collaborating agents – students. Models based on enrolment or the size of staff are the most frequently used. In output-oriented models funds are linked to the results achieved by academic units in their teaching and research activities. The main problem of this last type of models is that it is very difficult to identify and quantify educational outputs; in practice, indicators are used as proxies to assess performance.

In contractual agreements funds to be allocated are linked to the accomplishment of certain goals or requisites which are previously agreed between the university central administration and each academic unit. As in formula models, there are input-oriented contracts (such as those which pay a certain amount of money if the number of enrolled students is over a certain level) and output-oriented contracts (funds for each doctoral dissertation presented, for example).

Although there are differences of opinion about the effect of both formula and contractual models on the improvement of university management, in general, they both introduce elements which are supposed to improve university financial management: a clear identification of the elements of the production process, the definition of standardized costs which assume an efficient use of funds and more transparency in the allocation criteria so that units can approximate the

amount of funds they will receive in the future (making financial planning possible, reducing political pressures and favouring accountability).

As regards the effects of introducing output-oriented mechanisms, although there are arguments to support a positive impact of their implementation on performance (see United States General Accounting Office 1997), there are not conclusive studies in this sense (see, for example, Ziderman 1994; Jongbloed 1998; Liefner 2003). Experiences in performance funding and budgeting lead to highlight the advantages of this kind of approaches, but they also warn of their complexity (Seppanen 1998) and the aspects to take into account to implement them successfully (Joyce 1993; Galther 1997; Aceto et al. 1998; Layzell 1998). In Spain, there has been an important movement towards quality and performance evaluation in the higher education sector, but output-oriented funding mechanisms are not so widely used. Only few regional funding models of universities have recently introduced financial incentives linked to improvements in results (those of the Autonomous Regions of Valencia, Canary Islands, Castile and Leon or Catalonia). Therefore, we do not expect that output indicators are included in university's internal allocation models, except for those cases in which the regional funding model of universities make use of them.

(2) This leads us to the second research question. One of the hypotheses usually considered when studying resource allocation mechanisms is that the introduction of a certain funding model by the government responsible for the financing of higher education will influence institutional behaviour and the way funds are internally allocated to decentralized units (see, for example, Taylor 1991, p. 209; Woodhall 1992, p. 147; and Jongbloed 1998, pp. 7–12). In this sense, a result-oriented funding model would encourage universities to pay special attention to performance with the aim of getting more public funds. In some countries, such as Finland, the impact has been evident (Rekilä, et al. 1999).

In Spain, most regional funding models of universities use formula funding to determine core funding and contractual funding to incentive quality and promote the achievement of objectives that are considered strategic. We suspect that a positive association can exist between these regional funding models and internal resource allocation mechanisms.

(3) And finally, we have analysed the degree of decentralization of financial decisions within universities. Decentralized resource management is a process that combines the delegation of more autonomy of

management with a higher accountability over it. It is considered to be positive to increase flexibility, responsibility and transparency in the use of public funds (see Massy 1990; Commonwealth Higher Education Management Service 1998; Jongbloed, et al. 2000). And there is also a decisive financial objective behind these decentralizing processes: the concern of management units about income generation would be higher. In spite of its doubtless advantages, and that most university systems of developed countries seem to be advancing in this direction, this type of approach is not free of critics, mainly related to its difficult practical implementation: the need for appropriate information systems, the problems of coordination of decentralized units or the difficulties in aligning units' objectives and university's aims, among others. In any case, the prevailing opinion seems to be that benefits of decentralization outweigh the disadvantages (see, for example, Flynn and Strehl 1996, pp. 263–265).

Although the configuration of universities in Spanish legislation confers their essential teaching and research functions to decentralized units, there are also legal constraints to the management of certain budgetary items, such as, for example, the costs of personnel. These limitations, together with a long tradition of bureaucratic control (with many of their elements still present) lead us to expect a low degree of financial devolution in Spanish universities. However, as the 2001 Law on Univerisites has opted for a model of university where self-government and entrepreneurial features are reinforced, it is possible to expect changes in financial and organizational arrangements within institutions in the future.

To answer these questions, we have carried out a survey among Spanish public universities. According to statistics of the Spanish Council of Universities for the academic year 2001/2002, the Spanish university system comprised 66 universities, 49 of them public (Consejo de Universidades 2002).

With respect to the data sources we have used, these have been secondary and, mainly, internal:

- Initial budgets of Spanish public universities, in which they usually define the criteria used for the determination and distribution of funds corresponding to decentralized management units.
- Any other documents, internal regulations or publications to which we have had access and that came to complement such information.

Although we considered the possibility of going to primary sources, the examination of existing ones gave us, in general, enough information to respond to the objectives of the study. However, where this was not

possible, we contacted the people in charge of services of planning and budgeting of those universities, in order to ask for the suitable complementary information.

The detail of universities we have analysed in this study is shown in Table 1. We have excluded from it those universities whose initial budgets do not contain any information on the criteria of internal resource allocation and we could not have any additional document. Consequently, the sample used for the study of processes of allocation of funds to decentralized units is made up of 30 public universities out of the 49 of total sector (more than 60% of the entire population of public universities).

Table 1. Sample of Spanish public universities for the descriptive study

University	Abbreviation	University	Abbreviation
University of Castilla La Mancha	UCLM	University of Las Palmas de Gran Canaria	ULPGC
University Complutense of Madrid	UCM	University of Malaga	UMA
University of Balearic Islands	UIB	University of Murcia	UMU
Universidad of Alcala de Henares	UAH	University of Salamanca	USA
University of Alicante	UAL	University of Seville	USE
University of Almeria	UALM	University of Valencia	UVA
University of Cadiz	UCA	University of Valladolid	UVALL
University of Cantabria	UCAN	University of Vigo	UVI
University of Cordoba	UCO	University of Zaragoza	UZA
University of Extremadura	UEX	University Jaume I	UJI
University of Girona	UGI	University Pablo de Olavide	UPO
University of Granada	UGR	Technical University of Catalonia	UPC
University of Huelva	UHU	Technical University of Valencia	UPV
University of Jaen	UJA	Public University of Navarra	UPN
University of La Rioja	ULR	University Rovira i Virgili	URV

Criteria for the allocation of decentralized funds and financial incentives in Spanish public universities

In this section we concentrate on the first research question. The analysis is focused on delegated funds assigned to decentralized units so they can manage them autonomously. In practice, these are funds to cover operating expenses and some small capital investments of decentralized management units, as personnel budget is usually centrally managed.[1]

We have distinguished between the three previously identified types of resource allocation models: incremental line item budgeting, formula budgeting and funding agreements. The study shows that Spanish public universities, in general, tend to determine a lump sum to assign to units in an incremental way from the previous budget, that is, the global amount of money to be given to decentralized units altogether is calculated by increasing/decreasing the budget of the previous year in a certain percentage (to reflect inflation, new programmes, etc); then, most universities distribute that money between different units according to objective variables, using formulaic approaches.

Only two universities use a mechanism which is different from the formula model. First one is the University of Cadiz, where the traditional form of line item budgeting is still used. The second case, the one of the University Jaume I, is very different, in as much it is an example of a more innovative management. This institution is involved in a process of strategic planning and part of the budget is assigned to units according to the targets and courses of action agreed between each one of them and the Rectorship. The initiative is quite new in Spanish universities where, though several experiences in the implantation of processes of strategic management already exist, in general they do not link internal resources to them. Even though there is a general consensus about the importance of information about the results that are reached by universities, this does not occur when it is to link public funds to such results.

As regards the variables used for the distribution of funds in formula models, we analyse next the case of departments and centres separately.

Criteria for resource allocation to departments

The main functions of departments are the coordination of teaching activities of their discipline in one or more faculties/schools and the support of teaching and research initiatives of their staff. In approximately half of the budgets we have analysed, variables related

both to teaching and research were considered. And just in one case variables related to management were also included. In the rest of universities they considered variables referring only to teaching.

Indicators related to teaching and learning

Teaching and learning indicators considered in departments funding can be classified into two groups: those more related to teaching inputs and processes, and those related to outputs and outcomes of this activity. Regarding the first group, Table 2 details the information. The third column of this table indicates the number of institutions that use each type of indicator. The last one shows the percentage of the whole sample (26 institutions for the case of formula models in departments) that these universities represent.

As can be seen, most universities introduce some indicator related to enrolment of the department (enrolled students in 53.8% of universities and registered credits in 26.9% of them). In most institutions, such measures receive the highest weight in the resource allocation formula (between 30% and a 50% of total funds). Enrolment is heeded exclusively in its quantitative dimension, as no indicator of initial characteristics of students is considered. However, it is usual to weigh this indicator according to the intensity of studies (6-month, annual), or to the experimental nature of them (or to both aspects), in order to reflect the different cost of teaching. The number of different tariffs for disciplinary fields is usually around 4 or 5 (although this number varies from one university to another) and, frequently, it is related to the number of different registration fees levels established by the regional government for different courses, although we must say that the fixing of these prices is quite arbitrary.[2] We have not come across any case in which scale economies are taken into account in the allocations to departments, that is, prices are the same regardless of the number of students enrolled in subjects of each department. Finally, some universities distinguish between theoretical and practical lessons. They determine the cost of practical ones, which is used as weighing factor.

In all the cases, an indicator regarding the size of the teaching and research staff of each department (84.6% of universities) or their teaching workload (26.9% of cases) is considered, with an average weight in fund allocation of, approximately, 36%. In principle, if the number of academics is proportional to those needed to meet the demand (measured through enrolment), we could think that this variable is somehow redundant as both measures, students enrolled and number of academic to provide the service to them, are related to the

Table 2. Types of indicators of teaching and learning resources and processes of departments incorporated to mechanisms of internal resource allocation in Spanish public universities

Type of indicator	Universities	Freq.	%
Number of enrolled students	UIB, UJA, ULPGC, UMA, ULR, USA, UHU, UVA, UZA, UAH, UALM, UAL, UCO, USE	14	53.8
Number of registered credits	UAH, UCO, UMU, UPO, UGR, URV, UVALL	7	26.9
Size of the teaching staff [a]	ULR, USA, UAH, UAL, UCLM, UGR, UHU, UIB, UJA, ULPGC, UMA, UMU, UPO, UPC, URV, UVI, UPN, UVALL, UALM, UCO, UGI, USE	22	84.6
Teaching workload of staff	UCAN, ULPGC, UPN, UZA, UHU, UPV, UVA	7	26.9
Number of subjects taught by the department	UPN, UJA, USE	3	11.5
Enrolment in postgraduate programmes	UCAN, UCO, UGR, ULPGC, UPC, UPN, UJA	7	26.9
Number of postgraduate programmes	UCO, UGR, UJA	3	11.5
Degree of interdepartamentality, interdisciplinarity, stability or interest of doctoral programmes	UGR, UPC	2	7.7
Practical lessons	ULPGC, UPN, UIB, UZA	4	15.4
Number and type of discipline areas	UAL, UJA, ULR, UPN, USA, USE, UVALL	7	26.9
Number of different campus in which the department teaches	USE, UVALL, UZA	3	11.5
Material resources or specific requirements	UPC, UPN	2	7.7

[a]Full time equivalent teaching staff in most of the cases.

same variable: demand for access. However, the design of academic staff depends not only on the total number of students enrolled but also on the size of groups for different types of lessons (lectures, laboratory, workshops, etc.), which can affect the quality in the provision of the services. Besides, historical circumstances (as different levels of demand

in previous years) or the political power of different departments, have determined the configuration of staffs which, some times, are not related to those necessary to attend the demand. In any case, most universities that incorporate both variables – enrolment and teaching staff – are considering implicitly that allocated resources are also going to cover the needs of funds derived from the research activities of the academics. Besides, three Universities take into consideration the academic category of staff, in order to adjust for the quality of this resource.

The indicator that follows in importance, as far as frequency of use is concerned, is the one related to the number of different disciplinary areas of departments, although its weight in the allocation formula is much lower. Many institutions also introduce measures related specifically to postgraduate programmes. The number of enrolments is the most widely used indicator and some universities also award the interdisciplinary nature of programmes and other variables that could have a positive effect on the quality of these courses. The rest of indicators related to inputs or to the productive process of universities are not very important in resource allocation in most institutions.

More briefly, as they are scarce and have a very low weight in the models (they are used to allocate, at best, 10% of resources), we can review indicators related to the results of the teaching activity of departments, which are illustrated in Table 3.

We can distinguish four types of result indicators: (i) those related to the achievements of students: repetition rates, percentage of exams passed over enrolments or number of project dissertations presented by students; (ii) those related to the teaching quality of academics; (iii) for postgraduate programmes, the recruitment of students is considered as a result, and not only an input indicator of the teaching process; (iv) finally, the University of Valencia, according to the priorities of its regional government, also rewards teaching activities in Valencian language.

We can conclude this part of the analysis by saying that Spanish universities, when funding the teaching activity of their departments, prefer to use criteria related to the needs of resources of these units according to the tasks they will develop; therefore, indicators of inputs or, in some cases, of the production process, are widely used.

Only in five of the universities of the sample have we been able to find some link of the budget to the results of the teaching activity. This type of indicators usually appears in those autonomous regions in which the government makes also use of an output-oriented funding model for the higher education sector. The indicators finally used in the internal allocation are not always the same to those of the model used to finance

Table 3. Indicators of results of the teaching activity of departments incorporated to mechanisms of internal resource allocation in Spanish public universities

Indicator	Universities	Freq.	%
Number of students to be funded according to repetition rates	UALM	1	3.8
Passed credits/enrolled credits in the previous year	UVA	1	3.8
Research projects and dissertations	ULPGC	1	3.8
Quality of teaching (assessed by the Quality Commission)	UCO	1	3.8
Indicators of teaching results of academics	UPV	1	3.8
% of academics with a teaching assessment superior to the average	UVA	1	3.8
% of enrolled credits in doctoral programmes in the previous year	UPV	1	3.8
Number of enrolled students/credits in postgraduate programmes	UVA	1	3.8
Number of registered credits in valencian groups/total registered credits	UVA	1	3.8

the university system; nevertheless, the influence is remarkable. In the next section we will go into this topic in greater depth.

Indicators related to research

As we have done with teaching, we have also analysed the indicators used for resource allocation to departments related to the means needed to develop the research activity. And we have found just one institution, the Technical University of Catalonia, in which an indicator of this type is used: that of full time equivalent academics. The same does not happen when we look for indicators related to the results of such activity. Half of the universities of the sample introduce some indicator of this type or link part of the resources to the assessment of the research activity by the institution. We have summarized this information in Table 4.

The diversity of indicators is so high that only one of them, the number of doctoral theses defended in the previous year, is repeated in two institutions. We can say, however, that Spanish universities, regardless of the specific definition of measurement indicators, reward research according to three basic aspects: number of dissertations and doctoral theses defended by members of each department; research

Table 4. Types of indicators of results of the research activity of departments incorporated to mechanisms of internal resource allocation in Spanish public universities

Type of indicator	Universities	Freq.	%
Indicators related to the achievement of ''research aptitude'' by doctoral students[a]	UGR, UVA	2	7.7
Doctoral dissertations defended	UCO, ULPGC, UPC, UGR	4	15.4
Quantity and/or quality of the scientific production of the members of the department	UAL, UIB, UVALL, UJA, UAH, UCO, UPC, UVA, UVI	9	34.6
Income earned from external activities	UPC, ULPGC, UALM, ULR	4	15.4
Number of research studentships from the Ministry, the Autonomous Community or the University	ULPGC	1	3.8

[a]In Spain, when doctoral students finish doctoral courses, they usually have to pass a public exam in which they have to show their research abilities (and sometimes they also have to defend a research project) so they achieve the so call ''research aptitude'', which is a prerequisite for the presentation of the doctoral dissertations.

production, externally or internally assessed; and income earned by research activities regarding projects, agreements, etc.

We can conclude that Spanish universities, when trying to implement more output-oriented internal resource allocation mechanisms, prefer to do it in the research field. It seems to be generally accepted that research has to be assessed and that only those departments which prove to be excellent in this activity, will deserve additional funding.

Indicators related to administrative activities

Although these indicators have limited weight in the funding of departments, we refer, briefly, to some examples incorporated in some universities to stimulate the improvement of several aspects of their administrative management or, simply, to reflect the cost of carrying out these tasks. Only three institutions in the sample have established some indicators of this nature. Their descriptions are detailed in Table 5.

Table 5. Indicators related to administrative activities of departments incorporated to mechanisms of internal resource allocation in Spanish public universities

Indicator	University	Freq.	%
% of modification in credit for bibliographic purchases when the budget of the year comes into effect	UJA	1	3.8
% of budgetary credit for bibliographic purchases which has been used/total credit by the end of the year	UJA	1	3.8
Budget for bibliographic purchases committed/available budget before October	UPN	1	3.8
Budget for bibliographic purchases used/available budget from the previous year	UPN	1	3.8
Dedication of academic staff to administrative activities	UPC	1	3.8
Number of academics per campus and distance between each campus and the department	UPC	1	3.8
Distance between the department and the Rector's office or to the centre in which the head of department is assigned	UPC	1	3.8

Criteria for resource allocation to centres

As the essential task of faculties, colleges and schools consists of organizing the teaching function, in this part of the analysis we do not distinguish between teaching and research variables. We have maintained the differentiation between indicators of means and results.

Table 6 summarizes the type of indicators related to the inputs and processes of centres which are applied by the universities we have examined. The sample for which this information was available was composed of 24 institutions.

Again, most frequent input indicators are enrolments (some times weighted to take scale effects and/or academic disciplines into account) and number of academics or their teaching workload. The average weight of these types of indicators is around 50% and 20% respectively. The third type of indicator in importance is that related to the size and age of centres, because of their maintenance and running costs. The weight that universities give to the indicator fluctuates around 10%. The number of different degrees taught, which results in greater complexity of the organization of studies, is also considered in some mechanisms. The rest of indicators are not relevant.

Table 6. Types of indicators of resources and production process of centres incorporated to mechanisms of internal resource allocation in Spanish public universities

Type of indicator	Universities	Freq.	%
Number of enrolled students	UAL, UCAN, UCLM, UCM, UCO, UEX, UGI, UGR, UHU, UJA, ULPGC, ULR, UMA, UPC, UPO, URV, USA, USE, UVA, UVALL, UVI, UZA	22	91.7
Number of registered credits	UCM, UMU, UPV, UVA, UVALL, UVI	6	25.0
Size of the teaching staff	UAL, UCM, UCO, UEX, UHU, UJA, ULR, URV, USE, UVI	10	41.7
Teaching workload of staff	UCO, ULPGC, UPV, UZA	4	16.7
Size and age of buildings	UCM, UCO, UEX, UGR, UVI, UZA	6	25.0
Number of degrees taught	UAL, UJA, ULPGC, ULR	4	16.7
Other types of indicators	UCM, UGI, ULPGC, UMU, UPC, UVALL, UVI, UZA	8	33.3

As regards indicators related to output of centres, only three universities introduce them, as it is shown in Table 7. The average weight of these indicators in the resource allocation to centres is, in these three institutions, near 20%.

There are two types of measures related to results repeated in more than one institution, although with different specific indicators. The first one is the number or percentage of graduates. These indicators are more significant in the resource allocation to centres than to departments, as the last ones are responsible for specific subjects, while centres are in charge of degrees. The drawing up of curricula, the conditions in which teaching service is delivered, the regulations of student selection, the size of groups, the cooperation in the organization of bibliographical funds, etc., have an important impact on the teaching-learning process and depend directly on centres; that is why it seems reasonable to link part of the resources to the rate of students success. Secondly, there are some indicators which try to reflect the ability of centres to encourage and facilitate the participation of students in complementary activities, like those derived from mobilities within international programmes of exchange or practices in companies.

We can conclude by stressing the low weight that measures of results have at present in the budget allocation to faculties and schools in

Table 7. Indicators of results of centres incorporated to mechanisms of internal resource allocation in Spanish public universities

Indicator	University	Freq.	%
Number of graduates weighed by credits of the degree	UPC	1	4.2
Number of students who have studied all the credits of the degree	UPV	1	4.2
Number of graduates/number of students n[a] years before	UVA	1	4.2
Number of students in international programmes	UPC	1	4.2
Number of months spent by students in exchange programmes	UPV	1	4.2
Number of months spent by students in exchange programmes/number of full time equivalent students	UVA	1	4.2
Number of months spent by students in practical training	UPV	1	4.2
Number of students in practices/number of students that can apply for practices	UVA	1	4.2
Number of full time students/real number of students	UVA	1	4.2

[a]Being "n" the scheduled length of the degree.

Spanish public universities. When this type of financial incentives is introduced, they are mainly related to teaching products. If we take into account that centres are in charge of enrolments processes, among other administrative tasks, we think that indicators referring to results or quality in these services are missing.

Degree of influence of regional funding models of higher education

In order to answer the second research question, that is, to contrast for the Spanish case the hypothesis of the influence that external funding models of universities can have on internal resource allocation schemes, we have compared the criteria used by universities sited in autonomous regions whose governments have introduced normative or contractual funding models with those used by governments to allocate funds to universities. Although the description of different regional approaches exceeds the scope of this article, we will mention their general features to facilitate the understanding of this section.

As autonomous regions are responsible for higher education, we can not talk about a common model for the public funding of all Spanish universities. However, we can observe that different approaches tend to a similar scheme of formula to calculate basic funding (inspired in the one implemented in the Autonomous Region of Valencia), completed with contractual mechanisms to stimulate quality. In this sense, core funding is calculated through a formula which is a standardized average cost per full time equivalent student (FTS). These estimations are based on the costs that would be needed to provide the educational service to a FTS: personnel costs, other current expenditure and, in some cases, maintenance and amortization costs of capital investments. Specific assumptions about subjects of study, size of teaching groups, teaching workload of academics, staff salaries, number of credits to define a FTS or equipment needs per student are taken into account. And it is precisely in the values of the weights in each element of the formula where the models applied in each autonomous region usually differ.

As regards contractual funding, this is used in all the cases as a supplementary stream of funds which is conditioned to the achievement of previously set goals or programs (which can be the same for all the institutions of the region, or different for each university according to their strategic plans). The assessment of these contracts is made through indicators and in most cases output measures receive the highest weight.

Once we have presented the structure of these financial schemes, Table 8 illustrates the specific links we have found between internal and external funding models for different autonomous regions: Andalusia, Canary Islands, Catalonia, Valencia and Galicia.

If we begin with Andalusia, we can observe that only one of the eight universities we have analysed allocates part of funds to departments following one of the parameters introduced in the Andalusia distribution model; in particular, the normalization of the number of students to be funded. In the rest of institutions, although some concepts are common to those used by the regional government (number of credits, age of buildings, etc.), indicators and weights used are significantly different. Perhaps the main explanation of this low influence can be found in the limited implementation of the regional model of funding higher education, as the funds corresponding to each university have not been practically altered by its application so far.

In the Canary Autonomous Region, it is difficult to find a clear correlation between the allocation criteria to decentralized units used by the University of Las Palmas de Gran Canaria with the objectives of the first Contractual Agreement signed in 2001 by the government and this

Table 8. Degree of influence of the regional models of funding in the internal resource allocation in Spanish public universities

Autonomous Region	University	Degree of influence	Criteria
Andalusia	UALM	≅ 22.75% (departments)	Students to be funded according to the academic participation formula
Canary	ULPGC	–	Income earned from research projects in the previous year Income earned from agreements in the previous year
Catalonia	UPC	≅ 33% (centres) ≅ 69.5% + complementary funds + doctoral programmes improvement funds (departments)	Number of registered credits in postgraduate programmes Doctoral programmes of specific interest Research points obtained Technology transfer points obtained Resources earned from agreements, European projects and public funding Number of doctoral dissertations defended Number of graduates Number of students in international programmes
	UGI	–	Funding from grants of the General University Office
Valencian Community	UAL	≅ 75% (departments)	Full time equivalent students weighed by type of discipline Full time equivalent academic staff
	UJI UPV	–	Registered credits Credits registered by students Number of enrolled students Credits taught in lectures and practical lessons Incentive for graduates Incentive for participation of students in exchange programmes Incentive for participation of students in business sector practices

Table 8. continued.

Autonomous Region	University	Degree of influence	Criteria
			Incentive for favourable results in the academic staff assessment programme
			Incentive for students in doctoral programmes
	UVA	≅ 92.5% (centres) ≅ 87.5% (departments)	Full time equivalent students
			Registered credits weighed by type of discipline
			Teaching workload in credits of academic staff
			Incentive for passed credits
			Incentive for graduates
			Incentive for participation of students in exchange programmes
			Incentive for participation of students in business sector practices
			Incentive for credits taught in valencian language
			Incentive for favourable results in the academic staff assessment programme
Galicia	UVI	–	Experimentality (type of discipline)

University. Only the financial incentive to departments related to income from projects of research and agreements is similar to one of the key points of the contract.

In the case of Catalonia, as contractual programmes for the improvement of quality in universities (which have been agreed between the regional government and each university) have been drawed up taking into account the strategic plans of each institution, we can find important links between the internal and external resource allocation criteria. Thus it happens, to a great extent, in the Technical University of Catalonia that, for the case of the resource allocation to departments, considers the credits registered in postgraduate programmes, the development of specific programs of doctorate and the number of theses defended, which are also goals in the contractual program; at the same time, it has set up a scoring system for research and technology transfer activities which makes use of many of the indicators formulated in the contract.

The University de Girona, on the other hand, ties 70% of allocation to centres to the funding coming from the General Office for Universities and to incomes from enrolment. This implies that the budget of these units depends partially on the funding that the University has received from the autonomous government because of the teaching activity of each centre.

As regards the third Catalan university considered, the University Rovira i Virgili, budgets for the year 2001 defined formula based allocations to centres and departments depending basically on the evolution of the number of enrolled students/credits and full time equivalent academics. These mechanisms are clearly different from those established in the contractual funding arrangement decided with the regional government. However, as it was signed in November of the year 2000, it is quite probable that there would be changes in internal allocation criteria in the future, as the objectives of the contract reflect largely those of the strategic planning in this University.

To sum up, we can say that, in the case of the Autonomous Region of Catalonia, influences between autonomic funding and internal resource allocation of universities are reciprocal since contractual agreements are being signed. Regional funding has been able to gather the strategic goals of universities, while these ones have also assumed in their management commits the objectives and priorities stated by the government.

The Valencian Community designed in 1994 a long-term financial framework for Valencian universities, whose influence on the mechanisms of internal allocation is clear in most institutions. This relationship is, however, irregular. In the University of Valencia the influence is, perhaps, more evident, as the structure of the model used to fund centres and departments is equivalent to that of the region, the variables used in formula funding are also similar and most of the indicators used for the goal-oriented funding are the same than those of the general model.

The University of Alicante also establishes an allocation formula for departments that follows the general criteria of the government public funding of higher education. However, one third of funding is based on an indicator, the number of research awards, which is not considered in the regional model. The Technical University of Valencia also uses indicators related to activities and results of centres and departments, which are also similar to those used by the programme of funding of the Autonomous Region.

The degree of influence of the funding programme of the Autonomous Region on the University Jaume I depends on the specific agreements defined with each centre and department. In any case, part

of the resources is allocated according to the registered credits that are, as we are saying, one of the essential variables of such programme.

In general, internal resource allocation in valentian universities is very aware of the funding model of the Autonomous Region. This is leading to more complex and evolutionated resource allocation mechanisms. The possibility of obtaining more government funds according to the accomplishment of the goals defined in the regional model is taken into account in most cases when designing internal distribution criteria.

If we move on to analyse the case of the University of Vigo, the only clear reference in the criteria of internal allocation to the Agreement of Funding of the University System of Galicia, is made in the allocation of 40% of expenses for repairs, maintenance and conservation to centres in accordance with the coefficient of experimentality of degrees defined in such agreement. Apart from that, although some budgetary concepts are distributed according to the number of registered students or the number of full time equivalent academics, indicators used to quantify these variables are different.

This part of the study shows that, except for the comments we have made, the analysed Andalusian, Galician and Canary Islands Universities do not follow significantly the criteria defined in funding models used to allocate public funds in the university system level. In the case of the Catalan Autonomous Region, when a contractual funding programme between the government and the university exists, we can perceive a remarkable degree of connection between mechanisms of resource allocation in different levels of decentralization. Finally, in the Valencian Community, with more tradition in the use of normative models in the funding of universities, the influence of parameters of the autonomic model on internal financial management is noteworthy.

Therefore, it is possible to assume that the mechanisms used by regional governments to finance university systems have, in general, an effect on the internal allocation of institutions. This influence is stronger when the definition of parameters in such models is more transparent and clear, and when criteria remain stable in time. The greater influence of Catalan and Valencian models can also be due to the important participation of universities in the formulation of the regional funding model.

Decentralization in resource management

The first feature that determines the degree of decentralization of an institution comes from the treatment given to management units. Main

alternatives, which evolve from a slight to a greater degree of financial delegation, are the following (Williams 1992, pp. 24–25; Bourn 1994; pp. 5–24; the Commonwealth Higher Education Management Service 1998, p. 3):

- Decentralized management units treated as cost centres. In this case, the part of the university budget to be allocated to management units would be distributed between them according to historical criteria, their objective needs or the goals to be achieved.
- Systems in which, after separating a determined amount to cover centralized expenses, each decentralized unit receives the income it clearly generates (fees, incomes from governmental grant which can be attributed, etc.), in order to cover the necessary expenses to obtain such income.
- Schemes in which all the income is assigned to decentralized management units, settling down a system of overheads to cover expenses of central and support services.
- A last step in this process would be that of establishing a system of internal markets, in which decentralized units pay a price for services provided by central or support units.

It is difficult to find models of resource allocation that follow exclusively one of these perspectives; in most cases, we can find services provided using a system of prices, or some concepts that give rise to an overhead to cover expenses of central services. Anyway, we can say that, in general, Spanish public universities tend to be positioned in the first type of decentralization styles, although without a delegation of most functions related to personnel.

Table 9 illustrates about this, as it is reflected in initial budgets of Spanish public universities (in this part of the study the sample was extended to 29 institutions for which this information was available). We have considered decentralized management items those that are assigned in block to centres and departments, so that they can spend them as they seem suitable. We have excluded those concepts for which, even though the expense or investment can be made by the department or centre, the evaluation of proposals and the quantification of costs in such item are centrally made.

As can be observed, all universities determine a global unconstrained budget to cover operating expenses of decentralized units (excluded those from personnel). When we analyse the number of universities in which investment management is decentralized, the percentage is

Table 9. Budget items with decentralized management in Spanish public universities

Concept	University	%
Expenditure budget		
Operating expenses (excluded personnel expenses)	UAH, UAM, UALM, UCAN, UCLM, UCM, UEX, UGI, UGR, UHU, UIB, UJA, UJI, ULPGC, ULR, UMA, UMH, UMU, UPC, UPN, UPO, UPV, URV, USAL, USC (centres), USE, UVA, UVI, UZA	100
Current transfers	UJI (centres), ULPGC, USC (centres)	10.3
Investments	UAM, UCM, UGI, UGR (depart.), UJI (centres), ULPGC, UPN, UPO (depart.), URV, USAL, USC, UVI, UZA	44.8
Revenues budget		
Income generated by centres	UPC (centres), UVA	6.9

reduced to less than half of them. And, in such cases, delegation refers only to certain types of investments: bibliographical, furniture and equipment, computer and audio-visual material, software for computer laboratories, equipment for teaching laboratories and, in some cases, funds for research obtained by departments. Investments in land and buildings are usually excluded as they are centrally managed.

As regards the decentralization of expenditure items related to current transfers, in general they are related to the management of scholarships and other financial aids to students; such funds can not be derived to other items.

Finally, in some cases, income generated by each decentralized unit are made explicit and allocated to them in the budget (from programmes with specific diploma from the University, publications and products sales, current transfers from companies, the use of facilities, administrative concessions, etc).

This first level of analysis of decentralized concepts shows the slight degree of delegation existing in Spanish universities. The budgetary allocation to departments and centres is made just to guarantee and facilitate operations of units, but there is no scope for action in more strategic decision-making. However, some universities are advancing towards greater decentralization of resource management through the

Table 10. Percentage of expenses with decentralized management (in centres and departments) in Spanish public universities

Unit	Percentage of	Mean	Standard deviation
Centres	Current expenses	8.94%	7.13%
	Capital expenditure	4.47%	5.80%
	Total budget	1.23%	1.13%
Departments	Current expenses	11.19%	5.24%
	Capital expenditure	3.93%	2.96%
	Total budget	1.59%	0.49%
Centres and departments	Total budget	2.87%	1.05%

determination of the global amount to be distributed to each unit (department or centre), according to fees income or governmental grants, or by delegating funds to cover personnel costs.

A second part of our analysis on the degree of financial delegation in Spanish universities has been oriented to the estimation of the percentage of expenses that are managed by centres and departments. Table 10 summarizes such estimations for those universities in which it has been possible to observe this percentage (22 universities for the analysis of current expenses in goods and services, 7 for capital expenditure and 24 for total). Average values reveal a decentralization of expenses with respect to total budget of, around, 3% (and we can add that there was not any University that distributed 5% or more of the budget to centres and departments). If we analyse these percentages for each type of expenditure, we can observe that financial delegation is larger for current expenses (9% of total budget for the centres and 11% for departments), although it exists a high degree of variability of this percentage, especially for centres.

Main findings and implications of the study

This study on internal resource allocation in Spanish public universities allows us to characterize this process by the following basic features:

- As regards to the allocation model, most institutions use a formula scheme, based on inputs, specifically on the number of students or credits enrolled and the number of full time equivalent academics. The purpose is to break with traditional incremental and negotiated

methods of resource allocation which have proved to be opaque, rigid and inefficient. Rationale behind formula approaches is to give the same funding to equivalent programs and equivalent students according to normative criteria. These criteria usually take into account the level of education, academic discipline and intensity of study to reflect the different costs of teaching. It can be expected that the use of these models will favour a more efficient and equitable resource allocation and a more transparent accountability.

- Few universities introduce indicators related to the results of the teaching activity. For the funding of departments, these result indicators are mainly related to the academic success of students and the teaching quality of academic staff. In centres, together with measures related to the number of graduates, indicators related to the participation of students in business practices or international programmes are also used. While most universities are aware of the importance of performance measurement and are inmerse in processes of quality assessment, the use of performance-based budgeting is not seen with enthusiasm. The main requirements for a successful implementation of this type of budgeting are not present in most Spanish universities: accounting and other information systems are not prepared to offer an accurate assessment of performance, the introduction of a 'quality culture' is relatively recent and the use of strategic planning and management tools is scarce. There seem to be many steps to be made before the debate about performance budgeting can be seriously considered.
- Nevertheless, variables of results related to the research activity (in the case of department allocation) carry more weight: indicators related to research projects and theses defended, the research production or the income earned from research are some of the indicators more frequently used. As there is a longer tradition in the evaluation of research of academics and there is more consensus about research assessment criteria, the implementation of this type of measures is seemed as less problematic.
- With less quantitative importance, and only in isolated cases, some incentives related to the administrative activity of departments are introduced. In the search for more efficienct administrative services the use of other management tools, such as quality evaluation or total quality management, seems to be more adequate than financial incentives.
- In those Autonomous Regions in which governments have defined normative funding models of higher education, there is a remarkable

influence of these models on universities internal allocation, provided that these approaches are transparent enough, stable in time and, specially, when they link funds to the accomplishement of previously set goals. Normative funding models are proving themselves not to be neutral. They are usually designed to reflect governments' priorities for higher education institutions. As universities aspire to maximize the funds they receive from the government, they try to respond to the criteria included in the external funding model, and one way to contribute to that target is to introduce some of the elements of the external model on internal resource allocation mechanism. Besides, the introduction of goal-oriented funding increases the demand for accountability for the results and this requires transparent and systematic mechanisms of resource allocation at the institutional level (see Heads of University Management and Administration Network in Europe 2000, pp. 5–7).

- The use of contractual funding is also having an effect on university resource allocation. The influence is different according to the type of contract. There are some experiences of contracts which have been designed to integrate the objectives of the strategic plans of each university. This procedure is reinforcing strategic management, quality assessment systems and other management tools of universities.
- The degree of financial devolution within Spanish universities is quite low, both in quantitative and qualitative terms. This contrasts with other international experiences, with arguments in support of the benefits of delegation and with the decentralized structure of Spanish universities. It is expected that the new legislation on universities will result in an increase of the financial autonomy and the freedom of spend of universities.

The aspects mentioned above have policy and management implications. Governments can use funding to influence higher education systems, as it is confirmed by the increasing use of resource allocation mechanisms within universities which are similar to those used by the government. This can result in a loss of autonomy in universities – as they highly depend on public funding, they should behave as governments expect in order to get the funds – unless both universities and governments work together in the design of such models. This study shows that, in those cases in which government funding takes into account strategic plans of universities, motivation increases and positive results are achieved. It is not just funding, but the combination of it with

other management tools what produces changes in universities. Normative and contractual resource allocation mechanisms can favour that decision-making processes and negotiations focus on what is relevant, the objectives to be reached and the best ways to do it. But it is necessary to be aware of the practical difficulties for their implementation (related both to the correct identification of teaching and research outputs and to the availability of accurate information systems to evaluate costs and performance) and the possible unintended consequencies of their use (increased concentration of funds for the best universities and/or departments or centres and low motivation for the rest – see Massy 1996, pp. 321–322; Geuna 2001).

Acknowledgements

I am grateful to the anonymous referees for their many constructive and helpful comments. I also thank the administrators and finance department's staff of the universities examined in this study for their collaboration, and Professor Juan Antonio Rivas for the language revision.

Notes

1. Universities have the autonomy to design their staffs and to recruit personnel. Internal regulations of most Spanish Universities give the Rector the authority for staff recruitment; in these cases, decision making in personnel management can not be delegated to decentralized units. That is why personnel matters are centrally managed in most Spanish Universities.
2. The fixing of registration fees in the Spanish university system is competence of regional government within the limits established by the national Council for the Coordination of Universities. Different prices are set-up according to academic disciplines in order to account for the different cost of teaching, but these prices are different in each region and do not reflect a real knowledge of the cost of provision of the service in different universities (see Hernández Armenteros and Valverde Peña 1998, p. 11).

References

Aceto, V. et al. (1998). *A Proposal for Merit-Based Performance Funding for the State University of New York*. Albany: State University of New York, Office of the Provost and Vice Chancellor for Academic Affairs, June.

Berry, R.H., ed. (1994). *Management Accounting in Universities*. London: The Chartered Institute of Management Accountants.

Bourn, M. (1994). 'A long and winding road: The evolution of devolution in universities', in Berry, R.H. (ed.), *Management Accounting in Universities*. London: The Chartered Institute of Management Accountants, 5–24.

Bricall, J.M. et al. (2000). *Informe Universidad 2000*. Barcelona, March.

Brown, M.A. and Wolf, D.M. (1993). 'Allocating budgets using performance criteria', in Altbach, P.G. and Johnstone, D.B. (eds.), *The Funding of Higher Education. International Perspectives*. New York: Garland Publishing, pp. 173–187.

Commonwealth Higher Education Management Service, C.H.E.M.S. (1998). 'Principles of Delegated Budgeting Guidelines for Universities'. *Chems Paper 25*. London, June.

Consejo De Universidades (2002). *Estadística universitaria 2001-2002*. [http://www.mec.es/consejou/estadis/avan0102/311.html].

Flynn, N. and Strehl, F. (1996). *Public Sector Management in Europe*. Hertfordshire: Prentice Hall.

Galther, J. (1997). 'Development and Use of Performance Indicator Systems', *Presented at the 19th European Association for Institutional Research Forum*, University of Warwick, August.

Geuna, A. (2001). 'The changing rationale for European university research funding. are there negative unintended consequences?', *Journal of Economic Issues* 35(3), 607–632.

González López, M.J. (2003). 'Estudio comparativo de los modelos de financiaciación de los sistemas públicos universitarios españoles', *Presupuesto y gasto público* 33, 101–121.

Hackman, J.D. (1985). 'Power and centrality in the allocation of resources in colleges and universities', *Administrative Science Quarterly* 30, 61–77.

Heads of University Management and Administration Network in Europe, Humane (2000). *Resource Allocation Models*, Report of the HUMANE Working Party. [http://www.ao.bham.ac.uk/aps/planning/RAMReview/]. 16 October 2003.

Hernández Armenteros, J. (2004). *La Universidad española en cifras (2004)*. Madrid: Conferencia de Rectores de las Universidades Españolas (CRUE).

Hernández Armenteros, J. and Valverde Peña, F. (1998). 'La participación del usuario en la financiación de la enseñanza pública universitaria: especial referencia a Andalucía', *Cuadernos de Trabajo de la Universidad de Jaén*. Jaén: Servicio de Publicaciones de la Universidad de Jaén.

Jongbloed, B. (1998). 'Internal resource allocation in universities'. *Presented at the 20th Annual European Association for Institutional Research Forum, and published in Higher Education Policy Studies*, 298. Enschede: Center for Higher Education Policy Studies.

Jongbloed, B., Amaral, A., Kasanes, E. and Wilkin, L. (2000). *Final Report on Spending Strategies. Spending Strategies: A Closer Look at the Financial Management of the European Universities, CRE Guide* 3. Geneve: CRE.

Joyce, P.G. (1993). 'Using Performance Measures for Federal Budgeting: Proposals and Prospects', *Public Budgeting and Finance* 13(4), 3–17.

Layzell, D.T. (1998). 'Linking Performance to Funding Outcomes for Public Institutions of Higher Education: the US experience', *European Journal of Education* 33(1), 103–111.

Liefner, I. (2003). 'Funding, resource allocation, and performance in higher education systems', *Higher Education* 46(4), 469–489.

Massy, W.F. (1990). 'Budget decentralization at Stanford University', *Planning for Higher Education* 18(2), 39–55.

Massy, W.F. (1996). *Resource Allocation in Higher Education*. Michigan: The University of Michigan Press.

Mims, R.S. (1980). 'Resource allocation: stopgap or support for academic planning?', *New Directions for Institutional Research* 28, 57–72.

O.E.C.D. (1990). *Financing Higher Education. Current Patterns*. Paris: O.E.C.D.

Otten, C. (1996). 'Principles of budget allocation at the institutional level', *Higher Education Management* 8(1), 69–84.

Rekilä, E., Larimo, M. and Tauriainen, K. (1999). 'Do changing state steering mechanisms have an impact on academia leadership at universities', *Tertiary Education and Management* 5(3), 261–277.

Seppanen, L.J. (1998). 'Performance Funding on the Bleeding Edge: No Improvement, No Funding', *Asociation for Institutional Research (A.I.R.) Forum*, Minneapolis (Minnesota), May. [http://ir-server.willamette.edu/forum98/15-519/AIR9815-519.htm]. 19 June 2000.

Strauss, J., Curry, J. and Whalen, E. (1996). 'Revenue responsibility budgeting', in Massy, W.F. (ed.), *Resource Allocation in Higher Education*. Michigan: The University of Michigan Press, pp. 163–190.

Taylor, M.G. (1991). 'New financial models', *Higher Education Management* 3(3), 203–213.

The University of Birmingham (1998). *Strategy, Planning, Resource Allocation & Indirect Cost Allocation*. [http://bham.ac.uk/planning/resall.htm], 25 November 2000.

United States General Accounting Office (1997). *Performance Budgeting. Past Initiatives Offer Insights for GPRA (Government Performance and Results Act) Implementation*. General Accounting Office/Accounting and Information Management Division, Washington.

Williams, G. (1992). *Changing Patterns of Finance in Higher Education*. Buckingham: The Society for Research into Higher Education & Open University Press.

Woodhall, M. (1992). 'Changing sources and patterns of finance for higher education: A review of international trends', *Higher Education in Europe* 17(1), 141–149.

Ziderman, A. (1994). 'Enhancing the Financial Sustainability of Higher Education Institutions', in Salmi, J. and Verspoor, A.M. (ed.), *Revitalizing Higher Education*. Oxford: Pergamon.