

## **REVIEW**

**by Candidate of Economic Sciences, Department of International Economic Relations, Sumy State University**

**Anna Vorontsova**

**on the dissertation work**

**Yang Yu**

performed for the Doctor of Philosophy degree in Speciality 073 Management in the field of study 07 Management and Administration on the topic "The management of state financial resources in China's higher education: Enhancing regional equity, efficiency, and adequacy of financial provision."

### **1. Relevance of the topic of the dissertation research.**

Higher education is recognised as a vital driver of economic growth, social mobility, and technical innovation globally. In the competitive realm of the information economy, the calibre and availability of higher education are essential. The management of state financial resources aligns with global efforts to optimise educational expenditure, ensuring effective allocation to enhance educational outcomes and economic development. In China, higher education is crucial for developing the human capital necessary to fulfil these ambitions. Examining the allocation of governmental financial resources improves the understanding of how to support higher education institutions in fulfilling national objectives. The significant regional disparities in higher education funding in China constitute a critical issue affecting the country's overall development. This is essential for ensuring that all regions can engage in and benefit from the nation's educational and economic progress.

In the context of fiscal constraints and increasing demands for accountability, the efficacy of resource allocation in higher education is a paramount concern. The analysis of efficiency in financial resource allocation offers practical insights for improving the management of educational funding. This is crucial for maximising the effectiveness of limited resources and ensuring that educational investments provide the highest possible returns. Formulating methods to assess and enhance financing sufficiency guarantees that higher education institutions have the necessary resources to fulfil their objectives. This is particularly important for expanding educational opportunities and meeting the diverse needs of students and society. Develop a scientific basis for crafting policies that can enhance the management of public financial resources in higher education, improve regional equity, and promote economic and social development.

## **2. Relationship of the dissertation to scientific plans, programmes, basic and applied research**

The dissertation is congruent with scientific programs, fundamental research, and applied research, executed within the context of five research initiatives at Sumy State University. The project titled "The Management of State Financial Resources in Higher Education: Enhancing Regional Equity, Efficiency, and Adequacy of Financial Provision" (project number 0121U114364) addresses socio-economic challenges arising from the digitalisation of social relations and their implications for the management of state financial resources in higher education. The study "Convergence of Economic and Educational Transformations in the Context of Digitalisation" (project number 0121U114570) examines the optimisation of regional resource allocation in higher education. The research titled "The Innovative Drivers of the Growth of the Country's Macroeconomic Stability" (project number 0121U114396) investigates the relationship between the efficiency of state financial resource management in higher education and macroeconomic stability. Finally, the study "Transformation of the Financial System and Strategic Priorities of its Development" (project number 0121U114477) examines the determinants affecting higher education investment in regional economic development.

## **3. The degree of validity of the scientific positions, conclusions and recommendations formulated in the dissertation.**

The applicant's scientific positions, conclusions, and recommendations are logical, theoretically sound, and statistically robust. The thesis defines the subject of study and the research topic while clearly outlining the research tasks. The thesis presents a comprehensive analysis of scientific and methodological sources, supported by extensive statistical data from 31 provinces in China covering the period from 2007 to 2018. The reliability of the scientific outcomes, conclusions, and recommendations is supported by their presentation and positive assessment at four international scientific and practical conferences, in addition to the author's own scientific publications.

In writing the thesis, Yang Yu integrates general scientific methods, including induction, deduction, analysis, synthesis, and scientific abstraction, with specialised research methodologies such as bibliometric analysis using VOSviewer, logical-historical analysis, and the grouping method. This study employed a comprehensive suite of software tools and programming languages for empirical computations and modelling, including statistical analysis software, geographic information systems (GIS), data visualisation tools, data envelopment analysis (DEA) software, and structural equation modelling (SEM) software. The selection of these tools and

technologies is justified and coherently aligned with the objectives established for the research.

The research findings of Yang Yu's thesis enhance the scientific methodology for evaluating the effects of state financial resource management in higher education on regional equity, efficiency, and the adequacy of financial provision. The dissertation presents a systematic and logical exposition of the author's suggestions, includes essential demonstrations of intermediate outcomes accompanied by pertinent succinct commentary, and leaves a favourable overall impression. Every phase of the dissertation consists of well-defined conclusions that articulate the primary findings of the research and their practical implications.

#### **4. The reliability of the provisions, conclusions and recommendations presented in the dissertation.**

The dependability of the scientific findings, conclusions, and recommendations derived from the dissertation are unequivocal, as all phases of the research are thoroughly detailed, grounded in a robust array of credible statistical data, and supplemented by relevant illustrative material and accurate citations of the utilised sources.

#### **5. The novelty of the study and the results obtained.**

A comprehensive evaluation of the substance of Yang Yu's thesis supports the assertion that the applicant's primary provisions, scientific methodology, conclusions, and suggestions are scientifically innovative and validate her unique contribution.

The research innovates by enhancing and introducing new methods for managing state financial resources in Chinese higher education.

A new systematic approach to assess the management of financial resources in higher education, using  $\sigma$ -convergence, absolute  $\beta$ -convergence, and conditional  $\beta$ -convergence calculations. This helps analyse financial expenditure trends and disparities across regions over a decade.

Enhanced methods for ensuring regional equality in financial resource management using Dagum's Gini coefficient. Improved efficiency evaluation methods for financial expenditure distribution using a modified DEA model and SFA. Scientific justification for mechanisms considering unequal educational opportunities for youth from different regions. A new basis for studying education investment's role in economic growth, examining both direct and indirect impacts.

Advanced methods for investigating regional imbalances in financial resource management using a combined analysis approach. An optimised basis for horizontal

transfer payments to balance inter-regional resource distribution, based on a financial sufficiency coefficient calculation.

## **6. Theoretical and practical significance of the results of the dissertation.**

*Theoretical Significance.* The dissertation's methodological framework draws from foundational principles of economic theory, state economic regulation, management, finance, socio-economic process analysis, economic-mathematical modelling, and educational development and governance concepts in higher education. It incorporates findings from prior research on managing state financial resources in higher education.

Various general scientific and specialised methodologies were employed to address the research objectives. Induction, deduction, analysis, synthesis, and scientific abstraction were utilised to generalise organisational principles and identify current trends in the operation of education systems. Logical-historical analysis and grouping techniques examined the economic basis and organisational mechanisms underpinning financial resource management in higher education across countries. Bibliometric analysis and logical synthesis structured research on developing higher education systems. Graphic and tabular methods and dynamic and statistical analysis were applied to explore regional differences and convergence in financial resource distribution for education. Descriptive statistics, correlation analysis, and regression modelling (single- and multifactor) facilitated evaluations and comparisons of expenditure efficiency in higher education. Structural decomposition and functional analysis were used to investigate how financial resources are allocated. Regression analysis (2SLS) and production functions assessed the connection between educational investment and economic growth.

This study's empirical computations and modelling were carried out using MS Excel, VOSviewer v. 1.6.10, STATISTICA 12, STATA/SE 18.0, and ArcGIS.

*Practical Significance.* The findings hold significant practical value as the theoretical insights, methodological approaches, and actionable recommendations in the dissertation can be applied by Chinese governmental bodies to reform the structural and economic principles underpinning the higher education system. Local administrations in China can leverage these outcomes to manage funding for educational institutions within their jurisdiction. Additionally, providers of educational services can utilise these recommendations for internal strategic planning, determining priority activities, and fostering collaboration with key stakeholders in the education sector. These findings offer a solid foundation for national and regional authorities to design policies that enhance the equitable allocation of higher education resources. The recommendations are applicable

across national, regional, and institutional levels to increase financial resource efficiency and promote fair regional distribution of funds for higher education.

A methodological framework for assessing the efficiency of budgetary expenditures in higher education, utilising an adapted three-stage DEA model and combining the BCC model with the SFA approach. Conclusions on international public management practices, particularly in addressing regional equity, efficiency, and adequate financial support in higher education, have been adopted by the European Marketing and Management Association (EUMMAS) (as per the letter dated 19 September 2024). Methods for clustering regions based on the alignment of economic growth with educational needs and strategies for managing local education policies were used by the NGO "Centre for Lifelong Education" (reference number 1-08, dated 15 August 2024). Suggestions to refine horizontal transfer payment systems to ensure equitable distribution of public resources among regions were implemented by the Eastern European Association for Civic Education (EENCE) (document №1, dated 10 October 2024). Furthermore, recommendations on evaluating educational inequality and financial disparities across regions, using Dagum's Gini coefficient, were integrated into the work of the Centre of Sociological Research, Poland (reference number 1/17/7/24, dated 17 July 2024). All corresponding evidence is provided in the Appendix of the Dissertation.

## **7. Assessment of the content of the dissertation and its completeness in general.**

Yang Yu's dissertation is a finalised scholarly document comprising 260 pages, of which 213 pages consist of text. In compliance with regulatory requirements, which the applicant has thoroughly met, the thesis is structured as follows: an abstract, an introduction, nine subsections organised into three sections, general and intermediate conclusions for each section, a reference list containing 240 entries, five appendices supplying essential data for the study, an executive certificate, and a compilation of the scientific works in which the thesis has been published.

The dissertation examines the management of financial resources in China's higher education sector, focusing on equity, efficiency, and adequacy. It uses a literature review, empirical analysis, and international comparisons to develop theoretical and practical insights for better resource management. The study identifies significant regional disparities in China and the need for a balanced approach. It also analyses regional differences, convergence trends, and efficiency using Gini coefficient and convergence models. The study finds a gradual narrowing of regional gaps but significant efficiency variations across provinces. The dissertation also investigates the direct and indirect effects of education investment on economic growth, proposes a method to measure standard financial expenditure

considering regional differences, and discusses optimising horizontal transfer payments for balanced resource distribution. The dissertation provides a framework for managing higher education resources, offering policy recommendations for more equitable and efficient resource allocation. Future directions suggest areas for further research, including causal inference and long-term impacts. The dissertation is well-structured and rigorous, making significant contributions to the field.

The dissertation's conclusion succinctly encapsulates and organises the scientific findings attained by the applicant, affirming the realisation of the objectives and the comprehensive fulfilment of the pertinent research aims.

#### **8. Completeness of the dissertation materials in published works and personal contribution of the applicant.**

The research findings of the thesis are comprehensively represented in the published scientific works. According to the research findings of the thesis, Yang Yu has published 11 scientific works, totalling 11.01 printed pages, with 8.85 pages being personally authored by the individual. The contributions consist of 1 article published in a scientific journal indexed by the international scientometric database Web of Science, six articles in specialised scientific journals of Ukraine classified as "B" category, and four conference proceedings.

The thesis is organised logically, features well-supported scientific arguments, and includes an adequate number of tables and figures in the main body and the appendices.

#### **9. Testing the results obtained.**

Yang Yu's dissertation is congruent with scientific programs, fundamental research, and applied research, executed within the context of five research initiatives at Sumy State University. The dissertation encompasses "The Management of State Financial Resources in Higher Education: Enhancing Regional Equity, Efficiency, and Adequacy of Financial Provision" (project number 0121U114364), which addresses socio-economic challenges related to the digitalisation of social relations and their effects on the management of state financial resources in higher education. The study "Convergence of Economic and Educational Transformations in the Context of Digitalisation" (project number 0121U114570) examines the optimisation of regional resource allocation in higher education. The research titled "The Innovative Drivers of the Growth of the Country's Macroeconomic Stability" (project number 0121U114396) analyses the relationship between the efficiency of state financial resource management in higher education and macroeconomic stability. The research titled "Transformation of the Financial System and Strategic Priorities of its Development" (project number

0121U114477) examines the determinants affecting higher education investment in regional economic development.

**10. Absence (presence) of a violation of academic integrity.**

An academic plagiarism assessment of Yang Yu's thesis revealed no violations of academic integrity, confirming accurate citations of all utilised sources. No intentional misrepresentation of the text was identified.

**11. Comments on the design and content of the thesis.**

The overall assessment of Yang Yu's thesis is favourable, with no significant deficiencies in its structure, scope, substance, validity of results, or theoretical and practical consequences. Key points of discussion include:

1) 1) The author highlights the adequacy index (0.79) when he provides funding adequacy measurement, but the methodology for calculating the "standard expenditures per student" may not account for all regional and institutional variables, leading to potential oversimplification.

2) While the three-stage DEA model combines the BCC model with SFA, selecting inputs and outputs (e.g., number of students and teachers) may not fully capture qualitative aspects of educational outcomes, such as graduate employability or research impact.

3) The dissertation relies heavily on statistical data from the Chinese National Bureau of Statistics and other governmental sources. This data could skew the results if outdated, incomplete, or inconsistent. Regional data aggregation might mask intra-regional disparities, leading to overgeneralisation.

4) The  $\sigma$ -convergence and  $\beta$ -convergence methods assume linear trends in regional funding disparities, which may not fully reflect real-world complexities or external shocks like economic crises or policy shifts, especially on a regional level.

5) Recommendations based on US, EU, and Japanese practices might not fully adapt to China's unique socio-political and economic context. Factors like governance models, cultural differences, and demographic trends may limit their applicability.

6) The focus is on financial resource distribution, potentially neglecting non-financial contributors to higher education quality, such as faculty qualifications, curriculum relevance, and infrastructure disparities.

7) Recommendations, such as establishing a national efficiency evaluation platform and optimising horizontal transfer payments, lack specific implementation details. How these will be operationalised and monitored remains unclear.

The identified deficiencies and remarks are not essential and do not compromise the quality of the scientific findings and conclusions presented in the thesis, nor do they undermine the scientific uniqueness of the research.

## 12. Compliance of the dissertation with the established requirements.

Yang Yu's dissertation, completed at Sumy State University, titled "The Management of State Financial Resources in Higher Education: Enhancing Regional Equity, Efficiency, and Adequacy of Financial Provision," constitutes an independent, comprehensive, and thorough scientific investigation that possesses both scientific novelty and theoretical and practical significance. The reliability of the thesis research results is substantiated by the factual conclusions derived from applying contemporary scientific methodologies.

Therefore, the dissertation on "The Management of State Financial Resources in Higher Education: Enhancing Regional Equity, Efficiency, and Adequacy of Financial Provision" complies with the requirements of the Order of the Cabinet of Ministers of Ukraine No. 44 dated January 12, 2022, "On Approval of the Procedure for the Award of the Degree of Doctor of Philosophy and Cancellation of the Decision of the Once-Established Specialized Academic Council of the Higher Education Institution, Scientific Institution on the Award of the Degree of Doctor of Philosophy." The author of the dissertation, Yang Yu, merits the award of the academic degree of Doctor of Philosophy in Speciality 073 Management in the field of study 07 Management and Administration.

### Reviewer

Candidate of Economic Sciences,  
Department of International Economic  
Relations, Sumy State University

Anna Vorontsova

