4 The allocation of public funding to higher education institutions

This chapter examines the allocation of public funding to higher education institutions, with a particular focus on funds provided for core operating expenses. In many jurisdictions, public core funding is provided to institutions primarily, or exclusively, to cover the costs of educational activities, while research and engagement activities are supported through separate, targeted, funding streams. Separate public funding arrangements frequently also exist to fund capital investment. The chapter examines who is responsible for the allocation of operating funding to higher education institutions, how funding levels are set, and how funds are allocated to institutions. The discussion pays special attention to the design and use of allocation formula and performance-based funding arrangements, in light of their prominence as a funding innovation.

4.1. Resourcing higher education institutions

Higher education institutions (HEIs) are complex, sophisticated organisations. Most earn revenue from a variety of sources, including, in a majority of OECD jurisdictions:

- direct government funding;
- fees paid by domestic students (OECD, 2019, p. 327[1]);
- international student fees;
- research grants and contracts;
- bequests and other forms of philanthropic giving;
- knowledge transfer (such as consultancy services) and intellectual property revenue (such as licensing and patents);
- trading (such as revenue from investments, charges from providing accommodation to students, sales of services and leasing facilities for conferences).

For the majority of public higher education institutions in most OECD countries, direct government funding is the largest single source of revenue, with governments subsidising higher education because of the social and economic benefits higher education brings to society.

Governments can design approaches to the allocation of funds – alongside their regulatory powers, the student financial support regime and quality assurance – as a means of encouraging higher education institutions to operate in ways that advance national priorities for higher education and national goals for social and economic development.

Even in countries where funding represents less than half of institutions' revenue, the design of the funding system has a powerful influence on institutional behaviour.

This chapter examines policy challenges and choices faced by governments in designing funding systems and discusses the funding policy approaches that have been adopted by government in practice. Where possible, the chapter also comments on the strengths and weaknesses of those approaches, drawing on research and policy evaluations.

In looking at the design of a funding system, the chapter will consider:

- the options governments face in deciding agency arrangements for allocating funding to higher education institutions;
- how governments decide on the level of funding they provide for higher education institutions;
- the range of mechanisms that governments can use to decide how to split the funding available between institutions – for instance, whether to use performance agreements with institutions or allocate funding via a formula, and if so, what metrics to use in the formula;
- core operating funding, research funding and funding for capital projects;
- mechanisms for accountability for funding.

4.2. The elements of a funding design

Because funding is a powerful motivator of institutional performance, the model used to fund higher education institutions is an important way of ensuring that the higher education system can deliver outcomes sought by society. As such, the design of a funding model needs to start with an analysis of how funding can contribute to the country's expectations of the system and of higher education institutions. It needs to be shaped by an assessment of the human capital and research priorities for the society and economy.

Across OECD jurisdictions, there is a broad consensus that higher education funding systems should build on a set of principles that ensure that institutions are focused on:

- **delivering high-quality education and training that meets the needs of learners, employers and communities** – how can the funding system encourage the level of enrolment needed by the society and in the programmes that will deliver good outcomes both for the individuals and for the society?;
- **supporting equitable access to learning** – how can the funding system encourage participation by groups who might benefit from higher education, but are currently under-represented in the system?;
- **delivering strategically important programmes that meet national and regional needs** – the funding system needs to incentivise the network of higher education institutions to produce graduates with nationally important skills;
- in the case of research-focused institutions, **producing research of high quality, including research that is socially or economically valuable –** funding needs to encourage institutions to develop a research portfolio that: includes investigator-led enquiry, as well as socially and economically valuable research; provides the basis for collaboration with industry and other external partners on innovation; while also ensuring that students in research-based programmes develop the skills of enquiry and critical thinking that can help them become innovative members of the labour force.

Ideally, funding design should also promote efficiency and cost-effectiveness, and should promote and reward high performance. It should seek to encourage dynamism in the system.

To minimise transaction costs, funding should be delivered in ways that support the autonomy of institution and that allow leaders to manage efficiently (OECD, 2008[2]; OECD, 2018[3]). This autonomy needs to be balanced by an accountability regime that both ensures probity and demonstrates how well funding has contributed to the institution's performance goals and the goals that the government sets for its funding system.

Articulating the principles that underpin the funding design, and applying them in a transparent way, can build the trust and confidence of institutions, stakeholders, employers and the public in the funding system. Transparency also means that institutions will be given clear signals as to how they should prioritise their work in order to increase their funding.

The funding design needs to take account of the country's current educational and institutional culture and its strengths and weaknesses. It needs to complement the other revenue streams accessible to institutions – such as tuition fees and research revenue.

The elements of the funding design need to address such questions as:

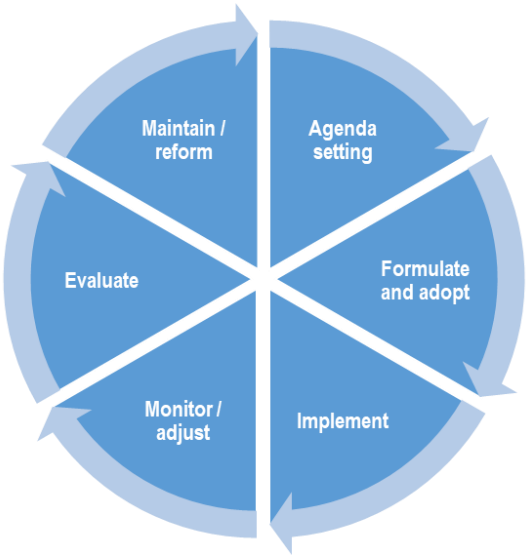
- What sort of government agency should be responsible for allocating funding and, if funding is to be allocated by a quasi-autonomous government agency, how should that agency interact with the government policy system (see Section 4.3)?
- How should government set the total amount of funding it allocates to higher education institutions (see Section 4.4 and also Chapter 2)?
- What are the mechanisms for allocating funding to institutions – for instance, institutional performance agreements or formulae for allocating funding – and what are the components of the mechanism (see Section 4.5)?
- Should direct institutional operating subsidies be combined with – or replaced by – voucher or voucher-like systems where public funds are directed to students (see Section 4.6)?

- What is the interaction between core operating funding and dedicated streams of funding for research and capital investment (see Sections 4.7 and 4.8)?
- What are the mechanisms for accounting for funding; how can government gain the confidence that institutions have applied funding to the purpose for which it was allocated and how well are institutions performing as a consequence of receiving that funding (see Section 4.9)?

4.3. Responsibility for allocating public funding to institutions

All jurisdictions have differences in the way they develop and implement policies, including funding policy. Typically, the policy cycle starts from a set of strategic intentions (agenda-setting), moves to a set of high-level goals that shape the strategic policy and that also set the focus for monitoring the effectiveness of the policy (policy formulation). The policy is implemented according to a set of operational rules – the operational policy. It is then monitored and adjusted if necessary. After a period, it may be subject to evaluation, leading to further reform (Figure 4.1).

Figure 4.1. A theoretical policy cycle



Source: Adapted from Anderson, J. (1975[4]), Public Policy-Making, Praeger, New York, http://dx.doi.org/10.2307/975069.

Responsibility for the high-level funding design and strategic policy usually rests with a minister, who assumes accountability for the system through the political process. The minister is supported in that function by expert advisers who likely work for the ministry responsible for higher education. Governments may set up intermediary bodies, sometimes called “buffer” bodies, that are responsible for managing the relationship between the government and the higher education institutions, including setting funding operational policy and implementing the funding system. Examples of intermediary bodies include: agencies under the responsibility of a ministry, funding councils or university systems boards.

Vesting responsibility for budget planning and allocation in quasi-autonomous public bodies reflects a concern to ensure that higher education funding is allocated with political neutrality, continuity and expertise. Providing a buffer between the political environment and allocation of funding is intended to ensure that funding can be focused on the enduring goals of higher education, without undue influence of shorter-term priorities.

These intermediary bodies are common in Anglophone higher education systems, including in England (United Kingdom), New Zealand, Ireland and many American states. In New Zealand, for example, the government sets the total amount of funding available for higher education and defines the broad funding policies, with advice provided by the Ministry of Education. The Tertiary Education Commission, an intermediate agency, sets the operational rules for funding, allocates funding to institutions through a set of investment guidance statements, and monitors the educational and financial performance of institutions (Government of New Zealand, 1989[5]).

If the government's relationship with institutions – and funding in particular – is managed by a quasi-autonomous agency, it is important to spell out the limits of the powers of the agency as well as the mechanisms for interactions between the intermediary agency and the ministry that advises on broader policy. The presence of two agencies with separate responsibilities, but overlapping roles, creates the need to formalise the relationship between the two (Government of New Zealand, 1989[5]).

In many federal systems, the constitution and law typically establish higher education as primarily a responsibility of state governments. This is the case in the United States, Canada, Germany, Switzerland and Belgium, for example.

While state governments may be responsible for the establishment of higher education institutions in federal systems and for setting their operating funding, federal authorities are often responsible for student support and research funding, owing, in part, to the mobility of students across sub-national jurisdictions, and due to spill-overs or externalities arising from research activity that might lead sub-national governments to under-invest in research funding.

Federal systems vary widely in their level of fiscal and governmental decentralisation, and in the role of federal authorities vis-à-vis higher education institutions. In Mexico, for example, states receive over 90% of their revenue from federal sources, and only 10% from local taxation and other revenue sources. Although constitutionally established as a federal government, Mexico "remains a centralised country" in which "federal powers are extensive and sometimes overlap with the responsibilities of states and municipalities", including in higher education policy (OECD, 2019[6]).

Research in higher education institutions is often funded by a ministry of science and technology or a quasi-autonomous body, such as a science council or research funding agency. Research funding agencies may exist within an education ministry (e.g. the Academy of Finland), or be an entirely separate body (e.g. the National Science Foundation in the United States). Funding for higher education innovation activities, such as collaboration with start-up businesses, may come from yet another public body, such as a national innovation agency.

4.4. Setting the level of public funding for higher education institutions

The public funding system for higher education institutions exists alongside other institutional revenue sources. It is important that the revenue per student received by institutions is sufficient to avoid them having to make detrimental changes or programming cuts in order to stay within budget and thus risk an erosion of quality. Adequate funding levels are also important to ensure that an institution can accumulate a sufficient surplus to provide a buffer against financial shocks and to create reserves that can be used by the institution to invest in quality improvement. At the same time, revenue needs to be sufficiently constrained in order to create incentives to manage institutions efficiently and to take a strategic view towards future investments.

As part of their budgetary planning, ministers seek an allocation through the government's budget process for funding for the network of higher education institutions. They do this taking account of factors such as:

- the part played by the public funding system for higher education institutions in the whole resourcing envelope for higher education institutions – in particular, how the funding system works with institutions' expected fee revenue;
- trends in the historic funding allocation for institutions;
- information on the costs of higher education and on inflationary pressures – to make sure that institutions are not forced to compromise on quality;
- data on the viability and sustainability of institutions and on their strategic priorities;
- demographic and labour market forecasts – from which a forecast of the likely demand for higher education within the funding period can be inferred.

The use, in particular, of historical funding allocation and cost models for the distribution of funding to individual higher education institutions is discussed in Section 4.5. However, while complex mechanisms can be used in the allocation of public funds to institutions, the total envelope of resources available to allocate is the result of a complex political process involving the factors mentioned above.

4.5. Allocation of public funds for the operation of higher education institutions

Countries can adopt many approaches for allocating available public funds to higher education institutions to support their day-to-day operations. As noted, public funding for core operating expenses is usually complemented by other targeted public funding streams, such as those for research, which are discussed later in this chapter. This section discusses six aspects relevant for the design of core funding mechanisms:

- the scope of funding – which institutions should receive funding;
- the duration of funding allocations – annual vs. multi-annual allocations;
- delivery mechanisms – how funding is delivered to institutions: line-item, block grant, targeted, competitive funding; or performance contracts;
- the main approaches to determining the level of subsidy received by individual institutions;
- the specific parameters that are used in formula funding;
- specific evidence of the effects of different forms of performance-related funding mechanisms.

Which institutions receive funding

A key aspect of the design of higher education funding systems is *which* institutions in a given jurisdiction should receive public funds to support day-to-day operations. Although private institutions in many systems compete for government funds for research projects alongside public institutions, they are less often eligible for funding to meet recurring operating costs.

In some systems with substantial private provision of higher education, such as most states in the United States, direct public operating subsidies are provided by government only to public higher education institutions, while private institutions are mainly reliant on tuition fees to cover educational expenditure. In the United States example, students at accredited private institutions *are* eligible to receive federal student aid – and, in some states, state student aid – which students use to pay fees and effectively constitutes an indirect public subsidy. This basic pattern is common in a majority of OECD countries where private institutions co-exist with public institutions, even though the private sectors in some countries – such as those in northern and western Europe – are very small.

In some other systems with a substantial number of private higher education institutions, such as New Zealand, private institutions are eligible for public funding for enrolments in quality-assured programmes, subject to their meeting performance standards similar to those used for public institutions. The United

Kingdom is a particular case, as what are generally referred to as "public" universities are, in reality, private entities. Historically, these institutions received a majority of their income for educational activities from direct government operating subsidies, although this has changed with the introduction of tuition fees, which, most notably in England, has shifted the burden of funding to students (who receive public loans to help them cover costs).

In some higher education systems, including Australia, Croatia and Estonia, targeted public subsidies are provided to private institutions for offering programmes in certain fields of study identified as "national priorities", or where private institutions have specific educational capacity in specialised fields – such as veterinary medicine, for example – that public institutions lack. In these cases, public authorities typically find it more efficient to outsource provision rather than to establish new public institutions.

More recently, some higher education systems have explored the possibility of opening funding up to institutions other than recognised higher education institutions, or to learning opportunities other than traditional academic degree programmes, permitting them to benefit from public subsidy. In New Zealand, for example, the Tertiary Education Commission has issued a call for proposals to deliver "micro-credential programmes", as distinct from full degree programmes (Tertiary Education Commission, 2019[7]).

The duration of funding

Most governments provide operating funding to eligible higher education institutions on an annual basis, while some operate multi-year funding regimes. Annual funding means that funding can be adjusted more frequently in response to changes in demand for higher education. Multi-year funding allows institutions to plan with greater certainty and gives them a degree of stability that can enhance their strategic behaviour. However, in a multi-year funding system, institutions may have less opportunity to expand their enrolments in response to unpredicted increases in demand. Conversely, if demand falls sharply, they may find that adjusting to the resulting reduction in funding at the end of the funding period is more severe.

A multi-year funding period has been established in a small number of jurisdictions, including Austria, Luxembourg and Brandenburg (Germany), often with the aim of giving institutions greater financial stability as a basis for longer-term planning. In these jurisdictions, public higher education budgets are established, respectively, for three, two and four years (Pruvot and Estermann, 2017[8]). In New Zealand, the government deals with the tension between annual and multi-year funding by allocating funding on an annual basis, but making indicative allocations for the following two years, based on forecasts of demand, that can be modified if demand changes.

In OECD countries implementing multi-year funding, funds are typically provided to higher education institutions through a contract signed by the ministry responsible for higher education and by public higher education institutions, and which is approved by the Ministry of Finance and the legislature. The contracts contain funding commitments from government and the reciprocal public obligations of higher education institutions, and are accepted as a framework for yearly budgets (OECD, 2019[9]).

Mechanisms for delivering funding to higher education institutions

Operating subsidies are delivered to eligible higher education institutions using different allocation mechanisms, including line-item budgeting, block grants, project-specific funding, and funds linked to institutional performance contracts.

Line-item budgets remain in use in few OECD countries

Line-item budgets are used comparatively rarely in OECD countries today – although remain in Greece, Korea and some sectors of Mexican public higher education (Esterman, Nokkala and Steinel, 2011[10]; OECD, 2019[6]; OECD, 2018[3]). Line-item budgets allocate funding to finance items and/or activities within

eligible higher education institutions, and characteristically impose strict limits (or prohibitions) on the reallocation of funds across budget lines. This results in a high level of financial control and transparency for central budgetary authorities, while sharply limiting the capacity of educational institutions to take responsibility for the management of resources and to make strategic decisions on the prioritisation of resources.

Block grants are the principal means by which recurring funding is delivered

In most systems, higher education institutions receive basic recurrent funding to cover several categories of expenditure such as teaching, ongoing operational costs and, in some cases, core research activities, through a block grant, which institutions themselves are mainly responsible for dividing and distributing internally, according to their needs and their strategic priorities, across their various units and activities (Pruvot and Estermann, 2017[8]).

Some systems divide the block grant into broad categories such as teaching and research, for instance, or earmark a share of the grant for specific tasks, such as widening access for disadvantaged socio-economic groups. Institutions can generally move funds within broad categories, such as teaching and research (as in Iceland or Sweden); teaching, research and infrastructure (Latvia or Lithuania); salaries and operational costs (Portugal); or investment and operational costs (France); but not between the categories (Pruvot and Estermann, 2017[8]). Block grants, properly designed, can enable long-term institutional planning, and provide higher education institutions with sufficient flexibility to implement structural change and adapt to changing socio-economic conditions. (Frølich, Schmidt and Rosa, 2010[11]).

Other systems – Australia and New Zealand are examples – allow institutions to spend their block grant funding as they see fit, so that funds that are provided as subsidies for tuition may be used for research or engagement costs, as the institution's leadership sees fit. In these systems, the monitoring and quality assurance systems then assess the performance of each institution in research, teaching and other activities, to ensure that the institution is meeting the terms of the funding agreement.

In some cases, the basic operating grant remains heavily regulated and subdivided in such a way that the margin for strategic financial management is minimal and the funding system ultimately resembles line-item budgeting. In Hungary, for instance, higher education institutions may not shift resources across funding items, and any decision with financial implications must receive the approval of the University Chancellor – a central figure created in universities in 2014 and appointed directly by the Prime Minister – thus limiting the capacity of an institution to decide on internal funding allocations (Pruvot and Estermann, 2017[8]).

Project-based funds awarded through competition have grown in importance

Public funding is also increasingly tied to projects through targeted funds that are in addition to block grants and are awarded based on competitions. This is notably the case in research (see Section 4.7), but also in other areas of expenditure such as specialised equipment, innovation and knowledge transfer activities, or the development of work-based learning. In many cases, this is money for projects or other specific activities that are not funded through the core institutional subsidy. Examples are competitive grants awarded by research funding agencies or European Framework programmes. These funds are often awarded for restricted periods of time and may be awarded directly to an institution's sub-units such as departments or laboratories (Jongbloed and Vossensteyn, 2016[12]).

While the funds are short-term, they can help support the development of an institution's research capability (by giving researchers the opportunity to engage with challenging questions), personnel capacity (allowing for the appointment of post-doctoral fellows or other researchers) and infrastructure (especially if the project involves the purchase of research equipment or data).

Competitive, project-based funding demands a high degree of competency and integrity from awarding bodies. Where research funding bodies are equipped with legal independence and robust norms of peer review, and if they apply widely agreed criteria of merit, competitive project-based funding can serve as an effective instrument through which university research priorities or investments in equipment or specific activities can be aligned to government priorities. However, where the awarding body's administrative capacity is weak, or if there is the possibility of favouritism or improper advantage in the evaluation procedures, there is a risk to the integrity and effectiveness of the use of public funds.

Seen from the vantage point of higher education institutions, there are significant risks and challenges to project-based funding:

- Evidence shows that an increased proportion of competition-based grants can limit the institutions' ability for long-term planning, forcing them to focus on areas where funding is available rather than on areas where the institutions possess expertise (Frølich, Schmidt and Rosa, 2010[11]).
- For the same reason, focusing most or all research funding on projects may limit the capacity of institutions to develop the research capability of their staff, whereas allocating some research funding as a block grant allows institutions to reserve part of the funding for that purpose.
- Short-term project funding creates financial management risks for higher education institutions and may provide incentives for them to shift uncertainty to their academic workforce, and to rely more heavily upon non-standard forms of employment, such as temporary contracts.
- Project-based funding carries higher transaction costs for higher education institutions compared to recurring funding delivered in block by formula, and absorbs un-costed resources, principally staff time (Advisory Committee, 2019[13]).
- In extreme cases, competitive funding may lead to the strategic management of institutions being transferred from university leaders to funding agencies (Frølich, Schmidt and Rosa, 2010[11]).

Performance contracts as funding instruments

Another method of steering institutional behaviour is to establish performance contracts, which set targets for institutions to achieve and can bind a share of the block funding allocation to reaching those targets. These contracts can have various purposes including: i) revising or clarifying the profiles of higher education institutions; ii) creating a structured and recurring dialogue between government and universities; iii) increasing transparency; and iv) setting detailed performance targets (Bennetot Pruvot, Claeys-Kulik and Estermann, 2015[14]).

Many OECD countries have established performance contracts between national ministries or agencies and higher education institutions, with many of these linked to funding. Such contracts are in place in 13 OECD member countries, and in a number of sub-national jurisdictions including Scotland; states including Louisiana and Tennessee in the United States; and Baden Wurttemberg, Brandenburg and North-Rhine Westphalia, among other federal states, in Germany. The shares of block funding subject to performance contracts vary from 1% in Denmark, 4% in France, and 7% in Latvia and the Netherlands, to 94-96% in Austria and 100% in Finland (OECD, 2019[15]).

In some systems, the targets set in the performance contracts are specific to the university and aligned with its strategy; while in others, they are derived from the more general higher education and research policy goals of the government. Targets are often described as results to be achieved, leaving it up to the university to decide how or which concrete actions are to be undertaken within a given timeframe to meet targets. They might be described as qualitative measures (e.g. improve equal access of men and women to senior academic positions) or be linked to quantitative indicators (e.g. increase the number of female professors).

Depending on the nature of the targets, the procedures for assessing their achievement also vary and are more or less complex. In some cases, the evaluation takes place in the form of discussions between the ministry and the university; for others, specific data analysis or collection is necessary.

These contracts usually include procedures for reporting and accountability, and they specify the measures to be taken in the event that the targets cannot be met (such as an obligation for the university to build up reserves, as in the case of Austria). These provisions emphasise the need for dialogue between the ministry and the university so that action can be taken in time to prevent possible underachievement of the target (Bennetot Pruvot, Claeys-Kulik and Estermann, 2015[14]).

Determining the level of subsidy for individual institutions

The overall amount of the block grant for each institution is generally determined – within the constraints of the overall budget envelope (see Section 4.4) – through one or more of three key methods (OECD, 2019[16]):

- Historical trends: The amount allocated is based on the amount of funding that has been provided in previous years, which may vary annually according to certain parameters.
- Negotiations between government and higher education institutions: The amount allocated is an agreed sum negotiated between government and higher education institutions. The negotiations may be set out in performance agreements or funding agreements.
- Formula funding: The amount allocated is calculated through one or more formulae based on a set of predefined parameters and indicators.

Although formula-based block grants are the most common method of funding allocation, negotiated block grant and historical allocation remain important mechanisms in some jurisdictions. Some funding systems combine these elements. In Mexico and Portugal, for instance, historical budget allocations provide a base that is subsequently subject to negotiations, while in Estonia historical budget allocations are combined with formula-based funding and a performance contract.

Providing funding to higher education institutions according to historical trends ensures a degree of financial stability for institutions over time. However, using historical trends to drive the allocation risks reducing the dynamism of the system because it favours existing institutions and makes it difficult for newer institutions to grow. Furthermore, using historical trends does not provide incentives for performance improvement. Formula funding, on the other hand, rewards past performance and can motivate improvement.

Negotiated funding has high transaction costs, but offers the chance for the funding agency to reward improved performance and to spell out the directions it wants the institution to focus on. An example is New Zealand, where the Tertiary Education Commission publishes its areas of focus (such as for participation and achievement of under-served groups) and the institution prepares an “investment plan” that includes information on institutional strategy and performance, a forecast of enrolments, and information on institutional actions to address the Commission’s focus areas (Tertiary Education Commission, 2019[17]). The plan negotiation works alongside a funding formula.

However, the use of multiple funding mechanisms can reduce transparency and risks increasing the transaction costs in the system. Another crucial aspect to consider is unintended consequences that financial incentives could have on institutions’ behaviour.

The parameters and indicators used in funding formulae

There is great diversity in the design of funding formulae across countries, in particular in terms of:

- The types of indicator used: Formulae can be calculated based on input indicators (e.g. number of students enrolled in bachelor's programmes, staff numbers, space); activity (e.g. credits earned); output (e.g. completion rates, publications per academic staff); and/or outcome indicators of performance (e.g. graduate labour market outcomes). Table 4.1 presents a list of selected indicators.
- The institutional missions funded: Formula funding can apply to both the teaching and research missions of higher education, and to the third mission of higher education, which involves societal engagement and social service.
- The proportion of funds linked to different indicators: Formulae may include one or two indicators, or a large number of distinct parameters, with different proportions of overall funding linked to each. In some systems, most funding is tied to input indicators, while in others 100% of funds are linked to outputs.

Table 4.1. Selected indicators

	Input	Activity	Output	Outcome
Teaching	Number of B.A./M.A. students enrolled; student/staff ratio	Students who took exams; credits earned; exams passed; years completed	B.A./M.A. degrees obtained; degree completion in standard time of study	Graduate employment rate; skills; added value of diploma; international students
Research	Doctoral students/candidates	Patent applications	Doctoral degrees awarded; successful patent applications; external research funding obtained; publications/citations; income from science and technology transfers; publishing; researchers	
Engagement and social service	Staff numbers and contact hours in support of service activities		External funding obtained; EU/international funding obtained; ranking of outcomes	International staff; diversity-related indicators; community outreach; review of strategic plans of universities; staff structure/quality

Source: Adapted from Pruvot, E., A. Claeys-Kulik and T. Estermann (2015[18]), "Define thematic report: Performance-based funding of universities in Europe", https://www.voced.edu.au/content/ngv:70169.

Most formulae include input indicators

In many systems with formula funding, input indicators such as enrolment numbers play an important role in determining the amount of funding an institution receives via a block grant. This method gives transparency to institutional allocations and it gears the level of funding toward the costs faced by institutions. However, input-based allocation mechanisms may encourage institutions to favour the quantity of enrolments over the quality of courses. The incentives to maximise student enrolment could lead institutions to shift the offer of courses with high student demand or which are cheap to deliver, while neglecting costly or innovative programmes and courses better aligned with their profile and labour market demand (OECD, 2008[2]). Activity-based indicators, such as credits attained, can produce a similar effect.

Output indicators are used in formulae for awarding all or a proportion of institutional operating grants in some systems. The Danish taximeter system for teaching funding, for instance, is exclusively output-oriented, largely based on the number of degrees awarded. A majority of states in the United States have

introduced output indicators into their formulae for awarding institutional operating funding (Li, 2018[19]). States such as Ohio now distribute 100% of state subsidies for instruction based on output indicators for both two-year colleges and four-year universities (ODHE, 2020[20]).

There are few examples of funding formula for education that include outcome indicators, such as graduate labour market success. However, there is growing interest in this issue, particularly in the United States, where at least 7 of the 50 states use some form of labour market outcome metric in their funding formulae for public institutions (TICAS, 2018[21]).

Where formulae for teaching funds and research funds can be distinguished, those for teaching funds are more typically input-oriented, while those for research funds are most often output-oriented. For systems that have one formula (including indicators for both teaching and research), the majority are primarily input-oriented.

Through the selection and weighting of indicators, governments can set policy priorities

Specific policy goals (such as internationalisation and student and staff mobility) can also be mirrored in formula funding. For instance, Denmark uses indicators such as the number of international students and, to a lesser extent, the number of international staff members. Finland takes into account competitive international research funding and other internationalisation-related criteria (Pruvot, Claeys-Kulik and Estermann, 2015[18]).

Some jurisdictions, such as New Zealand, the Flemish Community of Belgium and a number of US states, reflect equity objectives in their funding formulae, typically through the use of a weight in the formula for each student of a given under-represented group. Greater weighting in funding formulae for enrolments and completions for under-represented groups – whether low-income, minority, or older students – can provide a counterweight to the temptation for institutions to reduce or restrict their intake of such students (Dougherty et al., 2016[22]).

Weights can also be assigned to reflect the varying costs of provision by field of study, level of study and type of institution

Most countries try to reflect notional or expected costs in their instructional funding rates, providing different levels of subsidy for each student enrolled in, or each graduate from, different fields of study, for example. High-cost subjects – such as medicine, engineering, certain natural sciences or the arts – receive higher levels of funding than lower-cost fields such as the humanities and social sciences. Box 4.1 provides some specific examples of cost-related weighting in institutional funding formulae in OECD countries.

Box 4.1. Allocating funding based upon notional costs

Some states in the **United States** allocate public funding to higher education institutions based upon estimated or notional costs of provision, in which instructional funds allocated to the institution are calculated based upon the field of study, level of study, and other characteristics. (Hoagland et al., 2019[23]). In Texas, for example, public university study places in arts and humanities were weighted 1.0 per full-time equivalent student in undergraduate level education, 4.01 at the master's level, and 10.9 at the doctorate level. The weights assigned to business programmes were, respectively, 1.16, 1.83, and 24.7; and 2.46, 28.55 and 32.17 in pharmacy, according to cost estimations from the Texas Higher Education Coordinating Board (Texas Legislative Budget Board, 2018[24]).

In the **Netherlands**, the formula-based part of public funding for teaching differentiates three levels of funding per student enrolled (low, medium and high) depending on the differences in instructional cost. These differences are based on the discipline (for example, pharmacy is high, journalism is medium and teacher training is low) and the type of institution. (De Boer et al., 2015[25])

Another example comes from **England (United Kingdom)**, where formula funding takes account of the number of students enrolled and the estimated cost of providing instruction in each discipline, net of the private revenue generated by fees. In 2015, for example, institutions are funded GBP 10 000 per student enrolled in medicine, dentistry and veterinary sciences; GBP 1 500 for natural sciences, some care programmes and programmes with laboratory use; GBP 50 for archaeology and design; and GBP 0 for humanities and social sciences (De Boer et al., 2015[25]).

In part, the aim of cost models such as these is to avoid the inefficiency that results from under- or over-provision of a field when funding rates are out of line with costs. However, most institutions end up responding to these differentials in subsidy levels by field by adjusting their internal budget allocations to reflect the revenue generated. For instance, if computing is under-funded in comparison to current costs, the institutional unit that teaches computing will face a reduced budget and hence, reduces its costs. Conversely, if computing gets a higher rate of funding, the department gets more funding, so it spends more, driving up the cost of teaching computing. In that sense, differences in funding rates tend to drive differences in costs as well as reflect real differences in the cost of providing different types of programme.

If funding differentials are grossly out of keeping with the actual costs of provision and where the funding rate means that the field is simply uneconomic to deliver within budget, the institution has two options – it can close the field of study or it can cross-subsidise the fields (i.e. reassigning money from other subject areas). For instance, if agriculture is seriously under-funded relative to its costs, the institution can either discontinue agriculture or it can reallocate resources internally, reducing allocations for other fields (such as humanities or business) in order to cover the shortfall in agriculture. A public institution with a focus on delivery of agricultural education is most likely to do the latter – cross-subsidise. But in doing so, the institution may be posing a risk to quality of delivery in the fields that are providing the cross subsidy.

As such, the aim of the funding authority should be to establish funding rates that are broadly in line with costs. This is a difficult task; in particular, it is difficult to get data at the level necessary to decide when the disparity between cost and funding rate is gross enough to warrant a change in funding rate (Connew, Dickson and Smart, 2015[26]).

Evidence on the advantages and limits of performance-related formula funding

Performance-based funding can improve aspects of institutional performance

The inclusion of performance-related indicators in funding formulae has the potential to motivate institutions to improve efficiency, providing financial incentives for improvement in outputs such as academic research productivity, completion rates and other measures of teaching efficiency. As discussed above, in many countries, governments have sought to improve their higher education systems by including performance elements in the funding system.

There are some OECD countries (for instance, the United Kingdom) whose research funding is now largely or wholly performance-based. In Denmark, the education funding system is wholly performance-based (through the taximeter system). In Australia and at least two Canadian provinces, governments are currently looking at how they might incorporate more performance elements into their funding systems. In New Zealand, there was a performance element in the education funding system between 2011 and 2018, but this was recently discontinued, with the government having noted that that the issue of low completion rates (which was one of the factors that led to its introduction) was no longer a problem.

There are risks and trade-offs in performance-linked and performance-based funding systems, meaning that the design and implementation of such systems requires care.

Studies of performance funding show effects on institutional behaviour and certain types of output

Several studies of performance funding in Europe find evidence that performance funding has led to higher rates of faculty research productivity. This is the case in Denmark, the Netherlands, Norway, Switzerland, the United Kingdom and Hong Kong (Dougherty et al., 2016[22]). These studies typically find an association between the advent of performance-based funding and improved research productivity, although, given the absence of counterfactuals, cannot prove direct causality (Dougherty and Natow, 2019[27]). However, even if it is difficult to find a control that enables an evaluator to prove causality, there are cases where benchmarks and other information suggest that the association between the introduction of the performance element and the performance improvement is significant and more than coincidental (Smart, 2013[28]).

Studies both in the United States and in Denmark find evidence of improved instructional effort in response to performance funding; institutions tend to increase their spending on instruction and make improvements in their programmes and services. The most common changes are reshaping developmental education; improving course articulation and transfer; and revamping advising and counselling services (Dougherty et al., 2016[22]; Jongbloed and Vossensteyn, 2016[12]), as well as data analytics and academic advising services, in an effort to improve student success.

While the instructional efforts of higher education institutions may respond to performance funding, performance funding appears to have little measurable effect on measures such as graduation rates (Dougherty and Natow, 2019[27]). Empirical evidence from Europe and the United States also suggests that performance funding has limited effects on student completion (Bell, Fryar and Hillman, 2018[29]; Jongbloed and Vossensteyn, 2016[12]).

Certain conditions need to be in place if performance funding is to succeed

Evidence points to two main conditions that need to be in place for the successful implementation of performance-based funding, including:

- **Adequate differentiation between institutional missions and goals:** Performance indicators should be adapted to the missions of different types of institutions. If performance-based funding accounts for a large share of funding, and if the goals and indicators are applied to all institutions independently of their profile and specificities, then performance-linked funding may have adverse results (for instance, discouraging the enrolment of disadvantaged students) (Frølich, 2010[30]; Dougherty and Natow, 2019[27]; Guthrie and Neumann, 2007[31]).
- **Stability in funding and the selection of indicators**: Institutional responses to performance funding are best if performance indicators are stable and if the funding consequences of performance-linked funding are clearly and transparently specified in advance (Dougherty et al., 2016[22]). The level of performance-linked funding should be such that core funding needs to account for much of the cost of delivery.

Risks of performance-related funding

A potential effect of performance funding is to induce risk-avoiding behaviour in institutions, leading to an emphasis on outputs that are easily attainable and measurable. This could happen both in teaching, (with effort shifted away activities with less tangible outputs such as encouraging creativity and problem-solving skills), as well as in research. There is also evidence that performance-based funding is associated with faculty trying to improve their publication statistics by pursuing less difficult research questions (De Boer et al., 2015[25]).

The emphasis on goals (e.g. academic research productivity) may have adverse consequences on other important objectives of higher education institutions, causing goal displacement, distortion in institutional missions, and a reduction in diversity. This has been identified as a problem in studies of performance funding in the United States (Dougherty et al., 2016[22]) and in England (United Kingdom), where performance funding for research has led institutions to put less emphasis on teaching (McNay, 1999[32]; Sharp, 2004[33]). Institutional performance *agreements*, in contrast to formula funding using performance *indicators*, are potentially a more flexible tool for handling situations where institutions have multiple objectives.

There is concern that extensive use of performance-related funding can shift institutions away from equity objectives. Several studies of performance funding find that, in the United States, institutions reduce their intake of less advantaged students in order to improve their performance (Dougherty et al., 2016[22]; Jones, 2017[34]). Output-based funding might also increase inequality of performance by penalising poorly performing institutions, leaving them without the resources they need for improvement (Claeys-Kulik and Estermann, 2015[35]), and increasing stratification between institutions (De Boer et al., 2015[25]; McNay, 1999[32]).

Challenges may also arise if funding is linked to an assessment of labour market needs. In principle, allocating public spending by labour market measures helps to ensure that resources are directed towards economically productive fields. However, the use of funding linked to graduate labour outcomes is complex. For instance, it is difficult to optimise educational supply from institutions, which typically requires several years with the volatile and hard-to-predict labour market demand. Supply-driven arrangements are also likely to have a distorting effect on student choice, potentially lowering student satisfaction and systems' efficiency in allocating student talent (OECD, 2008[2]).

Lessons for designing performance-linked funding mechanisms

The discussion above suggests that, if it is to be successful, a performance-linked funding system must be carefully designed – especially if it is to avoid the risks of goal displacement, such as:

- **in research**: avoiding important, valuable, applied research topics, in favour of research that may take less time and attract more citations;
- **in education**: discouraging institutions from enrolling students from disadvantaged backgrounds who are more difficult to teach and less likely to succeed, thus reducing diversity of access.

The design questions that need to be addressed by countries seeking to develop a performance element in their education funding model include:

- Should funding be performance-*linked* (where only part of the funding depends on performance) or performance-*based* (where all or most of the funding is generated by performance)?
- If it is to be performance-linked, what percentage of funding should be attributable to performance? Some countries (for instance, New Zealand) have implemented models where 5% (or similar) is performance-linked.
- Should performance funding *reward good performance* (so-called "carrot" funding) or *penalise poor performance* ("stick" funding)?
- What measures should be targeted? Are the measures aligned with system goals? Are the measures aligned with identified problems of performance (for instance, equity of access or completion rates)?
- How many measures should there be? (If there are too many measures, they send confusing signals to institutions. If there are too few, that will raise the stakes for institutions.)
- How can the problem of "double jeopardy" be avoided if indicators are highly correlated and the problem of confused signalling be avoided if they are negatively correlated? If there are multiple measures, the designer needs to be sure that they are independent.

A similar set of questions should underpin the design of research-related performance-linked funding.

Even a well-designed performance-linked funding model needs to be carefully monitored to ensure that adverse outcomes are identified.

4.6. Voucher and voucher-like mechanisms for funding higher education

Some OECD jurisdictions have experimented with voucher or voucher-like institutional funding mechanisms, where public money is directed to the student, rather than the institution as in the examples discussed above. In voucher-based funding, funds are assigned to students – the clients of higher education institutions – who use the vouchers to "purchase" educational services. Students are granted vouchers by a public authority and trade these for educational services at the higher education institution of their choice. For the institution, the vouchers represent a certain value and can be cashed at the responsible government department. Each person is given a limited number of vouchers, effectively as a birth right, representing a value which can be used in a flexible way (during a certain period of time and for programmes supplied by a given number of accredited education providers). (Jongbloed, 2004[36]).

Alternatively, governments may create a quasi-voucher funding system, in which students are not provided a coupon to redeem to meet study costs, but are offered a demand-driven lending scheme that effectively permits tuition-free study with all recognised providers. This is the sort of model implemented in the English higher education system in 2012.

Proponents of demand-led systems suggest that they can lead to increased institutional responsiveness to consumer needs; incentivise efficient educational delivery; and encourage diversity and flexibility in provision (Bekhradnia and Massy, 2009[37]). Critics, in turn, argue that vouchers may hamper public steering of institutions (i.e. away from national priorities); result in fluctuations in enrolment and funding that lead to under-utilisation of capital; and force programmes with high cultural value, but small enrolments, to close. Similarly, a lack of student interest in certain science and technology fields, for

instance, can lead to cut-backs, loss of staff, reduced quality, and consequently, less student demand, despite labour market demand (Jongbloed and Koelman, 2000[38]).

The difficulty of satisfying conditions necessary for the effective functioning of voucher or voucher-like funding systems is illustrated by recent experience in Engand. Public authorities in England lifted enrolment caps and moved away from directly funding institutions toward tuition fees coupled with an income-contingent, government-subsidised student loan system. Together, these permitted a transition to a fee-based and choice-led system of higher education – effectively, a demand-driven, quasi-voucher system that was strongly responsive to student demand. Studies with quasi-experimental designs have shown that participation, completion and labour market outcomes for low-income students were not adversely affected by the system's transition to tuition fee-based institution funding led by student demand (although enrolments by older and part-time students fell) (Murphy, Scott-Clayton and Wyness, 2017[39]; Azmat and Simion, 2017[40]).

However, as the United Kingdom National Audit Office noted in its 2017 assessment of higher education market conditions, the system was unable to achieve all the conditions needed for a fully functioning and effective market (NAO, 2017[41]). Consider, for example, the question of price competition:

> *There is no meaningful price competition in the sector to drive down prices for the benefit of the student and taxpayer. …. In 2016, 87 of the top 90 English universities charged the maximum permissible fee of £9,000 a year for all courses. Evidence shows that students use price as a proxy measure for quality, and … providers … were concerned that lowering prices may signal poor quality. Providers also choose the purchaser in higher education, which differs from … traditional markets where the buyer chooses the product or provider.*

Effectively communicating quality and earnings information to students appears to be a general difficulty facing higher education systems across the OECD (Hofer, forthcoming[42]). Public authorities in England provide students with comparative data on providers and courses, including satisfaction scores and costs, as well as graduate employment and earnings outcomes. However, "only 20% of prospective students have used the data, dropping to 2% of prospective part-time students" (NAO, 2017[41]). As a result, the study decisions students made did not steer resource allocation towards the most productive human capital investments.

Student mobility may do little to improve the matching of students to programmes, or to drive improvements in institutional performance. This may be the consequence of very low switching rates, as in England (NAO, 2017[41]). In other demand-driven systems of higher education that rely upon market-like arrangements for resource co-ordination, there are much higher rates of switching; but poorly guided student mobility among programmes and institutions leads to long study times and lost credits, rather than efficiencies (GAO, 2017[43]).

4.7. Allocating research funding to higher education institutions

While the principal focus of this chapter is the allocation of funding in support of instruction, we note that research funding plays a critical role in higher education policy across the OECD, and forms a key funding stream for many higher education institutions. Moreover, in many OECD higher education systems, there are concerns about research being funded at less than its full cost, leading to extensive cross-subsidies from other revenue streams, including tuition fees and public teaching subsidies (Box 4.2).

Box 4.2. Teaching and research cross-subsidies

The UK's Higher Education Policy Institute calculates a "research deficit" of almost GBP 3.3 billion across the higher education sector in the UK, amounting to 37% of research income. This has traditionally been filled from non-publicly funded teaching surpluses (mostly from fees charged to international students) and other income, including activities such as consultancy and technology transfer. On average, over the duration of their degree, each non-EU student contributes over GBP 8 000 to UK research (Olive, 2017[44]).

Another example comes from Australia, where one research centre notes: "More than AUD 2 billion in surpluses from teaching are being used to fund research in Australian universities. On a conservative estimate, one dollar in five spent on research comes from surpluses on teaching. International students, who usually generate more revenue per student than domestic students, contribute a substantial proportion of this surplus." (Norton, 2015[45]).

These concerns are shared, as well, in the United States: "The underlying problem is that higher education has decided to price funded research at less than its actual cost. This research under-pricing arguably leads to a great deal of the upward push on tuition that has occurred over the past decades. Since reputations of universities are linked directly to their research expertise and external research funding – not their education – there is a continuing pressure to do ever-more funded research. As colleges and universities seek to move up the reputational ladder, they increase emphasis on funded research, which leads to a need for more internal research spending, which in turn increases the pressure to increase tuition." (Changing Higher Education, 2016[46]).

Public funding for research in higher education institutions awarded by national authorities was, historically, substantially based on formula-based block grant funding in much of the OECD. In many countries, research funding formulae take account of the number of researchers, the scale of doctoral training, or other indicators of activity. In other countries (the UK and New Zealand are examples), the research block grant funding is awarded on the basis of the institution's research track record, using a mix of peer assessment and research performance indicators.

While formula-based block grant funding persists, an increasing share of research funding is awarded on a competitive basis, giving rise to a dual mode funding model, in which the core funding of academic research (the institutional or direct funds that are part of the lump sum), is joined by a second, competitive funding stream originating from a research council or intermediary organisation (Jongbloed, 2010[47]).

While competitive research funding allocation decisions are based upon assessments of the volume and quality of scientific research output, how this output is assessed varies, with some funding bodies basing funding allocations principally upon bibliometric indicators, and others relying substantially upon peer review. There is debate, as well, over whether assessment processes should take note of other criteria such as impact (Zacharewicz et al., 2019[48]).

The proportion of funds distributed through competitive grant schemes is increasing relative to the funding allocated to formulae and other direct (core) funding schemes. There is also a trend of attaching new, additional research funds to specific priorities selected by the funding authorities. While competitive funds still may fund original, curiosity-driven projects, many governments are tying specific conditions and goals to new competitive funds. An example of the latter is the emergence of new initiatives and research programmes for carrying out strategic research, such as the creation of centres of excellence.

Governments are also increasingly funding research through contracts signed between funding authorities and individual institutions, in which part of the institutional budget is tied to a performance agreement. This

approach to funding may be seen as a way of government purchasing a particular performance or level of output from the university (Jongbloed, 2008[49]).

The distinctive role of applied science universities, polytechnics, and other professionally oriented higher education institutions in creating and disseminating knowledge has also recently been a focus of institutional funding policy. In higher education systems such as Switzerland's, in which its National Science Foundation funds research carried out in universities of applied science, separate competitive grants are awarded for applied research using criteria that focus on the "broader impact" of the proposed research and with the involvement of experts from relevant fields of practice in the peer-review process (Swiss National Science Foundation, n.d.[50]).

4.8. Allocating capital funding to higher education institutions

Capital expenditure in the higher education sector includes, or is substantially applied in, the construction of new teaching, research and student services buildings; refurbishment projects; infrastructure development and property acquisition. Countries can provide budget for capital expenditure in the regular block grant, discussed above, or through separate funds that are independent of teaching and research funding allocations.

In the US state higher education systems, for instance, there are often separate capital budgets with distinct procedures for the allocation of capital funding to public higher education institutions. By contrast, some other OECD countries (e.g. Australia, the Netherlands, New Zealand and Sweden) integrate capital expenditure in the regular block grant, which gives strategic flexibility to institutions, but may also lead to underfunding of capital projects (OECD, 2008[2]). Some of these countries periodically provide institutions with extra instruments for funding capital expenditure, such as additional funding available for specific projects in Australia. While there has been some opportunity for case-by-case negotiation with government for significant capital injections in New Zealand, institutions in that country usually raise funds for capital in the commercial loan market and service those loans through their operating revenue. In Sweden, loans are available from the State. Competitive capital funding schemes, and those requiring sharing of equipment among institutions, are also common and justified mainly by the need to maintain research competitiveness.

Along with the departments responsible for the allocation of the regular block grant, funding for capital projects can come from Research Councils. Research Councils usually provide project-based funding for research infrastructure or funding for Centres of Excellence (including facilities). Capital projects may also be funded by governmental departments in charge of regional and local development, innovation and entrepreneurship, and defence, among others; higher education agencies; and various levels of government.

In comparison to basic recurrent funding, funding processes for capital projects vary more widely, are less likely to be formula-driven and/or guided by master plans, and may be contingent on different levels of and agencies within government, which can make them more susceptible to political influence.

The majority of systems make it possible for universities to own and control their campuses and capital facilities, allowing them to determine their institutional strategy and academic profile (Pruvot and Estermann, 2017[8]). Some German states, Hungary and Sweden are notable exceptions to this pattern. In some cases, high maintenance costs or restrictions associated with historical buildings may deter universities in some systems from owning their facilities. In France, for example, only a few universities have become owners of their own buildings following a pilot launched in 2011-12. Some systems allow universities to sell real estate freely (e.g. Austria, Denmark and Estonia), while restrictions, usually in the form of an external approval, or a notification to an external authority (Ireland, New Zealand and Portugal), apply in other cases. Intermediary models, where a (semi-) public agency owns university buildings (e.g. Austria and Finland) also exist. In Sweden, universities may not own buildings – 60% of the space used

by universities in the country is managed by a state-owned company (the other 40% are owned by other real estate companies on the open market) (Pruvot and Estermann, 2017[8]).

The Netherlands exemplifies a system in which institutions benefit from great autonomy in the management of their infrastructure (OECD, 2008[2]). Public institutions have been given both ownership and control of their own campuses and capital facilities. Capital expenditures and revenues are part of the lump sum budget, meaning that efficiencies and revenues in this category can be directed towards the operational needs of the institutions. This approach also encourages, at least theoretically, co-operative planning among institutions when constructing new facilities. Dutch institutions can use debt financing without restrictions to pay for the facilities – in contrast to institutions in many other European countries, which are often constrained by a pre-determined maximum percentage of borrowing, or by the need to secure the approval of an external authority (Pruvot and Estermann, 2017[8]).

4.9. Accountability for funding

The complement of public funding for higher education institutions is public accountability for that funding. Accountability for funding needs to operate at two levels:

- assurance that the money has been appropriately spent on the purposes for which it was allocated – in other words, a **prudential assessment** of the spending;
- **strategic accountability** – assurance that the funded institutions were contributing to the outputs and outcomes that the government was "purchasing" in allocating funding.

The first level – prudential assurance or compliance – relies on an audit of the accounts in accordance with international accounting standards (conducted by a registered auditor) coupled with an assessment (presumably by the funding agency). This funding agency assessment would include measuring if, or how well, the institution has met its educational and research performance commitments and whether it has met benchmarks for prudent financial management (Tertiary Education Commission, 2016[51]). Ideally, these assessments should be *ex post,* meaning that the review occurs at the end of the year, following the expenditure and hence doesn't interfere with operational efficiency.

That funding agency review is more complex in countries (such as Korea and Greece) with line-item funding systems, (that is, where funding is disaggregated and set amounts are earmarked for particular items or activities). In those cases, limits apply to the reallocation of funds across budget lines. This results in a high level of financial control and much more complex audits. In the case of Greece, most approvals are granted *ex ante*, meaning that authorisation is required from finance officials in order to commit funding. This sort of funding and the resulting audit complexity serves no valuable purpose, but makes it difficult for institutions to operate efficiently or strategically (OECD, 2018[3]; OECD, 2019[9]).

These problems are less likely to arise in systems where funding is delivered in block grants, where accountability operates *ex post* and where performance frameworks are focused on performance commitments and a strategic assessment of financial performance.

Strategic accountability is focused on the higher-level system outcomes and should be focused on performance measures relating to government's goals for the system – including, where possible, measures of system outcomes.

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