Innovations in Financing of Higher Education in Slovakia[1]

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Introduction

Higher education has been in continuous flux for decades and the speed of change has accelerated in recent years. Increase in student numbers, observed in many developed countries in 1990s and 2000s, where anywhere from one third to two thirds of young population study at the post-secondary level, has created unprecedented demand for higher education, but also unprecedented pressures on the institutions themselves and the public purse that traditionally financed most of the cost in all but few OECD countries. As higher education and its costs grew, concerns over the efficiency of their use and outcomes also increased. The general tendency in post-industrial societies to emphasize individual needs and client orientation in public services also contributed to the changing environment of higher education financing and organization.

Governments all over the world responded to these developments through a plethora of initiatives, which tended to include introduction or strengthening of private resources including student fees. In 2002, the Slovak government also introduced a major reform of higher education, but for political reasons, fees were not an important element. Rather, the government decided to pursue changes in how the public subsidy is spent by creating a strong set of incentives for universities to pursue government objectives and by changing the rules so as to allow the universities to flexibly utilize their tangible as well as intangible assets in the response to the new conditions. The nature of the reform and its impact is discussed in this chapter.

The chapter is organized in the following manner. We start with a brief review of

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existing literature on innovations in financing public services in general and higher education in particular, with focus on the so-called quasi markets. The following section contains relevant background information on the Slovak higher education reform of 2002, especially on changes in the financial areas. The third section examines how the new funding formula, which is at the core of the paper, had an impact of behaviour of higher educations institutions as a group. We then try to prise open the "black box" of university decision-making and look at how the reform influenced their internal formula for distributing funding to internal units. The chapter ends with conclusion summarizing our findings.

Innovations in financing public services, including higher education

There are many definitions of public services. For example Grout and Stevens (2003, p. 2) see public services as "any service provided for a large numbers of citizens, in which there is a potential significant market failure (broadly interpreted to include equity as well as efficiency) justifying government involvement – whether in production, finance, or regulation". Le Grand (2007, p. 4) refers "specifically to services that are of fundamental importance to public… And it usually implies services for which there is some form of state or government intervention, whether in its finance, provision, regulation or all there."

Higher education is one of the important public services. As Moore (1983, p. 213) states, "higher education is not luxury good, but a prerequisite for developed country anxious to maintain its culture and standard of living. Its magnitude and expense make its aims important to all." Moreover, Barr (2004, p. 1) writes: "Higher education matters. No longer only a consumption good enjoyed by an elite, it is an important element in national economic performance. So it is no accident that the numbers in higher education have increased in all advances countries. However, a mass, high-quality university system is expensive and competes for public funds with other imperatives."

Demand and supply of higher education services exploded all over the world. For the developed economies, OECD documents rapid growth during 1990s and 2000s, with the only difference between countries having to do with the rate of growth. Dealing with the rapidly surging capacity needs in what has traditionally been a tax-funded public service (with few exception such as the US) required a number of organizational and financial innovations. Barr (2005) indicates that problems in financing higher education appear all over the world without exceptions. „Higher education faces problems throughout the world: universities are underfunded, raising worries about quality; student support is inadequate; the proportion of students from disadvantaged backgrounds is lamentably small; and the financing of universities in many countries is regressive, since the money comes from general taxation but the major beneficiaries are from better-off backgrounds."

Le Grand (2007, pp. 14-37) distinguishes four potential routes towards improvements in public services:

- trust – letting professionals do the job

- voice – giving feedback mechanisms to clients
- command and control – hierarchy and targets
- choice and competition – giving the client ability to choose a service provided,

Innovations in organization and financing of public services generally tend to fall into either voice or, even more frequently, in the choice and competition category as opposed to traditional – trust, command and control – approaches. In higher education, recent innovations in financing frequently involve either graduate tax or differentiated fees / income-contingent loans. (Greenaway and Haynes 2000, pp. 60-98; 2003, pp. 150-165) Both assume that those who benefit from higher education should contribute more to the costs. The graduate tax is an additional tax provided from graduates' salaries. The second idea is to allow universities greater freedom in setting fees, because universities can have different cost structure (subject mix, researches, wage structure) and the cost of education are higher than in the past. This is complemented by scholarships and "income contingent loans" so as to minimized potential barriers of accessibility into universities for poorer students.

On the other hand, innovations are also possible in how public funding is distributed. A good example are vouchers and voucher-like mechanisms through which a grant follows the student. (Barr 1993, p. 722). The government can create quasi-markets, with students and governments as consumers. Such mechanisms can also be integrated into traditional funding formulae for universities.

Genua (2001, p. 610) describes three channels for direct financing of higher education by the state:

- incremental funding – "funds are allocated on the basis of past expenditure levels with incremental resources made available for the development of new activities".
- formula funding – "the budget of the institution is determined by some form of assessment of the actual institutional expenditure per student enrolled or expected to be enrolled.... Research funds can also be determined by a formula system that allows the distribution of the funds in a selective way on the basis of research record."
- contractual funding – "is applied via tender schemes. Public funding agencies issue targets in terms of student numbers or research and the various institutions apply for the funds to carry out specified tasks. There are different forms of contracting depending on the existence of fixed limits for the availability of funds and in the degree of specificity of the activity. In the case of limited funds and tightly specified targets, universities have to compete with one another for the resources."

He finds that "although there is a high level of diversity in the mix of the different funding system in the EU, recent years have seen an increasing reliance upon formula and contract funding." (ibid.)

Jongbloed (2008, p. 13) suggests that funding on the base of outputs has better

economic results than on the base on input. Output funding "is believed to contain more incentives for efficient behaviour than input funding. If budgets depend on performance measures, there is reason to believe that those who receive the budgets will pay increased attention to their performance."

OECD (2003, pp. 65-69) observes that the manner in which public money is allocated is changing in most OECD countries. In the past, money was usually allocated via detailed itemized budget. Nowadays, the system of distributing money called "lump-sum" or "block grant" is becoming more popular: " In the case of block grants for recurrent funding, there has also been a trend towards governments using formula funding based on services provided and performance levels… These formulae are often based on student numbers, and hence in some respects on performance in attracting clients. However, there are also efforts towards linking funding to outputs and outcomes. A number of European countries… have incorporated outputs in their funding formulae, by taking account not just of enrolments, but of student completion rates."

Background and summary of innovations in the funding and financial management in 2002

Innovations in financing of Slovak higher education analyzed in this paper span a decade and three governments. They were started in 2000 by a Government White Paper called "Concept of Further Development of Slovak Higher Education in the 21st Century". The paper called for a radical change in legal framework of the higher education and accompanying changes in governance and financing. While some of these changes were then piloted during the 2000-2001 period, it was the new Act on Higher Education approved in 2002 that set the stage for the new system.

Until 2002, the funding and financial management system of the Slovak public higher education institutions[3] can be characterized by the following five features:

- higher education institutions (HEIs) had to transfer all revenue to the central budget
- the budgeting for individual HEIs was primarily incremental and generally did not take into account outputs (students, graduates, publications etc.) though it did take into account actual expenditure from the previous year (underspending)
- HEIs were given an internally structured subsidy by the government and could not modify it (e.g. shift funding from goods and services to wages)
- HEIs did not own any property, but instead held all their assets as publicly-owned property in trust and the government provided discretionary and targeted subsidies for investment to individual HEIs, thereby controlling HEIs'

[3] Private higher education in Slovakia grew significantly during the 2000s, but generally without recourse to public funding. Therefore, the paper will address only public institutions.

capital budget
- HEIs (in line with the rest of the Slovak public sector at the time) used cash-based rather than accrual accounting

This system was also combined with an acute budget constraint on higher education imposed on the system by the 1994-1998 Mečiar Government, partially as a result of the political conflict between the government and the majority of teachers and students.

It is worth noting that, since 1990, the Slovak public HEIs already had extensive autonomy in non-financial matters. The chief executives were elected by and accountable to academic senates, composed solely of staff and students' representatives. HEIs were free to set their own admissions procedures and largely ran their own examinations as they saw fit. As a result, the HEIs were free to respond to whatever incentives the government policy, especially funding policy, presented.

The 1998-2002 government, which approved both the White Paper and the new law, also substantially increased financing of higher education between 2000 and 2006 (there was a substantial degree of personal and political continuity between the 1998-2002 and the 2002-2006 governments). In real terms, the government subsidy for higher education increased by 65.6% in those 6 years. Therefore, the reforms took place in the environment of a relaxing budget constraint. On the other hand, since the change of government in 2006, there has been a substantial tightening of purse strings, but the main principles of the funding system remained untouched. We will therefore be able to examine interaction of both periods with the innovation in public funding.

In the OECD context, Slovakia experienced relatively stable real expenditure per student – it grew by 6% between 2000 and 2005 (after declining by 12% between 1995 and 2000), compared to the average growth in the OECD of 11% between 2000 and 2005. (OECD 2008)

The key problems with the pre-2002 funding mechanism were as follows:
- distorted incentives with regard to student numbers. The system did not provide motivation for growth in full-time student numbers since they did not translate into higher subsidies. However, due to lack of clarity with regard to payment of fees by part-time students, universities had an incentive to grow their numbers and charge fees
- no incentives for improvements in research since the funding formula did not take the research outputs or outcomes into account
- no incentives for savings / efficient asset management since any savings (e.g. in energy use) would be immediately cut from the next year's budget
- lack of sustainable approach to financial / asset management and absence of long-term planning coupled with political interference and clientelistic practices in investment subsidies

The new system, in place from 2002 onwards, can be characterized by the following

main features, which have not changed in principle though their application and weight varies. Probably the most important change has been that the government subsidy has shifted to a mixture of input- and output-based budgeting. Individual HEIs receive their subsidy based on a publicly known (and publicly consulted) formula, which primarily reflects the following factors:[4]

- number of students (weighted by standardized cost coefficients for individual areas of study – e.g. natural sciences vs social sciences)
- number of graduates (weighted in a similar manner)
- number of PhD students and graduates (not weighted)
- professional and education structure of the teaching staff (number of full professors, associate professors and other teachers with PhDs)
- research publications weighted by the category that should reflect their importance and quality
- volume of research grants from domestic and foreign sources

The second important group of changes was related to incentives of HEIs to generate their own revenue and to use their tangible and intangible assets more efficiently and effectively. According to the new law, HEIs:

- could keep all their own revenue regardless of its source
- received into their ownership the assets they had previously held in trust and could utilize it freely to generate additional revenue
- received the government subsidy in an unstructured grant, which they were free to utilize as they saw fit
- any unspent funds could be carried over into the following years

Lastly, the new rules aimed to introduce a more long-term and strategic perspective and sustainability into the HEI management by, in addition to the measures already mentioned:

- switching to accrual accounting, thus forcing the HEIs to switch from cash-based way of looking at their operations to one, where they also look at non-cash costs of their activities (primarily depreciation of assets)
- capital grants previously distributed by the central government on a discretionary basis were, to a large extent, converted into the regular subsidies though the government kept a portion for "development projects" of HEIs

Analysis of the main features at the level of the higher education system and their impact at the system level

From an economic point of view, the main impact of the new system is that it

[4] Additionally, there is a separate subsidy related to social welfare of students, primarily aimed at providing needs-based scholarships and subsidize dormitory and meal costs. Since the focus on the paper is on funding changes related to the education and research process, we will ignore the "social" subsidy

created, for the first time, a clear set of “prices” for various educational and research outputs. Therefore, this section will look at how the prices for individual outputs developed and whether there is any evidence of their impact on the behaviour of the higher education institutions.

In higher education and research, the ability of the system as a whole and of individual institutions to rapidly respond to changing incentive is limited. There are several factors that point to lengthy adjustment periods. One reason is the sheer length of the relevant processes. Even if new students are accepted immediately, or papers submitted to journals or grant applications written, it takes anywhere between 1 to 3 years before those students graduate, papers are actually published and bulk of the grant money starts to flow. The second reason is that the capacity of the higher education system to respond to the incentives takes many years to build. This is true for the tangible assets (buildings, equipment) as well as for human resources. Obviously, it takes at least several years to produce a new member of the teaching and/or research staff. Of course, individual institutions can recruit academics from other schools (poaching), but to increase the overall capacity of the system rapidly would require either inflow of talent from outside the higher education sector and/or its import from other countries.

Given the fact that, despite the rising finance, the system is not generous in terms of pay compared either to private sector employment in Slovakia or to other, neighbouring markets (particularly the Czech Republic with its cultural and linguistic affinity), there is a limited ability to import talent from other sectors and countries.

At the same time, there is a range of instruments available to managers of higher education institutions to respond to these incentives even if there are short- to medium-term supply constraints. These are, for example:

- increase in the student: teacher ratio
- increase in the number of research outputs without changes in the underlying research production

These measures have one thing in common – increasing productivity, potentially at the expense of unobservables such as quality – and have been observed also in other countries. (Butler, 2001; Geun, 2003). Therefore, we will examine to what extent the data allow us to observe their occurrence in the Slovak higher education system.

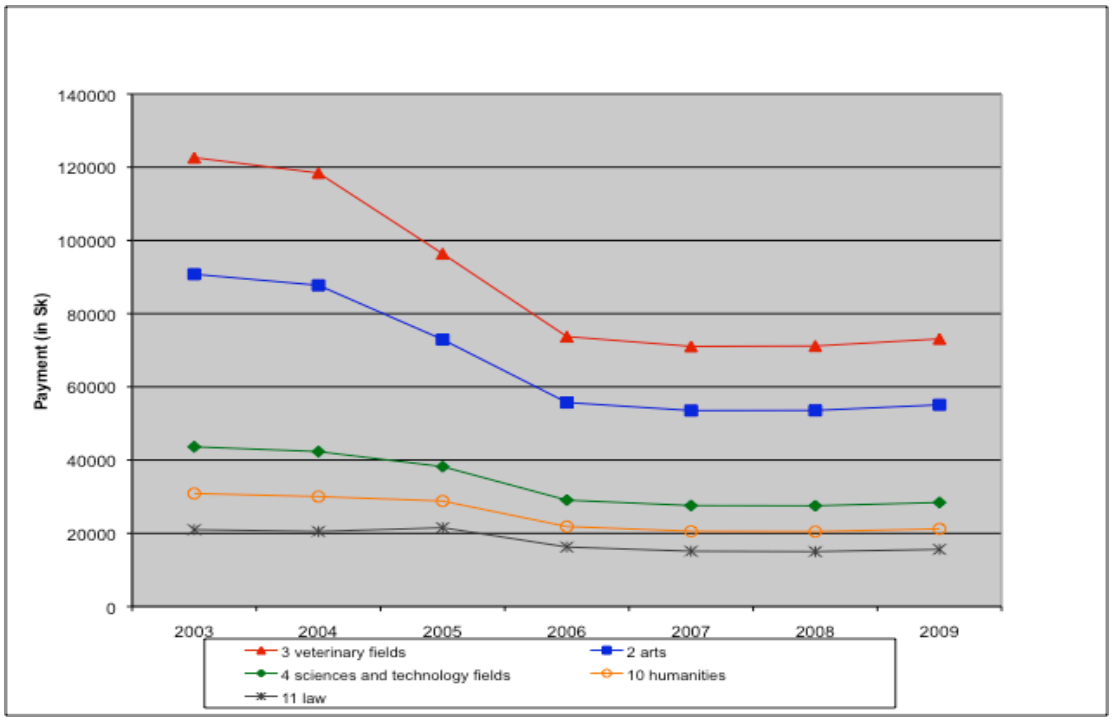


Chart 1: Payments per student in various fields – undergraduates (B.A.)
Source: authors

Starting with the payments per students, Charts 1 and 2 show developments in unit prices for various fields of study at the undergraduate and graduate level. We can observe significant nominal decrease in the unit price for undergraduate students of all types. This is despite the fact that the ratio of the overall government subsidy to number of students did NOT decrease over time. Therefore, the steep price decrease is due to the internal reallocation of the funding formula away from undergraduate student numbers. The prices paid for graduate students on the other hand have been fairly stable in nominal terms. This shift away from payments for undergraduate students is due to growing concern about increasing quantity at the expense of quality and gradual shift of resources towards research outputs (including PhD students).

Table 1: Developments in student numbers in Slovakia, 2000-2009

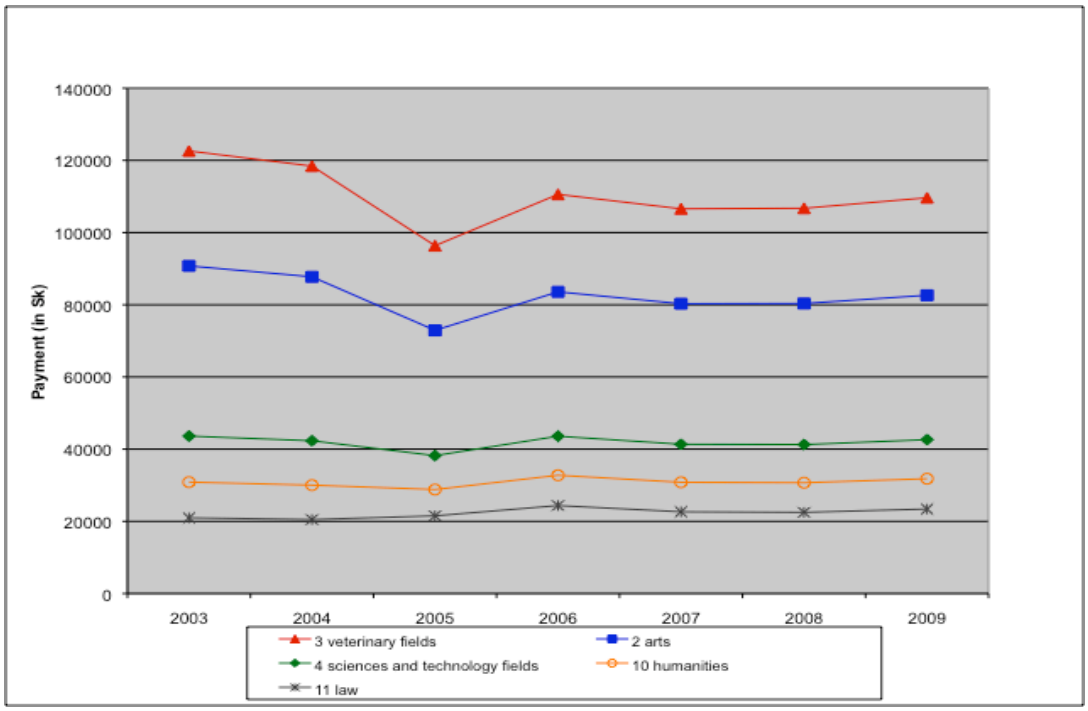
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
full-time students	88192	90446	92140	97932	97759	106194	113197	121058	126325	131048
part-time students	29240	33060	38948	38990	44494	50367	56309	60576	56944	51307
growth full-time	-	2.6	1.9	6.3	-0.2	8.6	6.6	6.9	4.4	3.7
growth part-time	-	13.1	17.8	0.1	14.1	13.2	11.8	7.6	-6	-9.9

Source: authors

Table 1 shows developments in the number of full-time and part-time students in public universities in Slovakia between 2000 and 2009. The table shows the following:

- after the introduction of the new system, we can observe acceleration in growth of full-time students that has only begun to taper off in 2008 and 2009 (but still growing relatively strongly). The only exception is the year 2004 for unrelated reasons.[5] In this sense, the new system produced results
- the number of part-time students continued to grow even more strongly until 2007 so the goal of the reform – to shift students from the illegal fee-paying part-time system to the official full-time system largely failed. The part-time system began to shrink only in 2008 and 2009, when the new private institutions became significant players in the market.

Chart 2: Payments per student in various fields – postgraduates (M.A.)



Source: authors

The pricing for PhD students is somewhat more complicated. It consists of three payments:

- payments for PhD students based on the expected cost of their field of study. PhD students were divided into three categories (medicine; natural, agricultural and technical sciences; others) and the formula provided differentiated subsidy, which was substantially higher than a similar subsidy per student at the undergraduate or postgraduate level
- additional bonus payments for PhD students, which were not differentiated
- bonus payment per PhD graduate, which were also not differentiated

[5] In 2004, the intake of the universities was much lower than usual because the size of the graduate class in the secondary education was artificially small. This was due to a shift from 8 to 9 years of primary and lower secondary education 4 years before, which created a very small "gap" year graduate population

To give an example, the payment for a mathematics student at the M.A. level in 2007 was 37 858 Sk. For a PhD student in the same field, the higher education institution received 93 134 Sk in the first category (costs of teaching) and 107 754 Sk in the second category (research excellence), which together is 200 888 Sk, or nearly six times the price per a post graduate M.A student.

We can observe considerable fluctuation in prices over years, but what remains is the significant premium paid for PhD students compared to undergraduate and graduate (M.A.) students. The premium was quite intentional and its objective was to increase the number of PhD students and graduates significantly. In this respect, it succeeded without reservation. As Table 2 shows, the number of full-time PhD students in Slovakia grew in double digits between 2002 and 2008 (with the exception of 2006), more than doubling overall during the period.

Table 2: number of full-time PhD students in Slovakia, 2002-2008

	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
number of full-time PhD students	2008	2236	2751	3370	3368	3718	4321
Annual growth rate (in %)	n.a.	11.4	23	22.5	-0.1	10.4	16.2

Source: authors
Note: number of PhD students refers to the number on October 31 of a given year.

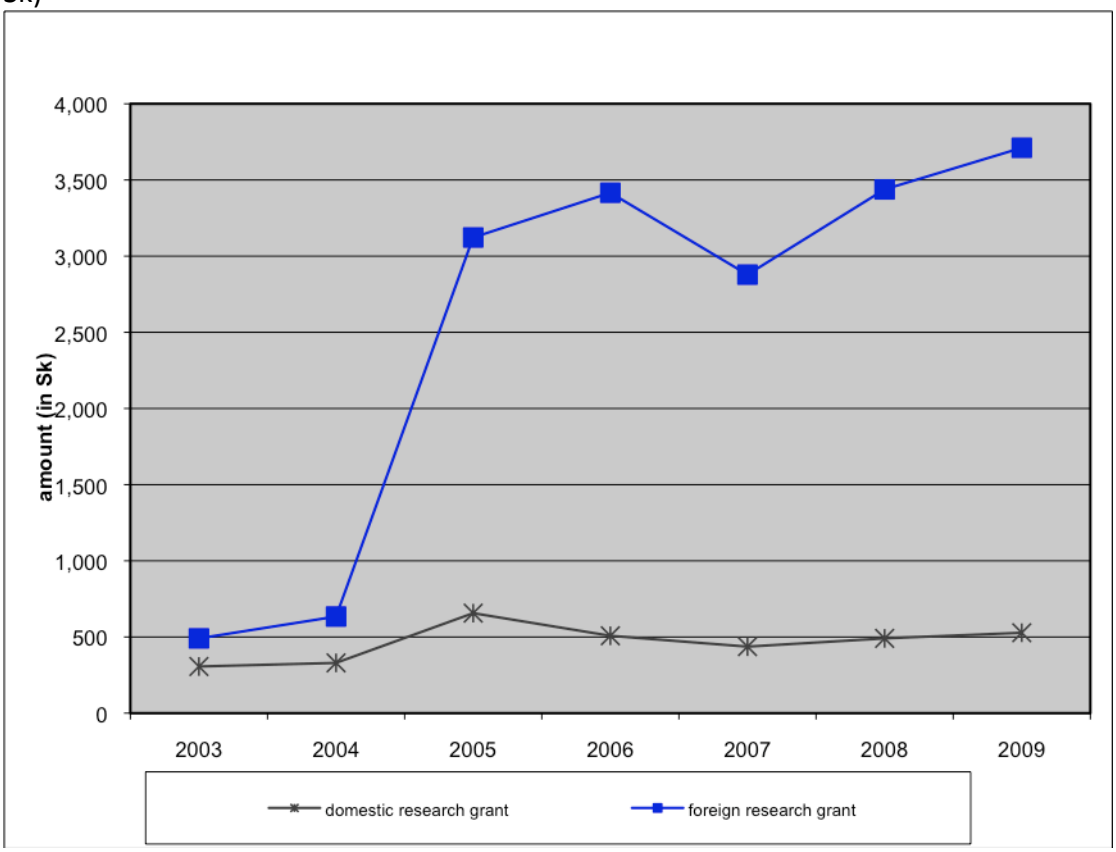
The next set of prices was attached to research grants received from sources in Slovakia and abroad. Due to limitations on the type of grants eligible, the only grants effectively counted in were:

- in case of Slovak grants, support from official government grant agencies (no private sources)
- in case of international grants, grants awarded on a competitive basis (primarily the EU Framework Research Program, European Science Foundation, NIH in the US)

The price setting is an ex-post matching, where the public subsidy is based on the volume of a grant in the previous year. As we can see in Chart 3, the ratio started around 0.4-0.5 in 2003 (i.e. 400 euro per 1000 euro of grant) and, in case of foreign grant, grew dramatically to the range of 3-4:1 between 2005 and 2009. For the domestic grants, the price stagnated around 0.5 ratio. The reward for foreign grants is enormous when one realizes that it implies provision of additional untied 300 to 400% premium over resources already received, which are likely to be quite generous themselves, given the higher funding standards of the funding agencies in Western Europe / US. It is difficult to imagine any stronger incentive for application for foreign grant resources.[6]

[6] It should be kept in mind that the premium was paid to the university and its internal distribution depends on the internal decision-making processes analyzed in the following section.

Chart 3: Subsidy received based on domestic and foreign research grants (per 1000 Sk)



Source: authors

However, success of such applications is conditional on a significant degree of integration into international networks of researchers and research institutions – one of the Achilles' heels of the Slovak higher education establishments. Such integration cannot be produced by fiat and internal production or recruitment of research of such calibre requires internal institutional conditions (salaries, equipment, processes etc) that are not amenable to simple or quick fixes.

Reaction of the Slovak higher education institutions is therefore likely to illustrate success (or limits) of the financial innovation itself in bringing rapid and deep changes in the way higher education institutions operate. Table 3 shows developments in the volume of the eligible foreign grants between 2003 and 2009. As we can see, there is an upwards trend after 2007, but there is a caveat – a structural break in the data. In 2007, the ministry relaxed eligibility conditions, which is associated with the massive jump between 2006 and 2007. On a comparable basis, we can observe a much milder growth between 2007 and 2009 and altogether 80% output growth between 2003 and 2009.

On the contrary, domestic grants where there is no international competition, the higher education sector reacted much more dynamically, increasing the outputs by nearly 800% - ten times more than in the case of foreign grants. This is despite much weaker incentives.

Table 3: Eligible research grants documents by higher education institutions between 2001 and 2008 **(in thousands of Slovak crowns)**[7]

Year	2001/2	**2002/3**	2003/4	2004/5	2005/6	2007	2008
domestic grants	267,634	433,217	881,843	1,299,987	1,605,668	1,956,405	2,160,313
foreign grants	167,057	225,383	185,417	193,241	243,535	279,248	307,241

Source: authors

The next group of prices concerns research outputs – publications. They were introduced into the pricing formula in 2006 to reward research outputs. The funding formula uses a system, which converts all outputs into a single indicator using weights that should take into account quality / research intensity of the output. Between 2006 and 2009, we can observe a marked increase in the total standardized volume of publications from 154 554 to 564 528.[8] Some of the increase can be attributed to a statistical illusion – increase in average weights in 2008 and 2009. This factor however is unlikely to explain most of the improvement. Therefore, it seems that the research output reacted to incentives and grew rapidly.

Unfortunately, that does not mean that the actual research conducted in higher education institutions improved. If there is no effective quality control, there are two potential strategies that can increase production without any improvement:

- dilution of the same amount research into a higher number of outputs (or repeated publication of the same research via its repackaging)
- increase in research quantity at the expense of quality / relevance

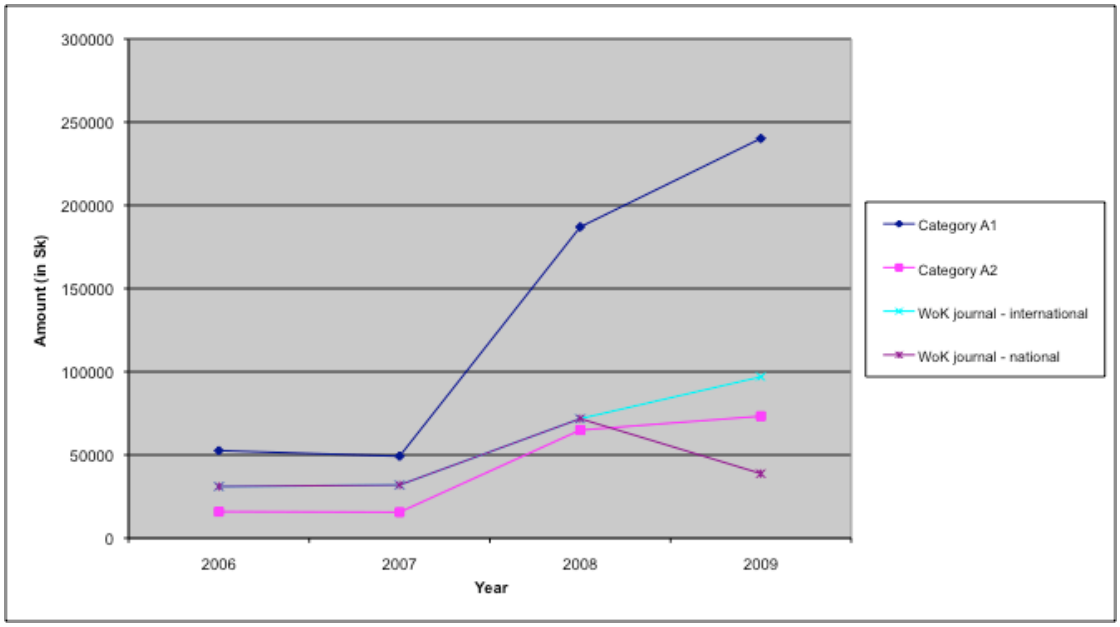
To compensate for these problems, the funding formula gradually introduced a more discriminating pricing mechanisms to reward outputs of higher quality. However, the higher quality output category contains outputs that have sufficient external quality control mechanisms and ones that do not. To give an example, the category contains both papers in journals listed in the ISI Current Contents database (with particular reward for foreign journals) and research monographs published domestically or abroad (category A1). Monographs command significantly higher prices since they are supposed to be more labour-intensive. The gate-keeping function for the journal papers is provided by their peer reviewers, which is difficult to game, particularly for foreign journals (there is only 1 humanities journal and 2 social science journals in Slovakia that are in the ISI database). On the other hand, all one needs to have a formally recognized monograph is 60 pages of text with an ISBN number and 2

[7] Note: the 2007 and 2008 numbers are doubled to allow comparison, since the 2001-2006 numbers were based on the total grant volume over the previous two years, whereas the 2007 and 2008 numbers are based solely on annual figures (which run from November of the previous year to October of the next year)

[8] As with some of the other outputs, the 2008 and 2009 numbers are doubled to allow comparison, since the 2005-2007 numbers were based on the total grant volume over the previous two years, whereas the 2008 and 2009 numbers are based solely on annual figures

names of academic peer reviewers. This makes it much easier to game. Therefore, the increasing rewards for both types of outputs provides a strong incentive to increase the A1 and A2 categories rather than publications in journals.

Chart 4: Unit prices for various research publications



Source: authors

The last set of prices that we analyse is concerned with the seniority / qualification structure of the HEI staff. Slovakia has a standard career ladder – progressing from lecturer to senior lecturer, associate professor to professor. For associate and full professors, there is a special appointment process conducted by the institution itself, but based on nationally determined criteria (the criteria were fairly loose until 2008, when they became quite rigidly regulated by the ministry). Therefore, the qualification structure of the staff is largely, but not completely under the control of the institution itself.

The government policy was to improve the staff qualifications, particularly by decreasing the numbers of academic staff without a PhD. Therefore, the qualification structure was priced into the formula. The prices have been fairly stable in nominal terms since 2005 and it has been accompanied by a gradual improvement in the qualifications structure. The number of teachers overall grew by only 1% from 9481 in 2003 to 9581 in 2009, but the number of teachers without PhD fell by 27.5% from 3873 in 2003 to 2806 in 2009.

The pressure on better qualification together with lack of direct incentives for hiring meant that growth in student numbers and research outputs translated into better pay, but not higher numbers. The average academic pay grew by 102% between 2001 and 2008 (from 15 441 SK monthly to 31 224 SK), which was faster than the overall wage growth in the economy over the same period (76%), increasing the relative wage of academics from 124.9% of the average wage in 2001 to 143.3% in

2008. The numbers on the other hand remained nearly unchanged (see above).

So far, we have analysed prices per outputs introduced by the funding formula, but we did not comment on what is missing. Based on the discussion so far, there are two outputs omitted from the system despite the fact that they would be fully in line with the formula philosophy.

The first one is lack of any incentive to attract private sector research and development funding. There is ample evidence that all government had this as a goal, particularly given the low level of private sector research and development expenditure in Slovakia. Based on interviews and personal experience of the authors, the explanation of the absence seems a combination of:

- lack of belief that private sector funding could be significant to warrant inclusion into the formula
- worry about gaming / fraud of the criterion

The second major omission is lack of use of citations as a measure of weighting the quality of research. This is largely explained by the unresolved technical complexity of the criterion both in terms of what citations should be used and what periods should be counted.

There are two additional items for discussion at the level of the system as a whole. The first one is the overall instability of the funding formula. We already discussed the lags in how both the overall system and individual institutions can react to changes in the formula. Genuine improvements and innovations (new degree programs, new research topics and researchers) require long-term investment. In such an environment, the predictability and stability of the formula is of paramount importance. If participants face even moderate uncertainty about whether the rules of the game might change, they will be reluctant to invest or they might pursue a diversification strategy, under which they produce a great variety of types of outputs to ensure success under any variation of the formula. Such a diversification is likely to be a negative phenomenon as teaching and research excellence are more likely to require specialization and different internal strategies.

We are discussing the issue at length because the previous pages have shown that, in many areas, the higher education witnessed dramatic fluctuation of prices even though the types of outputs that are rewarded have not changed much over time. In other words, what higher education institutions can derive from such an environment is that while the goods for which the “market” pays stay the same, there is an unpredictable pricing environment. At the same time, it should be said that the fluctuations in prices occurred more in the early years of the system - between 2002 and 2005, while the stability since 2006 has been much higher. Since 2006, we can observe fluctuations in prices of publications – a criterion introduced in 2006. This indicated that after a set of prices is introduced, it takes 3-4 years before an “optimal” level is found, from which it then does not diverge radically.

Analysis of the impact at the HEI level

Higher education institutions are generally large, internally highly differentiated and decentralized bodies. Decisions about what degree programs to offer, how many students to enrol and what research projects to pursue are generally made at much lower level than that of university leadership though the top management usually has a veto. Is it therefore very interesting and revealing how the innovations in higher education financing worked their way through the system into incentives systems for individual departments or other parts of universities.

In Slovakia, universities are internally divided into faculties, relatively large bodies with a long tradition and legally prescribed governance structures mimicking those of universities (dean as the chief executive and the faculty academic senate as the "legislature"). Faculties are then free to organize themselves internally as they see fit. The dominant model is division of faculties into departments ("katedry", "ústavy"), relatively small bodies whose size can range anywhere from 5 to 20 staff members.

The 2002 reform treated HEIs as black boxes and made no prescriptions about how they should internally distribute the funding. This section looks, from both a theoretical and empirical perspective, on what can we expect inside the "black box".

In this respect, it is important to note that, by law, the budget of a higher education institution is proposed by the rector, but has to be approved by the academic senate. The budget of a faculty is proposed by the dean but has to be approved by the faculty senate.

The university academic senate has an explicit apportioning of seats by faculties, i.e. both student and staff representatives are elected in, and as representatives of, "their" faculties. The faculty senate is elected by the faculty as a whole though students and staff elect their representatives separately. In both cases, out of all candidates, those receiving the highest number of votes are elected.

From a theoretical point of view, there are at least three relevant issues that any funding formula within a Slovak university has to deal with as a part of the decision-making process on distributing the public subsidy. They also apply to internal decision-making of the faculties vis-à-vis departments.

First of all, there is the issue of balance between incentives for high production on one hand and redistribution to achieve equality on other. It is a question familiar from general economic and social policy debates on trade-off between growth and equity. From the university point of view, there is a clear set of exogenously determined prices, so passing along those prices to constituent units in the internal budget formula (after shaving off a percentage for central services) is most likely to produce maximum production in the future because it entails the smallest marginal taxation of the faculty production. On the other hand, the budget has to be approved by the Academic Senate, which is composed of elected representatives of

the constituent units (faculties) in partial proportion to their size, but not to their budget / production. The production-maximizing long-term view thus inevitably clashes with redistributive interests of the less productive majority.

The second consideration is about dealing with long-term investment and strategic management or, to be more precise, at what level should decisions of this kind take place. Again, the fiscal analogy is appropriate. Development of new products (degrees, researchers etc.) usually requires upfront investment that will only pay back in time and with considerable uncertainty. To pay for the investment, existing producers need to be "taxed" by getting less for their existing products. The issue is – how much should be taxed and which level should keep the tax, thus effectively gaining control of the strategic management.

The third issue is how to deal with instability, uncertainty and short-term nature of the funding formula and the resulting fluctuating fiscal position of the constituent units. This is a similar, but distinct problem from the previous one. In smaller constituent units (smaller faculties, departments within faculties), production inevitably fluctuates. For example, it is not possible (or any, in case, desirable) to have smooth production levels of research monographs or papers published in prestigious journals. Student numbers can fluctuate from year to year even in a program, which has stable long-term demand. Since universities and their constituent units are officially forbidden to borrow, they must have a balanced cash budget on an annual basis. Lack of solidarity between units would potentially lead to need for redundancies and other savings purely on the basis of extremely short-term cash considerations even in cases where the long-term productivity is not threatened. On the other hand, it is not always easy to distinguish between short-term fluctuations and trend decline in production.

Before examining strategies chosen by individual Slovak universities and some of their faculties, let us also review an additional factor that needs to be taken into account. Hirschmann (1969) formulated, in his seminal book, the two principal options available to anyone dissatisfied with the state of the organization where she finds herself: voice or exit. What are the options available in the Slovak higher education establishment to faculties, departments or individuals who, for example, consider themselves to be taxed too highly – i.e. who receive significantly less than the university receives from the government for their products?

Exit is, technically speaking, feasible only at the individual level. While there is no legal rule against departments or even faculties moving from one university to another, a host of political and technical complications make this extremely unlikely. Of course, there is no way to prevent a coordinated group of individuals to exit together and set up shop elsewhere, which has occasionally happened. However, even this strategy is more likely in areas where tangible assets (which cannot be taken) are unimportant – social science, humanities. This would seem to favour majoritarian, redistributive strategies since the more highly productive individuals and units would be trapped in their existing institutions. In such a case, voice of the productive minority is unlikely to produce much impact.

However, there is also a third option, applicable in this case – shirking. Producing less, but bearing only part of the costs of smaller production due to high level of redistribution is quite possible, particularly as the ability of the university to monitor working time of the academics / whole units and whether they are engaging in other activities is limited.

We now look at how these issues played out in our sample of higher education institutions and their faculties in Slovakia. Our sample consists of 5 universities spread across the country, ranging from general ones covering all the main fields to more specialized one, where either social sciences and teacher preparation or technical sciences dominate. We look also at internal funding formulas of 7 faculties, of which 5 are from one university. They present a balanced sample of 2 natural sciences and 3 social sciences / humanities faculties. The two remaining faculties from other universities specialize either in technical or natural sciences.

We examined the funding formulas from the following angles:

- Are they based on the government funding formula?
- If there are differences, what are they? Are they simply redistributive towards existing interests or is their pursuit of other objectives?
- Is there taxation to support centralized decision-making about investments / strategic development?
- What are the mechanisms to compensate for potential short-term instability of revenue for small units?

At the level of higher education institutions, we find only gradual and uneven adoption of the state funding mechanism over time, but by 2009, 7 years after the formula was introduced, there is a wholesale adoption of the state model with some modifications to take into account internal politics / priorities. We have not observed any substantial reversals of the funding mechanisms so far – the shift from the historical to output-based formula seems to go only in one direction over time.

At the level of faculties, the picture is more complicated, with three strategies present:

- use of the government formula with minor modifications
- partial use of the government formula combined with other factors
- absence of formula and reliance on historical / hierarchical decision-making

The key modifications found in the formula are:

- both at the university and faculty level, use of different weights compared to the ministerial formula to support university priorities or take into account major intra-university interests
- at the faculty level, use of different periods for assessment, with some faculties preferring 3 or 5 years as the proper period for assessment
- at the university level, existence of internal / transfer prices for courses to stimulate joint teaching and other types of collaboration in this area

Additionally, all institutions have a centralized fund at the level of university to drive strategic development, but the fund tends to be quite small and the discretion in its use limited. In this respect, higher education institutions come across as very loose federation of faculties. At the faculty level, the situation is quite different, with the faculty management wielding substantial discretionary power with regard to non-salary expenditure.

With regard to short-term fluctuations, universities and those faculties that use a formula have made use of a provision (albeit often modified) in the government formula, which effectively insures HEIs against steep drops in the subsidy on year-to-year basis. This so-called "guaranteed minimum" is sometimes though not always combined with rules limiting expenditures of those departments and faculties that make us of this provisions – for example, limiting budgets for goods and services or taking away discretionary elements of salaries. This serves both to limit the size of the solidarity and to create incentives for the loss-making units to ensure that the "loss" is indeed a temporary fluctuation.

Therefore, we can conclude that the government methodology serves as a focal point in internal decision-making about the budget of all HEIs and a major percentage of faculties, thus gradually seeping through the system without major reversals. The universities have tried to deal with the dilemmas posed by the system in a way that does not impede future production through high taxation and are thus production-oriented. Central redistribution and taxation are relatively limited. The strategic management is thus left largely in the hands of faculties. This is, to a lesser degree, also true for faculties, where a however a greater variety of approaches can be observed. It should be kept in mind though that this might also change over time as even those faculties without output-oriented budgeting might shift to a more production-driven formula as the developments so far seem to be only in this direction rather than accompanied by reversals.

Conclusions

This chapter dealt with Slovak innovations in higher education financing following the Higher Education Act of 2002. Unlike in some other countries, the emphasis in financial innovation in higher education was not on using fees, but rather on making a strategic shift in the way public subsidy is distributed. This was a part of a major reform that also allowed HEIs to react to incentives by increasing their flexibility in allocation and utilization of resources.

This massive change, which assigned a clear set of prices to various products that the government deemed desirable – students, graduates, research outputs, teacher qualifications etc - appears to have influenced behaviour of the higher education institutions as a group considerably. This can be observed where the universities can react more easily and where the incentives were stronger.

For example, the number of full-time students increased by 40% during the six-year period following the reform, the number of PhD students more than doubled. This

can be explained both by the fact that the absolute numbers of PhD students are small compared to regular students so the recruitment does not pose the same investment challenges and the fact that the government decided to pay significant premium for PhD students over and above any reasonable cost differentials compared to regular students, whereas the nominal prices for undergraduates declined steeply over the period.

Another example of limitations to the ability of HEIs to react to the government incentives is the price put on domestic and foreign research grants. Despite the fact that the price paid for foreign grants was, in the end, seven to eight times higher than the one for domestic grant, domestic grants increased tenfold, whereas foreign grants less than doubled despite the fact that the government relaxed eligibility rules. This demonstrates that, to compete in the international research community, more than strong incentives are needed (at least in the short to medium run).

The Slovak reform is a typical example of a quasi-market, where the public sector mimics the market signals through the public subsidy formula. Our research showed success in the case of higher education, but there are also serious limitations. The quasi-market, unlike a real market is always susceptible to gaming by the participants and to underpricing of outputs that are difficult to observe, such as quality. This has also the case in Slovakia.

Our research also tried to look into the "black box" and examine how universities reacted to the new formula in their internal financial decisions. We identified three considerations that need to be taken into account in any internal formula:

- Stimulating production vs equality and redistribution
- Which level should makes strategic development / investment choices
- How to deal with short-term uncertainty

Most universities and their constituent units tried, in their internal formula, to have a highly incentivized pro-production system that is also highly decentralized in the sense that the ability of the centre to conduct strategic steering through finances is limited. On the other hand, there has been a strong emphasis on making sure that this does not lead to capacity destruction due to short term fluctuations in production at the level of smaller units (e.g. departments) by providing an effective insurance against downside risks. In practical terms, this meant that the government formula has been not only the tool used by the government to distribute funding between universities, but also seeped into the higher education institutions themselves and dominated their internal budgeting, even at lower levels (how faculties distribute money to departments). At the same time, as one progresses lower, one encounters more and more modifications and caveats to the utilization of the formula.

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