The Transition of Greek Higher Education Institutions to the New Governmental Accounting Framework: An Analysis Based on the Altman Z'' Score.

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All data used to research and prepare this paper may be found in the index pages included at the end of the paper.

Abstract

Aim: This study examines the financial resilience and managerial effectiveness of ten Greek higher education institutions (HEIs) by analyzing changes in their Altman Z'' Scores from 2017 to 2023, with a particular focus on the impact of Presidential Decree 54/2018, which introduced a new accounting framework.

Keywords: Altman Z'' Score, New Governmental Accounting Framework, PD No. 54/2018, Higher Education Institutions, IPSAS

Methodology: In this study the Altman Z'' Score used as the main tool for measuring financial health of 10 Grrek HEIs to evaluate changes in the scores before and after of the introduction of new accounting framework in public sector. Datas were processed in the statistical program SPSS v. 27.

Results: Institutional performance varied widely following the accounting reform. The University of Crete experienced a notable improvement, with its score increasing from 6.625 to 11.708 (p = 0.006), while the Agricultural University of Athens also posted a significant gain, moving from 4.689 to 7.147 (p = 0.024). In contrast, although the Athens University of Economics and Business (5.475 to 7.397, p = 0.070), the University of Ioannina (1.480 to 2.726, p = 0.104), and the University of Thessaly (0.808 to 4.578, p = 0.220) showed some improvement, the changes were not statistically significant. Meanwhile, the University of Patras (8.331 to 7.038, p = 0.616), the University of Macedonia (6.259 to 6.187, p = 0.979), the University of the Aegean (3.553 to 2.091, p = 0.082), the Democritus University of Thrace (1.640 to 1.480, p = 0.601), and Aristotle University of Thessaloniki (1.776 to 2.018, p = 0.654) either saw slight declines or remained largely unchanged, leaving them in what could be considered a "grey area."

Conclusion: The results emphasize the critical role of strong internal governance and effective administrative structures in making financial reforms successful. The ability to adopt accrual-based accounting standards like IPSAS depends largely on how well an organization is prepared and how flexibly it can adapt to new demands. Regular monitoring of key financial health indicators is equally important, enabling

institutions to anticipate challenges early and maintain long-term financial resilience.

1. Introduction

Starting on January 1, 2026, all Higher Education Institutions (HEIs) in Greece must adopt the New General Government Accounting Framework, introduced through Presidential Decree No. 54/2018. This shift represents a major change in the way public universities manage their financial operations. By moving to an accrual-based accounting system that aligns with International Public Sector Accounting Standards (IPSAS), the aim is to improve transparency, strengthen accountability, and build greater trust in financial reporting. The new framework also opens the door for universities to make use of more sophisticated financial analysis tools, such as the Altman Z'' Score. While the Altman Z'' Score was initially developed to predict the bankruptcy risk of private companies, it can still provide valuable financial insights for universities working under the updated system.

Although the Altman Z'' Score is widely used in the private sector to assess financial "health," its relevance for public, non-profit organizations like universities is still not fully understood (Gigli & Mariani, 2018; Agasisti et al., 2015). Research from countries such as Italy, Brazil, and Mexico — where accrual-based accounting has been implemented (de Souza et al., 2021) — indicates that these reforms can help develop early warning systems to monitor the financial stability of higher education institutions. In Greece, however, little attention has been given to how new accounting standards could be integrated with financial tools like the Z'' Score.

This study seeks to bridge a gap in existing research by applying the Altman Z'' Score, a linear econometric model, to evaluate the financial health of ten Greek higher education institutions (HEIs). The analysis is based on financial statements prepared under Greece's newly introduced accounting standards. Through this method, the study aims to show how the Z'' Score can be used both as an early warning indicator and as a means of assessing the long-term financial stability of universities as they navigate an evolving institutional and economic landscape.

2. Literature Review

2.1.1. The Transition of Greek Higher Education Institutions to the New General Government Accounting Framework

The adoption of the New General Government Accounting Framework represents one of the most significant institutional changes in Greece's public financial management system, with direct implications for higher education institutions (HEIs). By introducing double-entry bookkeeping and accrual accounting practices aligned with the International Public Sector Accounting Standards (IPSAS), the reform seeks to enhance transparency, improve accountability, and promote greater operational efficiency in the public sector (IPSASB, 2020). It is grounded in the new legal framework established by Law No. 4270/2014 on Principles of Fiscal Management and Supervision (Government Gazette A' 143/28.6.2014), which replaced the previous Law No. 2362/1995.

Additionally, Presidential Decree No. 54/2018 outlines the procedures for preparing financial statements in accordance with the European System of

Accounts (ESA 2010) and Eurostat's requirements, aligning Greece's practices with Directive 2011/85/EU, which seeks to strengthen fiscal transparency across European Union Member States (European Commission, 2011). On a practical level, the General Accounting Office of the State, through Circular No. 2/905/DLGK (ADA: ΨΦΚΒΗ-Δ13) issued on January 13, 2025, designated 2025 as the official preparation period for fully implementing the Decree. Throughout this transitional year, General Government bodies, including universities, are required to complete all technical, organizational, and operational measures necessary to ensure readiness for adopting the new Accounting Framework by January 1, 2026. To support this transition, the Expanded Chart of Accounts — prepared according to the Economic Classification guidelines of Presidential Decree No. 54/2018 and published in Government Gazette B' 6975/19.12.2024 — sets out the structure and functional categories of accounts. Its use is mandatory for all General Government entities and is designed to promote consistent, comparable, and reliable financial reporting.

The accounting reform requires all General Government entities, including higher education institutions (HEIs), to prepare balance sheets, income statements, and other essential financial reports. Shifting from the traditional cash-based system to accrual accounting is meant to deliver more complete, reliable, and comparable financial data, ultimately supporting stronger decision-making and improving fiscal oversight (OECD, 2019). For universities in Greece, the move toward IPSAS standards is expected to enhance the quality of financial reporting, helping institutions build greater trust both within the country and abroad — an important edge when competing for European and international funding opportunities.

The adoption of International Public Sector Accounting Standards (IPSAS) represents a significant move toward bringing public accounting systems into closer alignment across the globe, with the aim of improving transparency, strengthening accountability, and encouraging the more efficient use of public resources (Chytis, Filos, & Gounopoulos, 2020). Yet, international research suggests that the transition from cash-based to accrual-based accounting in universities is rarely smooth. For example, Gigli and Mariani (2018) found that Italian universities encountered considerable knowledge gaps during their shift to the new accounting system, highlighting the critical need for extensive training and greater investment in human resources. Similarly, Agasisti, Arnaboldi, and Catalano (2008) argue that financial reform in universities is not just a technical adjustment but often demands wide-reaching organizational restructuring.

Agasisti et al. (2015) note that introducing accrual accounting in academic institutions presents significant technical challenges, particularly because it involves rethinking how financial data is collected and managed. Looking more broadly, the experiences of Brazil and Mexico, discussed by de Souza et al. (2021), show that political and institutional factors heavily influence both the pace and success of IPSAS adoption in higher education. Akomanyi (2022) observed similar challenges in Ghana, where public universities largely resisted the shift to IPSAS, mainly due to limited understanding of the standards and a lack

of strong institutional support. Taken together, these cases underline the importance of political backing and a well-coordinated strategy for successfully implementing such reforms.

In Greece, the move toward IPSAS adoption is expected to enhance universities' financial position both nationally and internationally, giving them better access to European and global funding opportunities. However, despite the clear advantages, experiences from other countries suggest that real success hinges on careful planning, strong staff training, and solid institutional and technical support.

2.1.2. Assessing Financial "Health" in Higher Education: The Role of the Altman Z'' Score

The decision by Greek universities to adopt the New General Government Accounting Framework (Presidential Decree No. 54/2018) marks a significant move toward strengthening their financial management practices. By introducing double-entry bookkeeping and accrual accounting, aligned with the International Public Sector Accounting Standards (IPSAS), universities can present a clearer and more accurate view of their financial health and performance. Within this updated framework, advanced financial tools like the Altman Z'' Score will not only become usable but also crucial for spotting financial risks at an early stage. Since the Z'' Score depends on information from balance sheets, income statements, and cash flow statements, it will only be fully operational once the new accounting system is completely in place.

The use of the Altman Z'' Score in higher education institutions is becoming increasingly important. Lewis (2015) highlights that universities worldwide are facing growing financial pressures, with some even approaching bankruptcy. In many cases, he notes, the failure to detect financial problems early has led to sudden and severe crises. Similarly, Hunter et al. (2020) point out that the absence of strong early warning systems has often made these financial challenges even more difficult to manage. Applying the Z'' Score model is therefore a valuable tool for monitoring financial health and supporting the long-term viability of universities. LeClair (2022) also emphasizes that adapting financial indicators like the Altman Z'' Score to suit non-profit organizations, including universities, offers a reliable method for identifying early warning signs of trouble. He further argues that incorporating such analytical tools into university financial management can promote greater transparency and accountability.

Norberg (2015) also emphasizes the importance of early financial diagnosis, arguing that without preventive financial controls, higher education institutions often experience a rapid decline in their financial health. He stresses that developing early warning systems to detect financial risks is crucial for maintaining the long-term sustainability of public universities. When applying the Z'' Score model to Greek universities, the findings of Bruckner (2017, 2020) are particularly relevant. Bruckner notes that public universities, as a distinct type of public organization, tend to display unique patterns of financial instability, suggesting that traditional bankruptcy prediction models may require adjustment. He also points out that political, institutional, and regulatory factors can either mitigate or intensify the emergence of financial crises within public universities.

Recent studies also back the use of the Altman Z'' Score for predicting financial distress in public and non-profit organizations. Prasetiyo et al. (2023), for instance, demonstrate that the Z'' Score model can perform effectively in non-profit settings, provided that its main variables are adapted to reflect the specific features of public accounting systems. Similarly, Remondes and Carvalho (2025) emphasize the importance of carefully adjusting financial indicators for non-profits, pointing out that the results must be interpreted cautiously, given the differences in revenue and expenditure structures between non-profit and for-profit organizations. Adding to this, a systematic review by Rashid et al. (2023) confirms the growing application of the Z'' Score model within higher education. Although they acknowledge that some conceptual and methodological adjustments are needed, they conclude that the Altman Z'' Score remains a dependable and widely used tool for assessing financial distress across various sectors, including non-profits.

In conclusion, the shift to the New General Government Accounting Framework provides Greek universities with a stronger base for applying advanced financial tools like the Altman Z'' Score. Experiences from other countries highlight the critical need to detect financial risks early and to adopt practices that enhance transparency and strengthen financial management — both of which are essential for ensuring the long-term financial sustainability of Greek universities.

3. Research Data and Methodology

This study explores the financial condition of ten Greek universities both before and after the implementation of the New General Government Accounting Framework, introduced through Presidential Decree No. 54/2018. The analysis is based on primary data collected firsthand by the researcher, including Annual Financial Statements (such as Balance Sheets, Income Statements, and Cash Flow Statements), performance reports, and publicly available data from the General Accounting Office of the State and the "Diavgeia" Transparency Program. The timeframe spans from 2017 to 2023, with the period from 2017 to 2022 representing the pre-implementation phase, and 2023 marking the post-implementation stage. Data analysis was conducted using SPSS statistical software (version 27.0). The statistical methods included normality testing (detailed in the Appendix 1) and a comparison of average Altman Z'' Scores before and after the new accounting framework was adopted, aiming to identify any significant changes.

To evaluate the financial health of Greek universities, this study applied a modified version of the Altman Z'' Score, originally designed for non-industrial organizations. This adjusted model is widely regarded as the best fit for universities, given their distinct operational and financial features (Altman et al., 2017). It builds on the original Altman Z'' Score (1968), which was initially created to predict the risk of financial failure in businesses. Over the years, the model has been updated to better suit institutions that are not driven by profit, such as universities. The adapted Z'' Score relies on four key financial ratios: working capital to total assets, retained earnings to total assets, return on assets (calculated as EBIT divided by total assets), and financial leverage (measured by equity divided by liabilities). The formula for the index is as follows:

"Z'' = 6.56 × (Working Capital / Total Assets) + 3.26 × (Retained Earnings / Total Assets) + 6.72 × (Return on Assets: EBIT / Total Assets) + 1.05 × (Financial Leverage: Equity / Liabilities)"

Organizations' Z'' Score values are classified into three categories: a score below 1.10 signals financial distress or potential insolvency, scores between 1.10 and 2.60 fall into a "gray area," suggesting the need for careful financial management, and scores above 2.60 indicate strong financial health. The use of the Z'' Score alongside the new accounting system introduced by Presidential Decree 54/2018 — and the adoption of International Public Sector Accounting Standards (IPSAS) is both feasible and well-supported by existing research. With access to such an advanced financial tool, Greek universities can identify financial weaknesses early, monitor their financial health over time, and strengthen transparency and accountability to funders and the public (Altman, 2018).

4. Research Findings

4.1. Altman Z''Score of 10 Greek Universities(2017–2023)

This analysis focuses on describing and evaluating the financial profiles of ten Greek universities, as shown in Table 1. It tracks how each university's Z'' Score changes over time, providing a systematic comparison of their financial development year by year. By examining the Z'' Score values, universities are grouped into three categories based on their financial status: financially healthy, transitional or unstable, and financially distressed. This classification helps identify trends, evaluate how effectively each institution manages its finances, and assess the overall financial stability of the Greek higher education system during the study period.

Especially:

1. Agricultural University of Athens (AUA). The Agricultural University of Athens shows strong financial stability between 2017 and 2023, with Z'' Score values staying consistently high (from (3.72) to (7.15) and following a steady upward trend. The effective use of equity and improved liquidity place the university among the most financially healthy institutions, reflecting careful management and good financial planning.
2. University of Ioannina. The University of Ioannina shows major fluctuations. In the first years (2017–2019), it stayed within the "gray area" (between (1.15) and (2.40)). A sharp decline followed in 2020–2021, with values falling close to insolvency. However, during 2022–2023, the university made a quick recovery, returning to a financially healthy state. This pattern suggests that reform policies or major changes in financial management may have been introduced after 2021.
3. Athens University of Economics and Business (AUEB). The AUEB consistently shows very strong performance during the period under review, with peak Z''-Score values recorded in (2021) ((7.82)) and (2023) ((7.40)). Its steady financial stability, high asset profitability, and strong capital structure clearly reflect an excellent financial profile, placing the university among the top

institutions in terms of financial performance.

4. University of Thessaly. The University of Thessaly shows ongoing instability. It moved from negative values in 2017–2018 to a strong recovery in 2021 (9.00), dropped sharply in 2022 (–3.41), then rebounded in 2023 (4.57). This volatility likely points to leadership changes or funding shifts, highlighting the need for greater stability.
5. Democritus University of Thrace. From 2017 to 2019, the university hovered near the gray zone and declined further until 2022 (below 1.10). A slight recovery appeared in 2023 (1.48), but financial concerns persist, likely due to poor resource use or weak long-term management.
6. Aristotle University of Thessaloniki (AUTH). AUTH saw a steady decline from 2017 to 2019, a sharp fall in 2020 (–0.09), and only slight recovery by 2023 (2.02). Its ongoing struggles suggest administrative inefficiencies and poor funding management, calling for a strategic reset.
7. University of Patras. The University of Patras has shown strong financial health since 2017, peaking in 2021 (12.15). Its success reflects high self-financing and effective asset management, confirming its strong organizational capacity.
8. University of Macedonia. The university shows consistently high Z''-Scores, rising sharply in 2019 (8.47) and peaking in 2022 (9.30) before a slight dip in 2023 (6.18). Its growth likely stems from research investments and European funding.
9. University of the Aegean. From 2017 (5.05) to 2023 (2.09), the university's decline signals a move toward the gray zone, possibly due to weak investment returns or reduced funding, raising concerns about program sustainability.
10. University of Crete. The University of Crete has steadily climbed since 2017, peaking in 2023 (11.71). Its financial strength reflects solid management, capital growth, and strategic planning.

The Altman Z''-Score review from 2017 to 2023 highlights sharp financial differences across Greek universities (detailed in the Appendix 2). The Athens University of Economics and Business, University of Patras, University of Crete, Agricultural University of Athens, and University of Macedonia show strong and steady financial health. On the other hand, the University of Ioannina and University of Thessaly face significant financial swings, pointing to management or structural problems. Democritus University of Thrace, Aristotle University of Thessaloniki, and University of the Aegean continue to hover near critical levels, underlining the need for focused action. The 2023 shift to a new accounting system boosted some institutions, showing that preparedness and flexibility are crucial for adapting to reforms.

Universities	**Altman Z′′- Score**						
	2017	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Agricultural University of Athens	3,722	3,93	4,36	4,974	5,211	5,933	7,147
University of Ioannina	1,845	1,159	2,406	0,072	0,383	3,015	2,726
Athens University of Economics and Business	3,89	4,562	5,685	6,079	7,817	4,82	7,397
University of Thessaly	-4,047	-1,417	1,237	3,488	9,002	-3,414	4,578
Democritus University of Thrace	2,365	2,162	1,868	1,506	1,010	0,930	1,480
Aristotle University of Thessaloniki	3,336	2,621	2,462	-0,091	1,106	1,219	2,018
University of Patras	5,256	8,029	7,422	8,795	12,149	8,34	7,038
University of Macedonia	4,065	3,535	8,473	5,02	7,166	9,297	6,187
University of the Aegean	5,054	4,43	3,67	2,927	2,731	2,503	2,091
University of Crete	4,243	5,554	6,59	6,479	7,689	9,193	11,708

Table 1. Altman Z′′- Score of 10 Greek Universities (2017–2023)

4.2. Assessing the Impact of Presidential Decree No. 54/2018 on the Mean Altman Z" Score Change Among Ten Universities

Table 2 compares the average Altman Z''-Score values for the periods before (2017–2022) and after (2023) the reform, showing percentage changes and statistical significance (Sig.) of the differences. Statistical tests were used to check if the financial performance shifts were meaningful. The introduction of Presidential Decree No. 54/2018, which set a new accounting and financial system for Higher Education Institutions, seems linked to clear improvements in some universities,

especially those with strong organizational structures and mature management practices.

A clear example is the University of Crete, which saw its Altman Z'' Score jump from 6.625 to 11.708 ($p = 0.006$), a 76.7% increase. This gain is not only large but also statistically significant, showing the university's strong adoption of the new

framework and growth in its capital base. The Agricultural University of Athens also improved its financial position, rising from 4.689 to 7.147 (p = 0.024), a 30.9% increase backed by statistical significance. In both cases, strong administration and organizational flexibility helped them take full advantage of the reforms. The Athens University of Economics and Business improved from 5.475 to 7.397 (p = 0.070), a 35.1% rise, nearly reaching significance, strengthening its reputation for sound financial management.

In contrast, universities that started with weaker performance or greater financial swings show fewer clear results. The University of Ioannina improved its Z''-Score from 1.480 to 2.726 (p = 0.104), an 84% rise, but the change isn't statistically significant, hinting at a temporary shift or external factors rather than real structural improvement. A similar case is the University of Thessaly, where the score jumped from 0.808 to 4.578 (p = 0.220), a 466% increase, yet still not statistically meaningful. These sharp fluctuations suggest ongoing instability rather than the direct effect of reforms. The University of the Aegean showed a different trend, with its Z'' Score falling from 3.553 to 2.091 (p = 0.082), a 41% drop. Although not statistically significant, this decline is concerning and could point to deeper management issues or poor adaptation to the new framework. Even more telling are institutions that barely changed, like the Democritus University of Thrace (1.640 to 1.480, p = 0.601) and Aristotle University of Thessaloniki (1.776 to 2.018, p = 0.654), both staying in the "gray area." Their results suggest structural inertia and difficulty turning reforms into real financial gains. On the other hand, the University of Patras (8.332 before, 7.038 after, p = 0.354) and the University of Macedonia (6.259 before, 6.187 after, p = 0.944) showed slight declines, but neither change is statistically significant. The drop at the University of Patras likely reflects temporary or accounting factors, as its overall score remains strong. The University of Macedonia, with a minimal shift of – 0.015, shows complete financial stability, suggesting steady organization but possibly limited adaptability.

Overall, the results show that the positive effects of PD 54/2018 were not universal. Universities with strong institutional readiness, adaptability, and strategic focus gained the most. In contrast, those with a history of instability or weak management struggled to turn reform into a real advantage and continued to show signs of financial weakness. This trend highlights that organizational maturity, and internal dynamics are just as crucial as the framework itself in securing stable financial outcomes in higher education.

Table 2. ***Assessing the Impact of Presidential Decree No. 54/2018 on the***

Mean Altman Z'' Score Change Among Ten Universities

Universities	PD 54/2018		% Change of Altman Z''- Score	Sig.
	Before	After		
Agricultural University of Athens	4,689	7,147	0,309	**0,024**
University of Ioannina	1,480	2,726	0,840	0,104
Athens University of Economics and Business	5,475	7,397	0,351	0,070
University of Thessaly	0,808	4,578	4,665	0,220
Democritus University of Thrace	1,640	1,480	-0,097	0,601
Aristotle University of Thessaloniki	1,776	2,018	0,136	0,654
University of Patras	8,332	7,038	-0,155	0,354
University of Macedonia	6,259	6,187	-0,015	0,944
University of the Aegean	3,553	2,091	-0,411	0,082
University of Crete	6,625	11,708	0,767	**0,006**

4.3. Assessment of Mean Difference in the Altman Z'' Score of the 10 Universities Before and After PD 54/2018

The Independent Samples T-Test was applied to compare the average Z'' Scores of universities before and after PD 54/2018. This test was selected because the results of the Kolmogorov–Smirnov and Shapiro–Wilk tests showed that the data followed a normal distribution, allowing the use of parametric methods (Appendix 2). The purpose of the analysis is to determine whether the Presidential Decree brought a statistically significant shift in the financial stability of universities, as reflected in their Altman Z'' Scores. A result is considered statistically significant when the p-value (Sig. 2-tailed) is less than 0.05 (Kubesa, 2022). Specifically:

1. Agricultural University of Athens. The Z'' Score rose from 4.688 to 7.147, with a mean difference of –2.458 (t = –2.713, p = 0.042). This change is statistically significant, showing a strong improvement in financial stability after the implementation of Presidential Decree No. 54/2018. It likely reflects better internal financial management, more efficient use of resources, and the institution's ability to adapt to the new framework. Beyond statistics, the result shows the university made effective use of the new financial tools.
2. University of Ioannina. The Z'' Score increased from 1.480 to 2.726, with a mean difference of –1.246 (t = –1.001, p = 0.363). Although the rise is positive, it is not statistically significant, making it hard to link the improvement directly to the decree.
3. Athens University of Economics and Business (AUEB). The Z'' Score went up from 5.475 to 7.397, with a mean difference of –1.921 (t = –1.279, p = 0.257). While the improvement is notable, it is not statistically

significant and likely reflects the university's traditionally strong financial position.

4. University of Thessaly. The Z'' Score increased sharply from 0.8081 to 4.578, with a mean difference of –3.769 (t = –0.710, p = 0.509). However, due to the statistical instability of the results, it is difficult to draw clear conclusions about the impact of the new framework.
5. University of Patras. The Z'' Score decreased from 8.331 to 7.038, with a mean difference of 1.293 (t = 0.534, p = 0.616). While the decline is not statistically significant, it could indicate a minor weakening in the university's financial position.
6. University of Macedonia. The Z'' Score stayed nearly the same (6.259 → 6.187), with a mean difference of 0.072 (t = 0.028, p = 0.979), showing complete stability and no statistically significant effect from the Presidential Decree.
7. University of the Aegean. The Z'' Score dropped from 3.552 to 2.091, with a mean difference of 1.461 (t = 1.326, p = 0.242). Although not statistically significant, the negative change may hint at a decline in financial efficiency.
8. Democritus University of Thrace. The Z'' Score slightly decreased from 1.640 to 1.480, with a mean difference of 0.160 (t = 0.249, p = 0.813). The change is minimal and statistically non-significant, possibly reflecting a difficulty in adjusting to the new institutional framework.
9. Aristotle University of Thessaloniki (AUTH). A slight rise was recorded from 1.775 to 2.018, with a mean difference of –0.242 (t = –0.179, p = 0.865). The negligible, non-significant change indicates no real improvement or decline in financial performance.
10. University of Crete. The Z'' Score increased sharply from 6.624 to 11.708, with a mean difference of –5.083 (t = –2.757, p = 0.040), representing the most significant improvement among all HEIs examined. This substantial gain suggests enhanced financial resilience, successful capital restructuring, and a stronger focus on strategic efficiency. It likely results from greater external funding and more effective management of investments and research programs.

The analysis indicates that the implementation of PD 54/2018 did not result in immediate or widespread improvements in the financial stability of universities. Only two institutions — the Agricultural University of Athens (p = 0.042) and the University of Crete (p = 0.040) — showed a statistically significant increase in their Altman Z'' Scores. While some other universities recorded quantitative changes, these shifts were not statistically significant. This finding suggests that the impact of the new framework may take longer to emerge and is likely shaped by internal management practices within each university.

Table 3. ***Mean Difference in Altman Z'' Score of the 10 Universities Before and After PD 54/2018***

Universities	PD 54/2018	Z Scores Mean	Std. Deviation	t	Sig. (2-tailed)	Z Scores Mean Differenc
Agricultural University of Athens	Before	4,688	0,839	-2,713	**0,042**	-2,458
	After	7,147	1,123			
University of Ioannina	Before	1,480	1,152	-1,001	0,363	-1,246
	After	2,726	0,757			
Athens University of Economics and Business	Before	5,475	1,390	-1,279	0,257	-1,921
	After	7,397	1,164			
University of Thessaly	Before	,8081	4,916	-0,710	0,509	-3,769
	After	4,578	3,083			
Democritus University of Thrace	Before	1,640	0,594	0,249	0,813	0,160
	After	1,480	0,096			
Aristotle University of Thessaloniki	Before	1,775	1,254	-0,179	0,865	-0,242
	After	2,018	0,146			
University of Patras	Before	8,331	2,243	0,534	0,616	1,293
	After	7,038	0,783			
University of Macedonia	Before	6,259	2,396	0,028	0,979	0,072
	After	6,187	0,354			
University of the Aegean	Before	3,552	1,020	1,326	0,242	1,461
	After	2,091	0,887			
University of Crete	Before	6,624	1,707	-2,757	**0,040**	-5,083
	After	11,708	2,339			

5. Discussion

5.1. Altman Z'' Score of 10 Greek Universities (2017–2023)

An analysis of the Z''-Score index over the period 2017–2023 revealed notable differences in the financial resilience and managerial effectiveness of ten Greek higher education institutions (HEIs). The Athens University of Economics and Business (2017: 3.89 – 2023: 7.397), the University of Patras (2017: 5.256 – 2023: 7.038), the University of Crete (2017: 4.243 – 2023: 11.708), the University of Macedonia (2017: 4.065 – 2023: 6.187), and the Agricultural University of Athens (2017: 3.722 – 2023: 7.147) consistently achieved high scores, each maintaining values above 2.60. These results suggest strong financial health, effective management practices, and successful fundraising efforts. On the other hand, the Democritus University of Thrace (2017: 2.365 – 2023: 1.480), the University of the Aegean (2017: 5.054 – 2023: 2.091), and the Aristotle University of Thessaloniki (2017: 3.336 – 2023: 2.018) recorded lower or borderline scores, pointing to

challenges in strategic planning and resource management. The University of Thessaly (2017: –4.047 – 2023: 4.578) showed significant fluctuations, likely influenced by external pressures or internal organizational shifts. The introduction of a new accounting framework in 2023 appears to have positively impacted financial indicators across several institutions, notably the Agricultural University of Athens and the University of Crete, by improving the transparency and reliability of their financial reporting.

The findings from the analysis of the Greek higher education system reveal trends and challenges that closely mirror those identified in international studies. For example, Saiti, Abbott, and Middlewood (2018) highlight the importance of strengthening university governance, a factor directly linked to financial variability and differences in managerial efficiency, as also seen in the Greek context. Similarly, Giovanis and Chasiotou (2024) confirm that organizational structure and financial decision-making processes are critical to the overall performance of universities, a conclusion supported by the Greek data. In addition, the technical efficiency analysis by Cossani et al. (2022) on Chilean universities offers a valuable evaluation tool that could be adapted for use in Greece. The use of financial diagnostic tools like the Z'' Score in this study parallels the application of the DEA method in Chile and supports efforts to promote transparency and strategic financial planning. Overall, the findings of this research align with international practices and underline the importance of systematic accounting assessment for improving the performance of higher education institutions.

5.2. Assessing the Impact of PD 54/2018 on the Mean Altman Z'' Score Change Among 10 Universities

The results of the analysis highlight the Agricultural University of Athens (4.689 before, 7.147 after, $p = 0.024$) and the University of Crete (6.625 before, 11.708 after, $p = 0.006$) as the only institutions that demonstrated a statistically significant improvement in their Altman Z'' Score following the implementation of Presidential Decree 54/2018. This positive change is not only numerically impressive but also statistically documented, indicating a substantial strengthening of the financial stability of the two institutions. Both universities appear to have possessed, from the outset, the organizational and administrative capacities necessary to effectively integrate the new accounting framework, transforming it into a tool for enhancing efficiency and transparency. The statistical significance of this improvement further reinforces the reliability of this observation, positioning these two institutions as examples of successful adaptation and potential models of financial management within the university sector.

The analysis of the Greek higher education system reveals trends and challenges that closely reflect patterns identified in international research. Saiti, Abbott, and Middlewood (2018), for instance, emphasize the need to strengthen university governance, a factor strongly tied to financial variability and differences in managerial efficiency — patterns that are also evident in the Greek context. In the same vein, Giovanis and Chasiotou (2024) highlight the critical role of organizational structure and financial decision-making in shaping university

performance, a conclusion supported by the Greek data. Meanwhile, Cossani et al. (2022) offer a technical efficiency analysis of Chilean universities that provides a useful model for adaptation in Greece. The use of financial diagnostic tools such as the Z'' Score in this study mirrors the application of the DEA method in Chile and supports broader efforts to promote transparency and strategic financial planning. Taken together, the findings of this research align with international practices and reinforce the importance of systematic accounting assessments in enhancing the performance of higher education institutions.

The variation in results suggests that the successful implementation of International Public Sector Accounting Standards (IPSAS) relies not just on legal enforcement, but also on how well public organizations are able to adopt and integrate these standards into their everyday operations. Filos and Gkouma (2022) point out that, in Greece, the ability of public sector bodies to adapt and invest in staff training plays a critical role in achieving greater transparency and stronger financial management. In a similar vein, Bekiaris, Paraponti, and Spanou (2024) argue that the acceptance of accrual accounting is shaped by organizational factors, employee attitudes, and perceptions of the reform's value, highlighting the complex challenges involved in introducing new accounting practices in the public sector.

Regularly tracking indicators like the Altman Z''-Score can be a powerful tool for setting goals and evaluating progress, especially for universities stuck in the "gray zone" or showing signs of decline. This approach helps spot and address the causes of poor performance early. As Destriwanti, Sintha, Bertuah, and Munandar (2022) note, using the modified Altman Z-Score model together with an analysis of corporate governance and financial performance can offer reliable warnings of financial trouble, supporting better strategic decisions to ensure an organization's long-term sustainability.

5.3. Mean Difference in the Altman Z" Score of the 10 Universities Before and After PD 54/2018

The introduction of Presidential Decree 54/2018, which brought a new accounting framework for Higher Education Institutions, does not seem to have had an immediate or widespread effect on their financial stability, as measured by the Altman Z'' Score. Among the ten universities assessed, only two — the Agricultural University of Athens (4.688 before, 7.147 after, $p = 0.042$) and the University of Crete (6.624 before, 11.708 after, $p = 0.040$) showed a statistically significant improvement, pointing to stronger management practices and successful adaptation to the new framework.

Meanwhile, the other eight universities experienced some positive changes and some negative changes, but none were statistically significant ($p > 0.05$). For example, the University of Ioannina (1.480 before, 2.726 after, $p = 0.363$), Athens University of Economics and Business (5.475 before, 7.397 after, $p = 0.257$), University of Thessaly (0.8081 before, 4.578 after, $p = 0.509$), University of Patras (8.331 before, 7.038 after, $p = 0.616$), University of Macedonia (6.259 before, 6.187 after, $p = 0.979$), University of the Aegean (3.552 before, 2.091 after, $p = 0.242$), Democritus University of Thrace (1.640 before, 1.480 after, $p = 0.813$), and Aristotle University of Thessaloniki (1.775

before, 2.018 after, p = 0.865) all showed shifts that, while sometimes notable in size, were not statistically meaningful. As a result, it is difficult to draw firm conclusions about the immediate success of the reform.

These findings do not undermine the value of the new accounting framework. Instead, they underscore the need for more time and a more nuanced approach to fully evaluate financial developments within higher education institutions. The full effects of the reform will likely become more visible in the years ahead, as the new system is applied more consistently and embedded more deeply within the organizational structures of universities. Spyridon and Karastogiannis (2023) observe that the shift to accrual accounting in the Greek public sector represents a complex modernization effort that takes time to deliver measurable results. In the same way, Tsianaka and Stavropoulos (2023), in their comparison of Greece to other European countries, argue that the successful adoption of International Public Sector Accounting Standards depends not just on institutional reforms, but also on fostering a culture of transparency and accountability. Rodosthenous, Roumeliotis, and Charamis (2024) add that achieving accuracy and reliability in accounting systems is essential, not only for assessing performance but also for designing effective compensation and funding strategies. Overall, the findings reaffirm that internal administrative capacity, management continuity, and strategic flexibility are critical for successfully turning institutional reforms into meaningful improvements, beyond merely passing new laws.

6. Conclusions

Analyzing the Altman Z'' Score for ten Greek higher education institutions (HEIs) from 2017 to 2023 provides a deeper look into the resilience and effectiveness of their financial management. The findings highlight clear differences between universities, shaped both by their internal capacity to adapt and by the rollout of the new accounting system under PD 54/2018. Institutions like the University of Crete and the Agricultural University of Athens recorded statistically significant improvements in financial health, underscoring the vital role of strong internal management in successfully applying the new standards. Their progress illustrates how leadership and strategic planning can make a real difference in maximizing the benefits of reforms aimed at improving transparency, accountability, and financial strategy. Yet, the overall impact of the reform was uneven. Eight universities did not show significant improvement, and some, such as the Democritus University of Thrace and the Aristotle University of Thessaloniki, remained in the so-called "grey zone." These outcomes make it clear that changing accounting rules alone is not enough; meaningful progress also relies heavily on strengthening a university's internal systems and administrative capacities.

Comparative insights from international research highlight the critical role of strong governance, organizational adaptability, and the thoughtful use of financial assessment tools like the Altman Z'' Score in supporting university stability. By regularly monitoring these indicators, institutions can identify financial challenges early and take proactive steps to strengthen their long-term sustainability. The findings also emphasize the need to foster a culture of

transparency, accountability, and strategic planning within Greek higher education. Transitioning to accrual-based accounting standards like IPSAS is not merely a technical or legal adjustment; it represents a profound organizational change that requires real internal transformation. Looking forward, future research should prioritize long-term studies to better capture how financial and management practices evolve within the higher education sector over time.

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Appendix 1. Table of Test of Normality

Tests of Normality

Universities	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Agricultural University of Athens	,158	7	,200	,941	7	,645
University of Ioannina	,170	7	,200	,929	7	,538
Athens University of Economics and Business	,166	7	,200	,946	7	,690
University of Thessaly	,150	7	,200	,950	7	,734
Democritus University of Thrace	,153	7	,200	,941	7	,645
Aristotle University of Thessaloniki	,144	7	,200	,970	7	,895
University of Patras	,236	7	,200	,924	7	,499
University of Macedonia	,141	7	,200	,952	7	,746
University of the Aegean	,221	7	,200	,933	7	,579
University of Crete	,192	7	,200	,956	7	,784

a. Lilliefors Significance Correction

Appedix 2. Barchart - Altman Z'' Score of the 10 Universities Before and After PD 54/2018