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# QUALITY-RELATED FUNDING IN ROMANIAN HIGHER EDUCATION THROUGHOUT 2003 – 2011: A GLOBAL ASSESSMENT

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## ABSTRACT

*The article explores quality-related funding and its global outcomes in the context of Romanian higher education by focusing on the funding allocations provided to public universities throughout a period of nine years based on their institutional performance on the quality indicators integrated in the funding algorithm. Global funding allocations between universities are analysed and a summative appraisal for the entire nine-year window is provided. The article also explores the relation between quality-related funding, institutional disciplinary profiles and the results of a comprehensive evaluation conducted in 2011 by the Ministry of Education to complete a classification of the universities. The main findings indicate a low overall impact of quality-related funding for many institutions, but also a clear pattern in which universities focused on science, technology, engineering and mathematics overwhelmingly outperformed mixed institutions, as well as those focused on humanities, arts and social sciences. Furthermore, the global quality-related funding outcomes of the 2003 – 2011 period studied in the paper are shown to be significantly associated with the results of the 2011 classification.*

## KEYWORDS

- higher education
- quality-related funding
- quality indicators
- disciplinary profiles
- university classification

Among the most significant changes higher education institutions are confronted with in contemporary times is the growing importance of accountability, which is “currently widely adopted in higher education management worldwide, especially as a mechanism for allocating operational and or research funds to higher education institutions” (Shin: 2010, p. 48). Financial allocations are without a doubt an essential policy instrument leveraged by governments to steer organizational actors – especially those within the public sector – towards desired goals. Because of this, the underlying mechanisms that determine funding allocations, the constraints and incentives they create and the outcomes they lead to are an important object of study for academics, policymakers and, ultimately, for the organizational actors whose activities and routine operation the funding streams directly influence.

The Romanian system used to allocate resources to public universities is an interesting case study with regard to the manner in which performance-based criteria may be used to stimulate desired organizational behaviour. For nearly a full decade – the period between 2003 and 2011 – higher education funding was granted to the 49 public universities in Romania based on a dual system that relied in part on a quantitative aspect (determined by student numbers) and in part on qualitative aspects captured by specific performance indicators (known domestically as “quality indicators”). The use of this dual system entailed a separation between strictly quantitative funding (granted solely in accordance with student numbers) and qualitative-driven funding (which encouraged competition between higher education providers with regard to all dimensions captured by the quality indicators). Throughout the nine-year period the amount of funding earmarked for distribution according to qualitative criteria steadily increased (up to 30% of total funding for all universities) whereas the volume of the quantitative component steadily decreased. The period between 2003 and 2011 has thus been singled out for analysis specifically because it represents, at least insofar as Romania is concerned, a distinctive cycle in the recent history of higher education funding.

In spite of the importance of quality-related funding for Romanian universities no comprehensive empirical study has so far been conducted to assess the overall impact of this type of funding, either individually (i.e. for each higher education organization) or collectively (i.e. at the system level) throughout the nine years in which the dual funding algorithm was in use. The present paper is intended to fill these gaps by exploring the global outcomes of the qualitative component used in the funding of universities throughout the entire 2003 – 2011 period. More specifically, the aim of the paper is to investigate in a comparative manner the levels of funding determined for each university through the use of the quality indicators, the impact of this type of funding at the system level, as well as the relation between quality-driven funding and the disciplinary profiles of the universities. Additionally, funding results based on quality indicators are also corroborated with the results of an institutional classification of the universities conducted in 2011 by the Ministry of Education.

A simple but essential aspect informs the current paper: the distribution of quality-related funding between Romanian universities was by design a zero-sum game<sup>[1]</sup>. A thorough technical analysis of the funding mechanism that illustrates this point may be found in Țeca (2011). This fact implies the idea that in the competition for public resources some universities benefited while others were left in want. The zero-sum game logic of the quality-related funding mechanism therefore invites an exploration of a number of aspects, especially in light of the chronic underfunding that higher education institutions in Romania have had to cope with throughout the entire post-communist period<sup>[2]</sup>.

The present paper focuses on the global, diachronic outcomes of the funding algorithm. By investigating multi-annual data on quality-related funding from the

1 Essentially, “in zero-sum games, what one player gains, the opponent loses” (Raghavan: 1994, p. 736). More specifically, the gains of one party (or set of parties) exactly equal the losses of the other(s).

2 A comprehensive diagnostic of this issue may be found in the recent yearly reports of the National Council for Higher Education Funding. See for example CNFIS: 2013.

National Council for Higher Education Funding (CNFIS) the paper identifies the successful and unsuccessful institutions in terms of global funding allocations received throughout the entire nine-year period when quality indicators were used. These results are then explored in conjunction with university disciplinary profiles – broadly conceived in terms of the science, technology, engineering and mathematics (STEM) / humanities, arts and social sciences (HASS) divide, but also more granularly refined within these broad categories – in an effort to highlight possible patterns, commonalities within the group of successful institutions, as well as within the one of less successful institutions.

The paper is organized into the following sections: the first part provides a brief theoretical discussion of funding systems within the broader framework of higher education governance; the second part presents the practical operation of the funding mechanism used in Romania between 2003 – 2011, explaining its main components and reviewing its salient characteristics, including its inherent zero-sum game logic. Once this relevant background information is provided, two subsequent sections present the specific research questions of the paper and the methodology used to address them. Empirical analyses and results are then given in a separate part of the paper. A final section concludes.

### **Higher education funding**

Funding mechanisms used to distribute resources to higher education organizations are an intricate part of broader governance frameworks. Dobbins et al (2011) provide an up to date typology of higher education governance which distinguishes between three ideal-type models: the state-centered model, the market-oriented model and the academic self-governance model. According to Dobbins et al (2011) each of these ideal-types has its own distinctive approach to key aspects of higher education, including the funding mechanisms; for example, state-centered systems have as their main funding base the state budget and use an itemized funding approach which leaves little budgetary discretion for the universities while market-oriented systems have, in contrast, a more competitive and diversified funding base (including tuition fees, donations, research grants) and are synonymous with a lump sum approach to funding which allows higher discretion for university management.

With regard to the actual process of funding higher education institutions Jongbloed (2009) notes that there are several major options available to the government: incremental funding, contracts and mission funding, project funding and formula funding. Furthermore, the author argues that these allocation mechanisms can be classified with regard to the object of the funding process (i.e. inputs versus outputs) and with regard to the level of centralization (i.e. centralized approaches with intense government oversight versus decentralized approaches in which the market plays a more prominent role). Jongbloed also argues that worldwide trends in allocation mechanisms are increasingly indicative of a move from centralized and input-driven to decentralized and outcome-oriented approaches.

Although the funding of higher education institutions is a complex process which may assume several shapes, a crucial distinction usually made in policy practice

is the one between performance-based and indicator-based allocations of funds (Herbst: 2007): indicator-based funding, which is synonymous with formula-based funding, is a more generic term that encompasses performance-based funding (which is set apart from the more generic instance by the fact that it links resource allocation to performance indicators or output measures). According to Herbst, the distinction is not always easy to make because these two models of funding are often used simultaneously.

As a specific policy of funding higher education providers, formula funding “was introduced to give transparency and objectivity to the selectivity of resource allocation” (Talib: 2010, p. 59). Its distinguishing characteristic is that financial resources are granted to universities based on a specific methodology which contains mathematical formulae that relate funding to certain measurable aspects of universities. Student enrollment numbers and staff numbers are some of the more common measures. The use of formula-based funding has a number of advantages, but it also has a series of drawbacks. A review of the advantages usually points to the fact that the main positive features of formula-based funding are its objectivity, simplicity and capacity to induce a certain stability and predictability for both higher education institutions and government (McKeown-Moak: 1999, Jongbloed: 2009, Frølich et al: 2010). However, this advantage can come at the expense of a decline in quality that is further compounded by tendencies that inhibit diversity. Since a formula creates very specific incentives for universities, it is likely that in the absence of corrective measures it will lead to significant homogeneity. This issue has in fact already been thoroughly documented for Romanian universities, not only in relation to the funding formula but also as a result of broader quality assurance constraints (see Miroiu and Andreescu: 2010, Vlăsceanu et al: 2010, Florian: 2011, Păunescu et al: 2011, Vlăsceanu and Hâncean: 2012).

Performance-based funding systems are an extension of the New Public Management doctrine whose origins may be traced to the early 1980s (Hood: 1991, Pollitt and Bouckaert: 2011). When discussing New Public Management within higher education, a distinction may be made between “soft” and “hard” conceptions of managerialism (Trow: 1994, p. 11). The soft variant is concerned with improving the “efficiency” of existing institutions while the hard variant is more focused on the continual assessment of educational outcomes and on directly linking these outcomes to funding. The emergence of performance-based funding systems may thus be seen as an expansion of the hard variant of managerialism within higher education. Performance-based funding is applicable both to the teaching activities, as well as to the research activities conducted within universities. In the latter form it is described by the phrase “performance-based research funding system”. Research-driven systems have proliferated over the past decades in many countries around the world. Hicks (2012) provides a review of 14 such systems (most of which operate in Europe) and stresses the fact that while these systems create powerful competition for prestige, they can potentially have deleterious consequences for equity and diversity as well as fail to enhance the economic relevance of research.

In contrast to general indicator-based funding, performance-based research funding promotes a more meritocratic perspective that provides incentives for

increased organizational performance in a competitive environment that emphasizes the importance of research (Geuna and Martin: 2003). However, performance-based research funding is not without its own drawbacks. For example, Geuna and Martin (2003) note that it is costly to implement and it is also susceptible to induce a number of unintended consequences like homogenization of research and universities, discouraging innovative research or sheer manipulation of the performance measures intended to secure a more favorable rating during the evaluation process. Another unintended consequence which may emerge is the fact that organizations will focus excessively only on what is measured and disregard other aspects which, because they are not measured in the specific performance-based framework being used, do not directly contribute to a better assessment (Jongbloed: 2011). Furthermore, a heightened research evaluation culture can lead to a quantity – quality tradeoff in which the quality of outputs (especially publications) is sacrificed in favor of increasing sheer quantity (Butler: 2003).

The allocation of resources based on performance ultimately means that “less-motivated agents must work harder and according to the given criteria” (Liefner: 2003, p. 478). The existence of such given criteria necessarily means that performance-based funding has an implicitly normative impact on the organizations to which it relates. The nature and scope of the evaluation criteria thus become important elements in the analysis of funding mechanisms because they constitute the blueprint of the reward system which will effectively determine the success or failure of the organizations competing for scarce resources.

In a survey of the funding mechanisms used in 11 countries Jongbloed and Vossensteyn (2001) noted that formula funding is particularly common with regard to the allocation of funds for teaching, while mechanisms for the funding of research exhibit more variety. A later comprehensive review (Salmi and Hauptman: 2006) also stressed the fact that in most countries higher education institutions are funded through more traditional approaches such as negotiated budgets or funding formulas focused on inputs while performance-based mechanisms represent a major innovation in tertiary education allocation mechanisms.

### **Quality-related funding in Romanian higher education**

Within the recent (post-communist) history of higher education funding in Romania several stages of development may be discerned (Miroiu and Vlăsceanu: 2012): an initial period of historical funding marked by the inertial operation of principles inherited from the socialist era (up until 1999), a second period of reform (1999 – 2003) in which formula funding was introduced and resource allocation was tied strictly to input aspects (student numbers) and, more recently, a third period marked by the introduction of performance indicators into the funding formula (2003 – 2011). The present paper focuses only on this last period of nine years<sup>3</sup>.

3 The funding mechanism used since 2012 is similar in its overall conception with the one used throughout the previous nine years – it too distinguishes between quantitative and performance-driven funding – but it no longer relies on the quality indicators proposed by CNFIS. The quality indicator framework has been superseded by a distinct formula which relies on the results of a 2011 comprehensive evaluation of study programmes to inform funding allocations.



An examination of the Romanian funding system used between 2003 and 2011 following the broad division between formula-based and performance-based funding will lead to the conclusion that the Romanian system cannot be fully integrated into either of the two categories as it presents features inherent in both. This can easily be confirmed by a study of the annual methodologies<sup>4</sup> used by CNFIS to distribute funding to the public universities and indicates that the funding system used between 2003 – 2011 can most adequately be described as a mixed one, predominantly driven by an input formula aspect relying on students, but gradually being augmented with performance-based components in the guise of quality indicators. It should be noted that the introduction of formula-based funding as well as performance-based funding in Romania mirrors similar tendencies common at the European level as most European countries use a mix of formula-based and performance-based funding to allocate public grants to universities (Jongbloed: 2010).

The quality indicators incorporated into the funding methodology are what inform the concept of quality-related funding which is the main focus of the present paper. In order to clarify the meaning of this concept a brief review of the funding mechanism used in Romania between 2003 – 2011 is given in the following paragraphs.

There are two main streams of funding that higher education institutions in Romania receive from the government in the wake of an important reform implemented in 1999 (Miroiu and Dincă: 2000): basic (core) funding which is meant to cover fundamental operational expenses (salaries of university staff, material expenses and maintenance services) and complementary funding (which mainly covers student services, equipment and capital repairs). Basic funding is the more important of the two and is essential for public universities because it represents the most important part of their income. Throughout 2003 – 2011 basic funding was allocated based on a formula that distinguished between two types of funding allocations: a quantitative type of funding determined by student numbers and a separate qualitative type of funding determined by the relative performance of the universities on certain quality indicators. For each such indicator a specific percent of funding was earmarked from the total core funding to be distributed among all public universities.

Once introduced in 2003 the indicators were the subject of annual revisions and incremental modifications of their weight. Throughout the 2003 – 2011 period, when they were in use, the total amount of core funding allocated based on quality indicators more than doubled in size, growing from 12.7% of the total basic funding in 2003 – 2005 to 20% in 2006, 25% in 2007 and finally to 30% in the period between 2008 and 2011. Although the number of indicators also varied across the nine years (from 13 used in 2003 to 17 in 2011) the main dimensions evaluated by these indicators were essentially the same: teaching staff, scientific research, material resources and university management.

Before empirically analyzing the quality-related funding granted to public universities throughout the nine-year period under study some essential details must be provided with regard to the technical operation of the funding algorithm. An important aspect which must be emphasized is the fact that the inherently linear logic of the quantitative component (students and funding) was carried over to a certain

4 These are available at <[http://vechi.cnfis.ro/index\\_f.html](http://vechi.cnfis.ro/index_f.html)>, last accessed 15.07.2014.

extent to the qualitative component of core funding. Within this qualitative component the available funding allocation for each individual university is also determined in fixed relation to its number of students. However, unlike the quantitative component, the available allocation of each university is no longer guaranteed in accordance with student numbers alone. Instead, the relative performance in comparison to all the other universities determines whether the available allocation will be secured or forfeited – in other words whether or not it will become the actual funding allocation attained by the university. This is iterated at the level of each quality indicator and means that a university may gain funding on some dimensions but lose funding on others.

Because the level of quality-related funding available to each university was contingent not only on its performance with regard to the quality indicators, but also on its size (as expressed through its number of students), two universities with very similar scores on a quality indicator could receive markedly different funding. In absolute terms small universities (i.e. the ones with fewer students) could gain or lose much less than larger universities (i.e. the ones with more numerous students) consequent to the fact that their available allocations were scaled in accordance with their individual size.

A final technical aspect of the funding algorithm that must be noted is the fact that the quality-related funding received by any individual university was not based on the absolute value (actual score) of its quality indicators, but on the relative value of its indicators. To determine this relative value the absolute scores of each university were compared to those of all other universities within a formula that factored in the dimension of the university (expressed through its total number of students). Because the value of a relative quality indicators could only range between (near) 0 and (near) 2, for any given indicator a university could, in theory, virtually double its funding if it had an outstanding performance. However, at the other extreme, very poor performance would lead to a virtual loss of all of the funding available. Given this feature, the funding methodology used by CNFIS to distribute performance-based funding to the universities implicitly led not only to a zero-sum game but also to a multi-level ranking of the 49 Romanian public universities: in effect, universities were ranked according to all the aspects of their activity captured by the quality indicators and the intermediate rankings on each indicator led to differential funding allocations for each quality dimension being assessed. Upon aggregating the net amounts won and lost across all the quality indicators some institutions received more funding than they would have in the absence of the quality-related funding whereas other institutions received correspondingly less.

The features of the quality-relating funding mechanism outlined above make it an especially interesting topic of analysis. Its competitive nature also highlights the importance of its study, particularly if one recalls the fact that funding is a limited resource. In fact, because the Romanian system of higher education has always suffered from severe underfunding (for an explanation of the root causes of this phenomenon see Miroiu and Teca: 2013), losing funds through poor performance on quality indicators (especially on multiple indicators) could have significant consequences for the operation and future development of the universities. It will therefore be important to analyze the funding results for the 2003 – 2011 period not only in themselves, but also in relation

to the potential outcomes they might have had in the period immediately following this nine-year timeframe, for instance in relation to the institutional evaluation process that informed the classification of universities in 2011.

Although highly contested (including in courts of law) the classification of universities, which was closely intertwined with a ranking of study programmes, remains the most comprehensive evaluation of the performance of higher education institutions to have been undertaken and completed in Romania under the formal authority of the Ministry of Education. Following a thorough evaluation a university could be classified as focused on teaching (class A), as focused on teaching and research, or teaching and artistic creation (class B), or as a university focused on advanced research (class C). Labels notwithstanding, the 2011 “classification” of the universities was in fact more akin to a global ranking (on this see Andreescu et al: 2012, Andreescu et al: 2015, Viu et al: 2015) and therefore invites the question of whether or not it is in any way connected with the funding allocations from the preceding decade.

## Research questions

Several areas of inquiry will constitute the object of the present paper. The first and most general one is a global assessment of the quality-related funding provided to public universities throughout the period of nine years under study and it mainly relies on a summative approach based on aggregating data for the entire 2003 – 2011 period. The specific research question connected to this general topic of inquiry may be stated in the following form:

*(RQ 1) What was the overall impact of quality-related funding for Romanian higher education? In other words, what were the global amounts of quality-related funding gained or lost individually by each of the 49 public universities and, through extension, what was the collective – system-level – result of the use of this type of funding?*

This question directly appeals to the zero-sum logic of the funding mechanism. Its exploration entails the identification of the universities that were successful in securing quality-related funding, as well as of those that were unsuccessful in this process. Because annual differences in performance mean that within each year different universities may be successful or unsuccessful, a summative appraisal is employed to assess the global differences throughout the entire 2003 – 2011 period. Technical details as to how this is achieved are provided in the methodological section. The straightforward hypothesis associated with this first research question is that universities differ substantially with regard to their capacity to attract quality-related funding and that certain patterns are discernable throughout the period of nine years under study. Some universities are therefore expected to consistently count themselves among the group that benefited from quality-related funding, whereas others are expected to consistently count themselves within the group of universities that lost such funding. This hypothesis will be tested by exploring the annual status of each university with respect to quality funding.

With regard to the system-level outcomes of the funding algorithm a separate hypothesis will be investigated. This hypothesis – initially put forward and partially validated by Miroiu and Vlăsceanu (2012) with data selected from the 2010 funding



allocations – states that quality indicators ultimately had a limited impact at the system level due to a mutual cancelation of effects. As stated above, under the quality indicator framework a university could gain funding on some indicators (where it had a better performance) but lose funding on others. Hence (with the exception of the case in which a university would gain funding on all indicators), a certain tradeoff or mutual cancelation of effects was unavoidable. Since this phenomenon has yet to be rigorously quantified and longitudinally assessed, part of the exploration of the first research question will be devoted to determining with greater precision the system-level impact of quality-related funding.

A secondary subject to be investigated regards the differential allocation of quality-related funding in connection to the disciplinary profiles of the Romanian higher education institutions. Because the 49 public universities operating in Romania are different from the point of view of their disciplinary focus this particular aspect may be used as an analytical instrument in the comparison of their relative performance with regard to the quality-related funding they secured throughout the 2003 – 2011 period. The following specific research question will therefore be the subject of empirical scrutiny:

*(RQ 2) Is there a significant association between the disciplinary profiles of the higher education institutions and their capacity to acquire quality-related funding? In other words: were some types of universities more successful than others?*

Such a question follows from the (admittedly limited) diversity of the higher education system. In broad strokes, the Romanian universities may first be divided<sup>5</sup> into comprehensive and specialized ones. The specialized institutions are usually focused on one of the following general disciplines: a) technical sciences; b) medicine and pharmacy; c) agricultural sciences and veterinary medicine; d) social sciences and/or humanities; e) military studies, information, public order or national security<sup>6</sup>; f) arts; g) physical education and sports. These clusters will be investigated to determine how they interact with quality-related funding and whether or not they offer any insight into to the distribution of this type of funding.

Two layers of analysis will be employed: the granular one just outlined, which considers the specific profiles of the universities, but also a more general one which groups the universities into i) STEM-oriented institutions, ii) HASS-oriented institutions and iii) mixed institutions. STEM / HASS is of course a rather coarse division, but one that is nonetheless intuitive and therefore useful for analytical purposes. This division corresponds to the distinction often made between “hard” and “soft” sciences. For example, as early as the 1970s Biglan (1973) suggested distinguishing between scientific disciplines in light of three dimensions: the existence of a guiding paradigm, the degree of concern with practical application and, finally, concern with life systems. The first division suggested by Biglan (paradigmatic versus non-paradigmatic) corresponds to the “hard” / “soft” divide. Physics, astronomy

5 The following taxonomy was stipulated in Ministry of Education Order 5212/ 26.08.2011 which outlined the methodology used in 2011 for the ranking of study programmes and for the classification of universities.

6 These institutions (although also public) were (and are) not funded by the Ministry of Education and are not included in the group of 49 universities analyzed in the paper because quality-related funding in the sense discussed above was never applicable to them.

and chemistry are typical examples of “hard” sciences, while humanities and social sciences (for example political science or sociology) fall within the category of “soft” sciences. A more recent in-depth discussion, including a critical perspective on the contemporary relevance of the STEM / HASS opposition may be found in Bastow et al (2014).

Details on the disciplinary grouping procedure used to analyze the Romanian universities are provided in the methodological section that follows. The hypothesis to be tested in relation to this secondary research question is that STEM-oriented institutions were more successful than their HASS counterparts. The main reason for this specific hypothesis is connected to the historical legacies of the socialist regime whose policies strongly favored STEM-oriented programmes and institutions, leading to an “excessive ‘politechnization’ of higher education to the disadvantage of social sciences and the humanities, fields which experienced also a severe fall of allocated study places and the closing down of several study programs” (Murgescu and Sora: 2013, p. 33). A direct consequence of the excessive emphasis placed by the socialist regime on technical studies meant that “for several decades, technical institutes have enjoyed a relatively privileged status: large numbers of students and professors, significant investments, and more consistent financial allocations” (Mihăilescu and Vlăsceanu: 1994, p. 84). Assuming that STEM-oriented institutions were able to preserve (and perhaps even enhance) the competitive advantages previously bestowed upon them under the socialist regime, it is expected that these institutions also outperform HASS-oriented tertiary education providers in shares of quality-related funding secured throughout the 2003 – 2011 period.

A third broad subject which lends itself to analysis is whether there is any relation between the quality-related funding for the 2003 – 2011 period and the results of the institutional evaluation conducted by the Ministry of Education in the second part of 2011 in order to produce the first (and to date only) global classification of universities. A specific research question to be addressed will be the following:

*(RQ 3) Is there a significant association between the global outcomes of quality-related funding accessed throughout 2003 – 2011 and the results of the 2011 institutional classification, or are the outcomes of these two policy processes unrelated to one another?*

The reason such a question is warranted is the fact that both the allocation of quality-related funding and the classification of the universities were complex evaluation processes that relied on numerous indicators to evaluate (in a global manner) the Romanian universities. It therefore seems appropriate to investigate whether there is a convergence between the results produced by one type of assessment and the results produced by the other. The hypothesis attached to this third research question is that the institutions that benefited from quality-related funding throughout 2003 – 2011 also performed better in the comprehensive evaluation from 2011. This hypothesis essentially seeks to determine whether or not there is a correlation between the past performance of the universities with regard to quality-related funding and their more recent performance in the institutional evaluation from 2011.

## Methodological notes

To address the first research question two types of annual data from CNFIS regarding the allocation of quality-related funding were analyzed: first, yearly available allocations (determined by CNFIS, as stated above, as a function of each university's number of students); second, yearly actual (attained) allocations received by the universities for all the quality indicators based on their relative performance. It must be stressed that due to the different magnitudes of the higher education institutions (as expressed through the number of their students) it would make little sense to compare the different universities according to their absolute performance, in other words, simply in accordance with the absolute level of quality-related funding they received (i.e. the attained values). Larger universities would, by definition, receive more quality-related funding than smaller ones. Even if a substantial amount of the available allocation was lost by a large university through poor performance, the absolute quality-related amount of funding it received would still be greater than that of a well performing but small institution.

An altogether different approach must be taken to arrive at a meaningful comparison of the quality-related funding received by the 49 higher education institutions. Instead of analyzing the absolute values of the quality-related funding allocations (which are size-dependent measures and may therefore lead to biased results), *the difference between the actual allocations and the available ones must be compared*<sup>7</sup>. To clarify, this difference is itself also a size-dependent measure and therefore cannot be used as such, but it does provide an important step in a better analytical direction. To further eschew the potential biases introduced by absolute, size-dependent comparisons, an additional refinement based on the difference between available and attained allocations was employed for the purposes of the present paper: consistent with the zero-sum framework of funding the 49 universities were divided into only two groups: *successful institutions* (i.e. those that secured greater funding as a result of the operation of quality constraints throughout 2003 – 2011) and *unsuccessful institutions* (i.e. those that lost funding). Furthermore, to obtain consistent and meaningful longitudinal results both the available allocations and the actual allocations were adjusted in accordance with the annual rates of inflation<sup>8</sup> prior to being aggregated across the nine-year window and prior to calculating the differences between them. This permits a global comparison of the quality-related funding allocations for the entire 2003 – 2011 period which takes as reference the purchasing power at the level of the year 2003.

Concerning the second research question, an assessment of whether there is a significant association between the relative performance of the public universities and

7 A corollary of this method is the calculation of the percent difference between the actual allocations and the available ones which is even more informative with regard to the relative performance of each individual university since it looks at the differences between potential performance (i.e. available allocations which are a function of student numbers) and actual performance (i.e. the actual allocation received by each university as a result of its individual achievement on the dimensions captured by the quality indicators). This approach to the comparison of university funding levels based on percent differences between nominal and attained values was employed in Vîiu and Miroiu (2013) in a discussion of the 2011 funding granted to universities according to the specific quality indicator dealing with the level of performance in scientific research.

8 Data on inflation rates were taken from the periodic reports of the National Bank of Romania (usually from the February editions). The reports are available at <<http://www.bnr.ro/PublicationDocuments.aspx?icid=3922>>, last accessed 15.07.2014.

their disciplinary profiles first requires an adequate taxonomy of the higher education institutions in accordance with these profiles. Unfortunately, no such taxonomy is readily available from any of the public bodies regulating Romanian higher education policy<sup>9</sup>. Therefore, in lieu of an official disciplinary profiling a custom procedure had to be adopted to catalogue the 49 public universities. This procedure was based on the information regarding the distribution of individual study programmes ranked in 2011 by the Ministry of Education. For the purposes of the ranking process each university reported data for all of its accredited study programmes conforming to a division of five fundamental disciplinary fields (FDFs) widely adopted in higher education policymaking in Romania. These main disciplinary fields (further divided into 60 ranking domains that grouped all study programmes offered by Romanian universities) are the following<sup>10</sup>: I) mathematics and natural sciences, II) engineering, III) biomedical sciences, IV) social sciences and V) arts and humanities. One may note that the first three FDFs constitute the area of STEM disciplines, while IV and V account for HASS disciplines. These five FDFs also represent the standard classification used annually by the government in the process of regulating the individual structure of all accredited higher education organizations and the maximum number of students which may be enrolled by each institution; the fivefold classification is also pivotal to the operation of the National Council for the Attestation of University Titles, Diplomas and Certificates.

By examining all of the study programmes<sup>11</sup> of the 49 universities and their distribution across the 60 ranking domains and five FDFs it becomes easy to assign each university to the broad categories of STEM, HASS and mixed institutions. For example, a university with one programme in FDF I and 10 programmes in FDF II falls in the STEM category; a university with only 10 programmes clustered in FDF IV falls in the HASS category. The following convention was used: an institution was labelled as STEM if at least three quarters of its programmes fell into fundamental fields I, II or III. Equivalently, an institution was labelled as HASS if at least three quarters of its programmes fell into fundamental fields IV or V. A mixed category was adopted for all other institutions (which usually have their programmes scattered across all five fields). The underlying data and the resulting categorization of the universities based on their disciplinary profiles are presented in Appendix 1. In total, 16 universities were assigned to the STEM category, 13 to HASS and 20 to the mixed group.

It is important to acknowledge that this approach is only a reasonable proxy for the exact disciplinary profiles of the universities, not a definitive assessment. A thorough disciplinary profiling of the universities would have to account for other aspects (for example the distribution of student numbers and the composition of the academic staff) which lie outside the scope of the present paper and, at least for

9 The division quoted earlier (see RQ 2 in the preceding section) which was used in the classification process from 2011 only outlined the distinction between comprehensive and specialized institutions, together with the secondary division of specialized institutions. It did not, however, nominally assign each institution to a particular category.

10 See Appendix 2 of Ministry of Education Order 4174/13.05.2011.

11 The full list of each university's accredited programmes was derived from the document outlining the results of the 2011 ranking process which is available at < [http://chestionar.uefiscdi.ro/docs/programe\\_de\\_studii.pdf](http://chestionar.uefiscdi.ro/docs/programe_de_studii.pdf)>, last accessed 15.07.2014.

the period under study, defy precise quantification. This places some limitations on the interpretation of the results obtained for the second research question but – one would surmise – not enough to undermine the general validity of the findings.

To allow more granular comparisons a more nuanced assignment was also made following the division outlined for the 2011 classification. This more nuanced picture reveals 19 comprehensive universities, 7 universities focused on technical studies, 6 universities focused on medicine and pharmacy, 4 universities focused on agricultural sciences and veterinary medicine, 8 universities focused on art studies and 5 universities focused on social sciences and humanities. Both the coarse model of the classification of universities based on their general disciplinary profiles (STEM-HASS-mixed) and the more granular model just presented are used in the analysis and interpretation of the quality-related funding data which constitute the object of the second research question presented above.

Finally, to address the third research question the results of the classification process from 2011 (as outlined by Ministry of Education Order 5262/2011) are corroborated with the global results of the quality-related funding framework used between 2003 – 2011. This entails exploring the global quality-related funding outcomes (benefit or loss of funding) across the three distinct classes of universities defined within the institutional evaluation process that guided the classification of the universities.

## Results and discussion

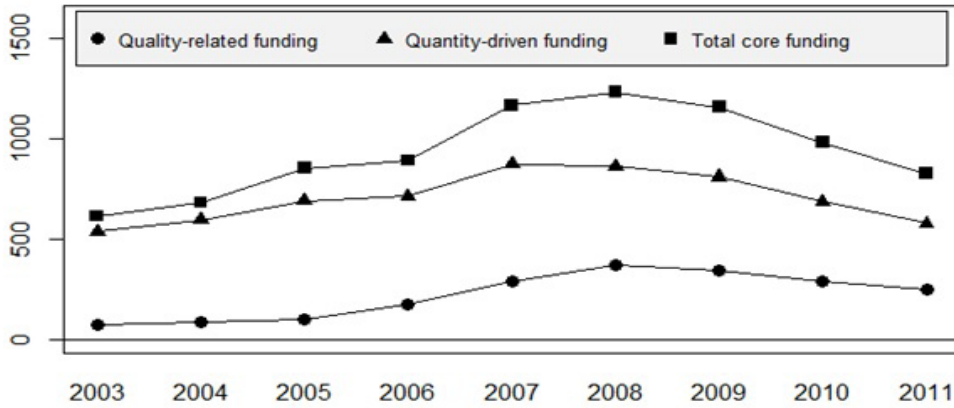
In order to provide a general background for the discussion of quality-related funding, Figure 1 offers a large scale picture of the evolution of core funding throughout the 2003 – 2011 period. Total core funding is decomposed into its two constituent elements: quality-related funding allocations and quantity-driven allocations. Since values are adjusted for inflation and reflect a constant 2003 purchasing power they highlight that in real terms core funding allocations increased until 2008 and then followed a descending trend closely connected to the global financial crisis. Throughout 2003 – 2011 quality-related funding oscillated between a minimum of approximately 78 million RON<sup>[12]</sup> (in 2003) and a maximum of about 370 million (in 2008). Student-driven funding, on the other hand, oscillated between a minimum of approximately 538 million RON (in 2003) and a maximum of about 876 million (in 2007). Throughout the entire 2003 – 2011 period quality-related funding – in other words the entire amount of funds distributed according to all quality indicators across the nine years – represented approximately 2 billion RON (about 24% of total core funding for this period). Quantity-driven funding represented approximately 6.3 billion (meaning about 76% of total core funding).

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12 Unless explicitly stated otherwise, all amounts presented in this section reference real (inflation adjusted) values, not nominal ones.

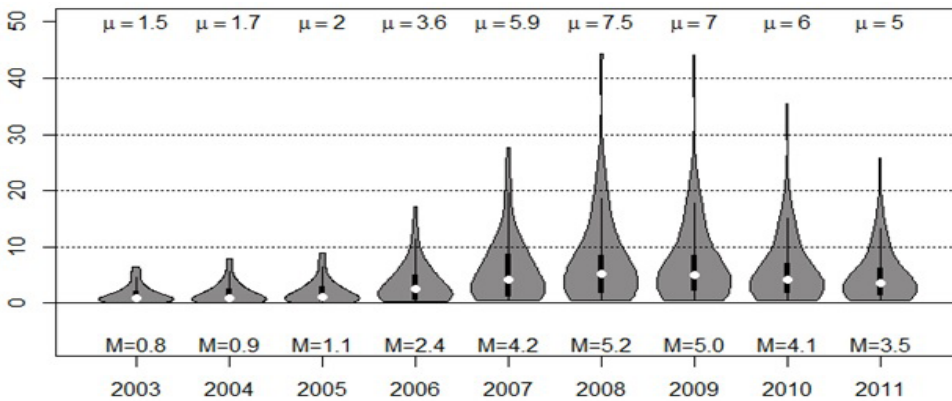


Figure 1. Global trends in the allocation of core funding to public universities between 2003 – 2011 (millions of RON)<sup>[13]</sup>



Source: Based on data from CNFIS

Figure 2. Annual distribution of the 49 universities according to the funding allocations (millions of RON) received based on all quality indicators throughout 2003–2011 (M denotes the median values,  $\mu$  denotes the mean values within each year)



Source: Based on data from CNFIS

The specific distribution of the 49 universities according to the level of quality-related funding they received within each year of the period under study is further

13 This figure as well as all subsequent ones were produced using the R language and environment for statistical computing (R Core Team: 2015). Specific packages which were used to produce figures outside the basic R functionality are “viopoints” (developed by Adler: 2005) used to produce Figure 2 and “vcd” (developed by Meyer et al: 2015) which was used to produce the mosaic plots in Figures 5 and 6.

detailed in Figure 2 with the aid of a violin plot<sup>14</sup>. This figure indicates a skewed distribution of the universities throughout the entire period with most receiving less than 10 million RON in any given year and only a handful exceeding this threshold, generally in the later years of the period when the overall amount earmarked for distribution according to quality criteria increased to 30% of total core funding.

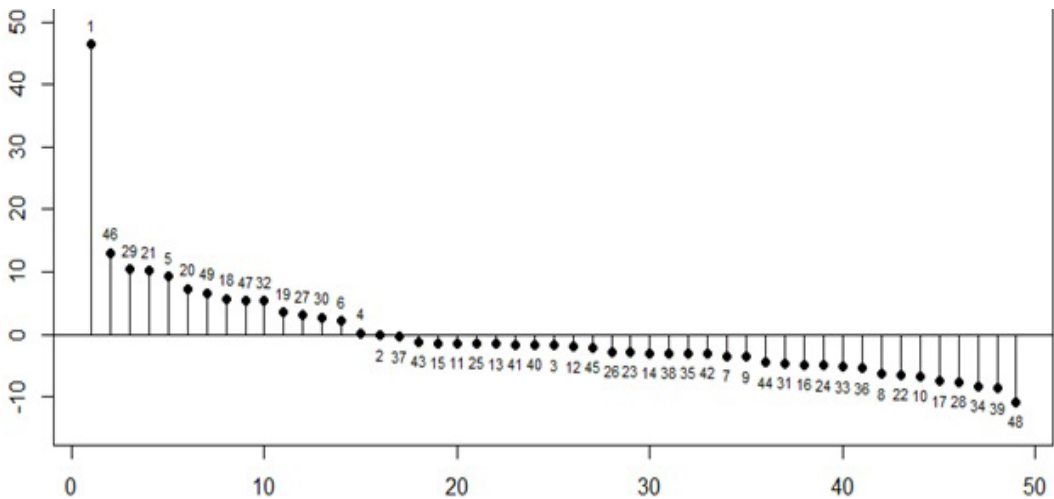
Moving to the exploration of the specific research questions, Appendix 2 provides the aggregated available allocations and the aggregated attained (actual) allocations received by each of the 49 universities for all the various quality indicators used throughout the entire 2003 – 2011 period. This appendix also provides the differences between the two quantities, as well as the percent difference between them. A global assessment of the entire quality-related funding allocations gained and forfeited between the 49 public universities throughout the entire nine years indicates a sum total of about 131 million RON which were transferred from 34 unsuccessful universities to 15 others that were successful in the zero-sum game of funding due to better performance on the quality indicators. Comparing these 131 million RON to the total quality-funding allocation of 2 billion yields the conclusion that only 6.5% of this global amount was the object of transfer between the public universities. The remaining 93.5% is composed of the funding that was not the object of transfer. These system-level figures confirm the hypothesis of an overall limited impact of quality-related funding: due to the mutual cancellation of influences by separate indicators most universities received roughly the same level of core funding that they would have gained if no quality indicators were in use at all. This is also illustrated by the final column of Appendix 2, where the closer a university is to 0%, the less its funding was influenced by the use of quality indicators.

A more intuitive representation of the zero-sum game determined by quality indicators is given in Figure 3 which shows the distribution of the universities according to the differences between available and attained quality funding. This figure underscores the fact that through the use of quality-related funding nearly all universities either won or lost (individually) a total amount no greater than 10 million RON throughout the entire 2003 – 2011 period. Only one university lost slightly more than this while only four others gained more. Most universities were moderately successful or unsuccessful in securing quality-related funding while for others the differences are more pronounced. Again, a detailed account of this issue is given in the percent difference column (between attained and available allocations) in Appendix 2.

On balance, the unsuccessful universities are more numerous than the successful ones: only ten institutions gained more than 10% of the quality-related funding they had available, while 24 lost more than 10% of their available allocation. For the remaining 15 institutions the differences are moderate to quasi-absent. For example, the Technical University of Civil Engineering only lost 0.18% of its available quality-related funding for the entire 2003 – 2011 period. Similarly, the Bucharest University of Agricultural Sciences and Veterinary Medicine only gained an incremental 0.75%.

14 As explained by the original proponents (Hintze and Nelson: 1998, p. 181) a violin plot “synergistically combines the box plot and the density trace (or smoothed histogram) into a single display that reveals structure found within the data”. Violin plots retain most of the information provided by boxplots but also add information about the shape of the distribution which boxplots cannot render with adequacy.

Figure 3. Distribution of public universities according to the global differences (expressed in millions of RON) between available and attained allocations for all quality indicators throughout the entire 2003 – 2011 period (numbers above and below the points identify each university with its unique code from Appendix 2<sup>15</sup>)

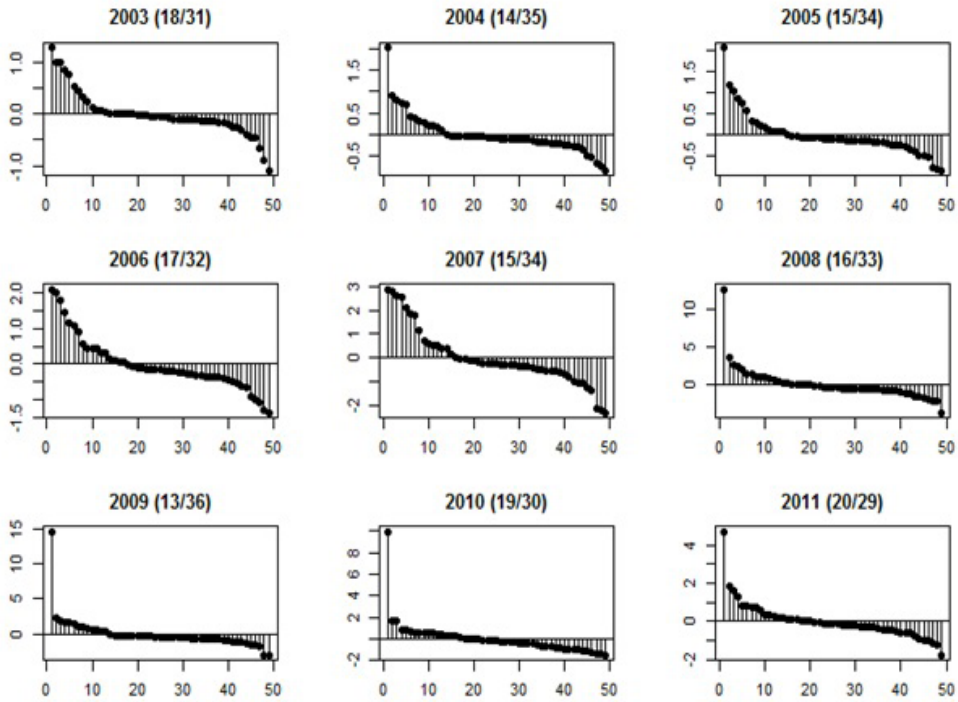


Source: Based on data from CNFIS

The global assessment provided in Appendix 2 and Figure 3 is supplemented with a more granular perspective offered by Figure 4 which is actually a composite graph that illustrates the differences between attained and available quality funding within each individual year. This figure shows the variation in the number of successful and unsuccessful institutions across the nine years under study. The most unbalanced ratio of successful to unsuccessful institutions occurs in 2009 (13 to 36), while the most balanced ratio (20 to 29) occurs in 2011. A further aspect that merits attention in this context is whether or not there is a significant correlation between the annual performance of the institutions. Because the differences in available and attained allocations create a different rank order of the 49 universities within each year these ranks may be investigated with specific statistical tests that measure the strength of the relationship between the results obtained by the higher education institutions in a specific year and those obtained in the subsequent one.

<sup>15</sup> Note that in the figure universities are sorted in descending order according to the monetary values of the difference, whereas in Appendix 2 they are sorted in descending order according to the percent difference column. This means that the order given in the figure is different from the one in the appendix, although the essential benefit / loss division is conserved.

Figure 4. Annual evolution of the public universities according to the rank order determined among them by the difference between available and attained quality-related funding (parentheses next to the year index indicate the ratio of successful universities to unsuccessful ones)



Source: Based on data from CNFIS

Table 1 presents the results of pairwise correlations tested with Kendall's rank correlation tau to compare the evolution of the university rankings determined by the differences between available and attained allocations when moving from one year to another. The results generally show a moderate or high level of correlation, meaning the relative position of the public universities did not change dramatically from one year to the other. The highest coefficient ( $\tau = 0.86$ ) is obtained for the correlation between the results from 2004 and those from 2005, while the weakest ( $\tau = 0.27$ ) is obtained for the results from 2005 and 2006. With regard to the higher coefficient, it is most likely explained by the fact that the exact same funding methodology was used by CNFIS (at the request of the Ministry of Education) in both 2004 and 2005. Similarly, the weaker correlation is most likely explained by the fact that the 2006 methodology was marked by much more pronounced changes with regard to the previous one.

*Table 1. Pairwise correlations between annual rank orders of universities based on the differences between their available and attained quality-funding allocations (Kendall's rank correlation coefficient tau and corresponding p-value)*

Pairwise correlation	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011
Kendall's tau and p-value	$\tau = 0.53$ $p = 0.00$	$\tau = 0.86$ $p = 0.00$	$\tau = 0.27$ $p = 0.00$	$\tau = 0.74$ $p = 0.00$	$\tau = 0.46$ $p = 0.00$	$\tau = 0.63$ $p = 0.00$	$\tau = 0.63$ $p = 0.00$	$\tau = 0.46$ $p = 0.00$

Specific details regarding the annual performance of each individual university throughout the 2003 – 2011 period are given in Appendix 3. The appendix provides the status of each university with regard to quality-related funding (benefit / loss) within each of the nine years under study. Three broad clusters may be discerned: i) universities that consistently gained quality-related funding throughout all (or nearly all of) the nine years; ii) universities that consistently lost quality-related funding throughout all (or nearly all of) the nine years; iii) universities that had mixed results, gaining funding in some years but losing funding in others. An overall assessment indicates that the universities in the first cluster are substantially less numerous than the ones in the second cluster. Specifically, only three universities – all focused on STEM disciplines – consistently gained quality-related funding within each of the nine years under study, whereas no less than 17 consistently lost funding across all the nine years.

The tables and figures presented so far have provided enough information to answer the first of the three research questions outlined in the preceding sections. To answer the second, the basic division of universities highlighted by Appendix 2 and Figure 3 should be borne in mind: the summative appraisal of the quality-related funding distributed for the entire 2003 – 2011 period uncovered 15 universities that benefited to various degrees from the use of quality indicators and 34 others that lost various amounts of funding as a result of the use of these indicators. These two groups may now be further scrutinized by refining the analysis in such a way as to take into account the role of disciplinary profiles. Operationally, this entails an exploration of the degree of association between the global quality-related funding outcome – benefit or loss – and the disciplinary profiles presented in Appendix 1.

A chi-squared test for the relation between general disciplinary profiles and the global funding outcome of benefit or loss results in a value of 29.05 (2 degrees of freedom; p-value of 0.000) and therefore indicates a statistically significant departure of the observed data from the null hypothesis of independence between disciplinary profiles and funding outcomes. A cross-tabulation of the 49 universities according to their benefit / loss status and general disciplinary profiles yields the results graphically displayed in Figure 5 (left-hand side) with the aid of a mosaic plot<sup>16</sup>. This plot highlights the following: among the 15 universities that benefited from quality-related funding most (13) are focused on STEM disciplines, while two others (the University of Bucharest and the Babes-Bolyai University) have a mixed profile; none of the universities focused on HASS disciplines benefited from quality-related funding.

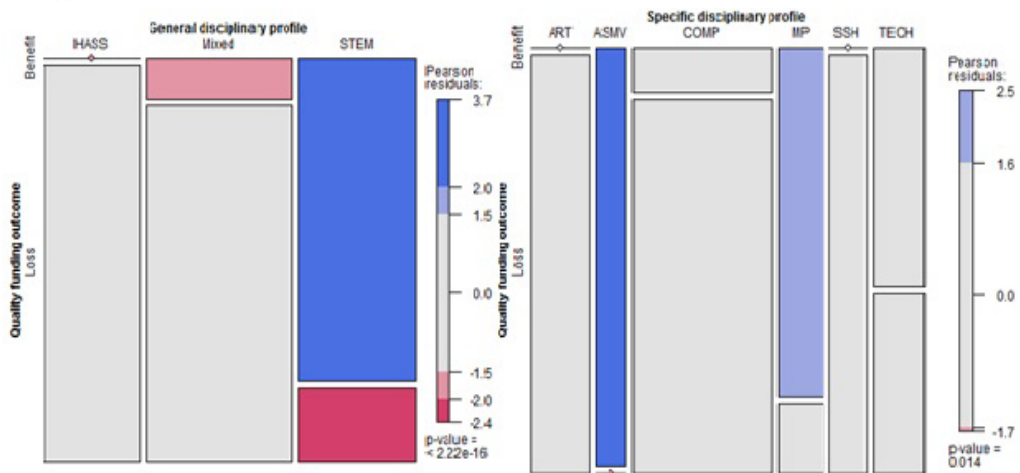
<sup>16</sup> Technical details on the creation of mosaic plots in R using the “vcd” package are provided in Meyer et al (2006).



Therefore, among the 34 universities that were unsuccessful in acquiring quality-related funding we may find all 13 institutions focused on HASS, 18 that have a mixed profile and three others that are focused on STEM disciplines.

A review of the individual positive and negative correlations indicates that universities focused on HASS disciplines are positively associated with loss of quality funding and negatively associated with benefit. For the universities focused on STEM disciplines the reverse is true: these institutions are positively associated with benefit and negatively associated with loss. Mixed institutions are negatively associated with benefit and positively associated with loss. Note that specific panels highlighted in Figure 5 correspond to the cells of the cross-tabulated values of disciplinary profiles and funding outcome whose residual values (i.e. the difference between observed and expected count values under the assumption of independence) are individually significant at least at the 0.05 threshold. In other words, these specific values have a greater contribution than the others in driving the value mentioned above to the high level it displays, therefore also substantiating the statistically significant association between the general disciplinary profiles and the quality-related funding outcomes.

Figure 5. Mosaic plots of relation between quality-related funding and disciplinary profiles (general profiles in left graph, specific profiles in right graph; note that the disciplinary profile acronyms listed in Appendix 1 are used)

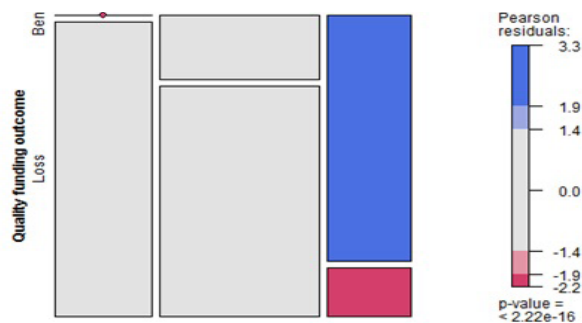


A more granular analysis which focuses on the relation of the global funding outcome with the specific disciplinary profiles of the universities reveals the following: first, a separate chi-squared test for the relation between specific disciplinary profiles and the global funding outcome of benefit or loss results in a value of 28.58 (5 degrees of freedom; p-value of 0.000) and also corroborates a statistically significant association between disciplinary profiles and funding outcomes. Secondly, the cross-tabulation of the 49 universities according to their benefit / loss status and specific disciplinary profiles, graphically illustrated in the right-hand side of Figure 5, shows the following: of the 15 universities that benefited from quality-related funding, four are

specialized in agricultural sciences and veterinary medicine (in fact, these four are the only such specialized institutions among the total 49), five are focused on medicine and pharmacy, four others on technical studies, while the remaining two are comprehensive institutions; as in the more general case where institutions are divided in STEM, mixed and HASS, none of the universities focused on social sciences and humanities or on art studies benefited from quality-related funding. Consequently, the 34 universities that lost quality funding throughout 2003 – 2011 include all eight universities focused on art<sup>17</sup> and all five institutions focused on social sciences and humanities; additionally, 17 comprehensive universities, three universities specialized in technical studies and a single university focused on medicine and pharmacy also count themselves among the 34 unsuccessful institutions. However, none of the four universities specialized in agricultural sciences and veterinary medicine count themselves among this group since all belong to the previous one.

A review of the individual positive and negative correlations at this more granular level of analysis reveals the following: comprehensive universities, those focused on art studies as well as those focused on social sciences are all positively associated with loss of quality-related funding and negatively associated with benefit from such funding. On the other hand, technical universities, those specialized in medicine and pharmacy as well as those specialized in agricultural sciences and veterinary medicine are all positively correlated with benefit and negatively correlated with loss. Again, specific panels highlighted in the right-hand graph of Figure 5 correspond to the cells of the cross-tabulated values of specific disciplinary profiles and funding outcome whose residual values are individually significant at least at the 0.05 threshold, therefore contributing to a greater degree to the overall  $\chi^2$  value of 28.58 which underscores the statistically significant association between the specific disciplinary profiles and the quality-related funding outcomes.

*Figure 6. Mosaic plot of the relation between global quality-related funding outcomes and the official classification results based on the 2011 institutional evaluation (note that A stands for universities focused on teaching, B for those focused on teaching and research, or teaching and artistic creation, while C represents universities focused on advanced research)*



17 The status of these universities focused on art studies (constant loss of funding throughout the entire nine years) seems to confirm a perceptions of stakeholders noted by Strehl et al (2007, p. 14) according to which funding systems (whether formula-driven or performance-based) create “disadvantages for small, specialized institutions and areas of study as opposed to advantages for the large and powerful institutions”.

In answer to the third research question of the paper, a similar analysis to the one just presented was undertaken. However, instead of corroborating global quality-related funding outcomes with disciplinary profiles, these funding results are cross-tabulated with the global results of the official evaluation that informed the 2011 classification process conducted by the Ministry of Education. The corresponding chi-squared test for the relation between the global funding outcome of benefit / loss and the outcomes of the 2011 classification process yields a value of 22.73 (2 degrees of freedom; p-value of 0.000) thereby negating the possibility that these two are unrelated.

A more detailed analysis indicates the following: among the 15 institutions that secured a greater level of funding under the quality indicator framework, ten were placed by the evaluation from 2011 in the class of universities focused on advanced research. Since only 12 institutions were placed in this class in 2011 (out of 90, public and private, participating entities) the ten universities that benefited from quality-related funding throughout 2003 – 2011 are in effect quasi-synonymous with the ones evaluated in 2011 as advanced research institutions. The five other universities that were successful in securing larger shares of quality funding were placed in the class of universities focused on both education and research. One may therefore note that none of the successful institutions were placed in the class of universities focused exclusively on teaching. Conversely, most of universities that were unsuccessful at acquiring quality-related funding were placed in the class of universities focused on teaching (14) or on teaching and research / artistic creation (18); only two universities unsuccessful with regard to quality funding were placed in the class of advanced research (the Bucharest University of Economic Studies which is specialized in social sciences and the Alexandru Ioan Cuza University of Iasi which is one of the oldest higher education institutions in Romania). A study of the positive and negative correlations between the global outcome of quality funding and university classes indicates that universities placed in class C are positively correlated with benefit and negatively correlated with loss of funding. Universities from classes B and A, however, are both negatively correlated with benefit and positively correlated with loss.

### **Summary and concluding remarks**

Quality-related funding was introduced in the Romanian system of funding higher education institutions with a view towards stimulating competition and counterbalancing the decline in educational standards. The analyses presented in the preceding section were meant to reveal the overall results produced by the quality-related funding approach throughout the entire period of its operation. First, although a total amount of approximately 2 billion RON was distributed based on quality indicators throughout the nine years in which they were in use, only 6.5% of this amount was the object of actual transfer (owing to differences in institutional performance on the quality indicators) between 15 successful institutions and 34 unsuccessful ones. This rather diluted impact of quality indicators is most likely a consequence of the institutional homogeneity of Romanian higher education institutions, but it may also

be attributed to the mutual cancellation of influences by several indicators. As a result of these two factors many universities were moderately affected by the use of quality-related funding, gaining or losing incremental amounts of funding. However, for most institutions the benefits and losses are more pronounced and distinctive patterns of benefit or loss typically emerge when analyzing the annual performance of each university across the nine years.

The successful and unsuccessful institutions in the zero-sum game of quality-funding can be analyzed further by distilling the global outcomes of the funding algorithm in accordance with general and specific disciplinary profiles. A markedly contrasted picture of higher education institutions emerges: STEM-oriented universities constitute the overwhelming part of the institutions successful in acquiring larger shares of quality-related funding, whereas HASS-oriented universities are all counted among the unsuccessful institutions that forfeited such funding. Universities focused on agricultural sciences and veterinary medicine, together with those specialized in medicine and pharmacy seem to have been particularly adept at acquiring larger shares of quality-related funding. Rather surprisingly, only two comprehensive institutions are found to have benefited through the use of quality indicators; whether their positive performance is more closely connected to their STEM-oriented departments or rather to their HASS departments is uncertain. However, based on the system-level trends described above one may speculate that their success is more closely connected to their STEM components.

Further analysis of the global outcomes of quality-related funding in conjunction with the results of the institutional evaluation that informed the classification of universities conducted in 2011 also highlights a substantial convergence: most of the institutions that were successful in acquiring quality-related funding throughout the 2003 – 2011 period are the same institutions that were placed by the 2011 evaluation in the class of universities focused on advanced research, a class which was largely perceived (if not in fact intended) as hierarchically, not only functionally different from the other two. If one is indeed willing to concede that the classification was actually a ranking in disguise, then a consistent pattern of institutional performance and the presence of a type of Matthew effect (Merton: 1968) may be discerned: the universities that had already received larger shares of funding were also, for the most part, the same institutions with a better standing in the 2011 institutional evaluation. Similarly, the institutions that were unsuccessful in acquiring quality-related funding were further put at a disadvantage in the institutional evaluation that led to the classification results. This, however, only raises additional questions related to the underlying factors that may be at work in producing such outcomes. Although not empirically addressed in the preceding sections, it is likely that institutional age as well as the size and composition of the academic staff were highly influential in determining both the global outcomes of quality-related funding, as well as those of the 2011 classification. These aspects require further study and careful collection of additional data but may yield new insights into the architecture of the Romanian higher education system. They remain important topics for future research.

## Acknowledgements

The author would like to express his gratitude for the helpful feedback provided to him in the course of the peer review process conducted by the journal.

*Appendix 1. Disciplinary profiles of Romanian public universities based on the distribution of their study programmes (as evaluated in the 2011 ranking); results of 2011 institutional classification*

Code	University	I	II	III	IV	V	General profile	Specific profile	2011 class
1	Polytechnic University of Bucharest	1	10	0	0	0	STEM	TECH	C
2	Technical University of Civil Engineering (Bucharest)	0	6	0	1	1	STEM	TECH	B
3	Ion Mincu University of Architecture and Urbanism (Bucharest)	0	0	0	0	1	HASS	ART	B
4	Bucharest University of Agricultural Sciences and Veterinary Medicine	0	9	2	0	0	STEM	ASMV	B
5	University of Bucharest	7	2	2	10	5	MIXED	COMP	C
6	Carol Davila University of Medicine and Pharmacy (Bucharest)	0	0	3	0	0	STEM	MF	C
7	Bucharest University of Economic Studies	0	0	0	10	0	HASS	SSH	C
8	Bucharest National University of Music	0	0	0	0	1	HASS	ART	B
9	Bucharest National University of Arts	0	0	0	0	2	HASS	ART	B
10	I. L. Caragiale National University of Theatre and Film (Bucharest)	0	0	0	0	1	HASS	ART	B
11	National University of Physical Education and Sport (Bucharest)	0	0	0	1	0	HASS	SSH	A
12	National School of Political and Administrative Studies (Bucharest)	0	0	0	6	0	HASS	SSH	B
13	1 Decembrie 1918 University (Alba Iulia)	1	3	0	9	3	HASS	SSH	A



14	Aurel Vlaicu University (Arad)	3	8	0	12	4	MIXED	COMP	A
15	Vasile Alecsandri University (Bacau)	4	8	1	7	1	MIXED	COMP	A
16	North University of Baia Mare	5	12	1	5	5	MIXED	COMP	A
17	Transilvania University (Brasov)	4	14	1	14	3	MIXED	COMP	B
18	Technical University of Cluj-Napoca	0	12	0	0	1	STEM	TECH	C
19	University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca	1	7	2	0	0	STEM	ASMV	C
20	Babes-Bolyai University (Cluj-Napoca)	8	4	1	17	7	MIXED	COMP	C
21	Iuliu Hatieganu University of Medicine and Pharmacy (Cluj- Napoca)	0	0	3	0	0	STEM	MF	C
22	Gheorghe Dima Music Academy (Cluj-Napoca)	0	0	0	0	1	HASS	ART	B
23	University of Art and Design (Cluj-Napoca)	0	0	0	0	1	HASS	ART	B
24	Ovidius University (Constanta)	7	9	4	15	7	MIXED	COMP	B
25	Constanta Maritime University	0	5	0	0	0	STEM	TECH	A
26	University of Craiova	6	14	1	15	6	MIXED	COMP	B
27	Craiova University of Medicine and Pharmacy	0	0	3	0	0	STEM	MF	B
28	Dunarea de Jos University (Galati)	4	13	3	13	7	MIXED	COMP	B
29	Gheorghe Asachi Technical University (Iasi)	1	12	0	0	1	STEM	TECH	C
30	Ion Ionescu de La Brad University of Agricultural Sciences and Veterinary Medicine (Iasi)	0	5	2	0	0	STEM	ASMV	B
31	Alexandru Ioan Cuza University (Iasi)	7	1	1	17	5	MIXED	COMP	C

32	Gr. T. Popa University of Medicine and Pharmacy (Iasi)	0	1	3	0	0	STEM	MF	C
33	George Enescu University of Arts (Iasi)	0	0	0	0	3	HASS	ART	B
34	University of Oradea	6	13	4	16	7	MIXED	COMP	B
35	University of Petrosani	3	9	0	7	0	MIXED	TECH	A
36	University of Pitesti	4	8	2	15	5	MIXED	COMP	A
37	Petroleum-Gas University of Ploiesti	5	9	0	7	1	MIXED	COMP	A
38	Eftimie Murgu University (Resita)	0	7	0	6	2	MIXED	COMP	A
39	Lucian Blaga University (Sibiu)	4	13	3	17	6	MIXED	COMP	B
40	Stefan cel Mare University (Suceava)	2	10	0	14	3	MIXED	COMP	A
41	Valahia University (Targoviste)	4	7	0	10	4	MIXED	COMP	A
42	Constantin Brancusi University (Targu Jiu)	0	5	0	11	3	MIXED	COMP	A
43	Petru Maior University (Targu Mures)	2	6	0	10	2	MIXED	COMP	A
44	Targu Mures University of Medicine and Pharmacy	0	0	3	0	0	STEM	MF	B
45	University of Arts (Targu Mures)	0	0	0	0	2	HASS	ART	B
46	Politehnica University (Timisoara)	2	12	0	2	1	STEM	TECH	C
47	University of Agricultural Sciences and Veterinary Medicine of Banat Timisoara	1	8	2	0	0	STEM	ASMV	B
48	West University of Timisoara	6	0	1	17	9	HASS	SSH	B
49	Victor Babes University of Medicine and Pharmacy (Timisoara)	0	0	3	0	0	STEM	MF	B

NOTE: The table is based on the results of the 2011 ranking process of study programmes conducted by the Ministry of Education, as explained in the Methodological notes section above. Columns I through V represent the fundamental disciplinary fields mentioned in the methodological section. In column General profile

STEM stands for Science, Technology, Engineering and Mathematics; HASS stands for Humanities, Arts and Social Sciences. In column Specific profile the acronyms are to be read as follows: COMP - comprehensive universities, TECH - universities specialised in technical studies, MP - universities specialised in medicine and pharmacy, ASMV - universities specialised in agricultural sciences and veterinary medicine, SSH - universities specialised in social sciences and humanities, ART - universities specialised in arts. Column 2011 class lists the classification category to which each university was assigned following the 2011 evaluation supervised by the Ministry of Education: A stands for universities focused on teaching, B for those focused on teaching and research, or teaching and artistic creation, C for universities focused on advanced research.

*Appendix 2. Global quality-related funding of public universities for the entire 2003 – 2011 period*

Code	University	Available allocations	Attained allocations	Difference	Percent difference
1	Polytechnic University of Bucharest	169618385	216035017	46416632	27.37
47	University of Agricultural Sciences and Veterinary Medicine of Banat Timisoara	25035820	30472472	5436651	21.72
21	Iuliu Hatieganu University of Medicine and Pharmacy (Cluj-Napoca)	47537609	57700574	10162965	21.38
49	Victor Babes University of Medicine and Pharmacy (Timisoara)	37200038	43865818	6665780	17.92
46	Politehnica University (Timisoara)	79818535	92911910	13093375	16.40
30	Ion Ionescu de La Brad University of Agricultural Sciences and Veterinary Medicine (Iasi)	19004206	21783896	2779690	14.63

19	University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca	25549317	29078579	3529262	13.81
32	Gr. T. Popa University of Medicine and Pharmacy (Iasi)	42766114	48123987	5357873	12.53
29	Gheorghe Asachi Technical University (Iasi)	87866501	98328316	10461815	11.91
27	Craiova University of Medicine and Pharmacy	26340436	29414220	3073784	11.67
18	Technical University of Cluj-Napoca	73058985	78815330	5756345	7.88
5	University of Bucharest	119570948	128904126	9333179	7.81
20	Babes-Bolyai University (Cluj-Napoca)	132693842	139997428	7303586	5.50
6	Carol Davila University of Medicine and Pharmacy (Bucharest)	86725666	88929302	2203637	2.54
4	Bucharest University of Agricultural Sciences and Veterinary Medicine	37618278	37898998	280720	0.75
2	Technical University of Civil Engineering (Bucharest)	43800643	43719949	-80694	-0.18
37	Petroleum-Gas University of Ploiesti	21903736	21537810	-365926	-1.67
26	University of Craiova	78828180	76114904	-2713276	-3.44
31	Alexandru Ioan Cuza University (Iasi)	92442130	87861671	-4580459	-4.95
7	Bucharest University of Economic Studies	60209783	56814241	-3395542	-5.64
40	Stefan cel Mare University (Suceava)	24639450	23012168	-1627282	-6.60
41	Valahia University (Targoviste)	22904956	21305607	-1599349	-6.98
15	Vasile Alecsandri University (Bacau)	16437001	15057197	-1379803	-8.39

17	Transilvania University (Brasov)	78505691	71009675	-7496016	-9.55
3	Ion Mincu University of Architecture and Urbanism (Bucharest)	17604019	15858811	-1745209	-9.91
43	Petru Maior University (Targu Mures)	10506366	9376954	-1129411	-10.75
24	Ovidius University (Constanta)	40335550	35367111	-4968439	-12.32
44	Targu Mures University of Medicine and Pharmacy	35209562	30727804	-4481758	-12.73
28	Dunarea de Jos University (Galati)	56625941	49100467	-7525474	-13.29
34	University of Oradea	60434344	52147310	-8287035	-13.71
13	1 Decembrie 1918 University (Alba Iulia)	10498980	8972571	-1526409	-14.54
39	Lucian Blaga University (Sibiu)	49261983	40625655	-8636328	-17.53
11	National University of Physical Education and Sport (Bucharest)	7709015	6299819	-1409196	-18.28
35	University of Petrosani	16180179	13179277	-3000903	-18.55
48	West University of Timisoara	56779754	46012953	-10766801	-18.96
36	University of Pitesti	26226299	20833710	-5392589	-20.56
12	National School of Political and Administrative Studies (Bucharest)	9707963	7708256	-1999707	-20.60
33	George Enescu University of Arts (Iasi)	21013104	15884063	-5129041	-24.41
9	Bucharest National University of Arts	14167481	10626056	-3541425	-25.00
14	Aurel Vlaicu University (Arad)	10853187	7923507	-2929680	-26.99
23	University of Art and Design (Cluj-Napoca)	9271544	6541188	-2730356	-29.45
25	Constanta Maritime University	4611416	3201377	-1410039	-30.58
16	North University of Baia Mare	14866520	10109057	-4757464	-32.00





20	Benefit	Benefit	Benefit	Loss	Loss	Benefit	Benefit	Benefit	Benefit
21	Benefit	Benefit	Benefit	Benefit	Benefit	Benefit	Benefit	Benefit	Benefit
22	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Loss
23	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Loss
24	Loss	Loss	Loss	Loss	Benefit	Loss	Loss	Loss	Loss
25	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Loss
26	Benefit	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Benefit
27	Loss	Loss	Loss	Benefit	Benefit	Benefit	Benefit	Benefit	Benefit
28	Benefit	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Loss
29	Benefit	Benefit	Benefit	Benefit	Loss	Benefit	Benefit	Benefit	Benefit
30	Benefit	Benefit	Benefit	Benefit	Loss	Benefit	Benefit	Benefit	Benefit
31	Benefit	Benefit	Benefit	Loss	Loss	Loss	Loss	Loss	Loss
32	Loss	Benefit	Benefit	Benefit	Benefit	Loss	Benefit	Benefit	Benefit
33	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Loss
34	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Loss
35	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Loss
36	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Loss
37	Loss	Benefit	Benefit	Benefit	Benefit	Loss	Loss	Benefit	Loss
38	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Loss
39	Loss	Loss	Benefit	Loss	Loss	Loss	Loss	Loss	Loss
40	Loss	Loss	Loss	Benefit	Loss	Loss	Loss	Benefit	Loss
41	Benefit	Benefit	Benefit	Loss	Loss	Loss	Loss	Loss	Benefit
42	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Loss
43	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Benefit	Benefit
44	Loss	Loss	Loss	Loss	Loss	Benefit	Loss	Loss	Loss
45	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Loss
46	Benefit	Benefit	Benefit	Benefit	Benefit	Benefit	Benefit	Benefit	Benefit
47	Loss	Benefit	Benefit	Benefit	Benefit	Benefit	Benefit	Benefit	Benefit
48	Benefit	Loss	Loss	Loss	Loss	Loss	Loss	Loss	Loss
49	Loss	Loss	Loss	Benefit	Benefit	Benefit	Benefit	Benefit	Benefit

**NOTE:** Universities are identified in the first column with their codes from the previous appendices

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