Conference Paper

International Accounting Standards, Budgeting and Controlling in Private and Public Sector

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Abstract

The purpose of this article is to present the ability of convergence in budgeting and control mechanisms between Private and Public Sectors, based on the standardization of financial events in accordance with International Accounting Standards (IAS). The necessity arises from the trend –expressed as New Public Management (NPM) theory – of adopting in Public Sector entities, management procedures that are followed in the Private Sector. The research concludes that the common structure of financial statements under IAS/IFRS and IPSAS allows the convergence of budgeting and control mechanisms between Public and Private Sectors. In the herein presented article, the budgeting and controlling models applied in the Private Sector entities have been applied in the Public Sector organizations considering the different directions of the mechanisms that generate these models. The research enhances the accountability and decision-making in the Public Sector, while contributing to further discussions about the effectiveness of the application of Private-sector techniques in Public entities.

Keywords: Audit; Accounting, IAS/IFRS/IPSAS, Financial Control

JEL Classification Codes: M42; M41; G17

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1. Introduction

The application of an increasing number of private sector principles to public entities, a theory that is embedded in the concept of New Public Management, is based on the need to harmonize public sector in modern methodologies and practices that are applied to Private, although the purpose and the direction of resource management in these sectors remain different. The need to measure the efficiency and effectiveness

in Public Sector by using relevant indicators (KPIs), is part of the enhanced accountability of decision makers within public sector. The establishment of International Accounting Standards (IAS) and International Financial Reporting Standards (IFRS) in Private Sector has been the basis for the establishment of corresponding Standards in Public Entities (IPSAS).

Budget and decision-making in public sector are regulatory in legal commitments and its implementation is enshrined institutionally. In contrast, in private sector, budgeting and control is a function of managerial accounting which is conducted without specific and institutionally regulated standards. Public accounting, incorporating functions of Managerial and Financial Accounting, is legally determined, while measuring of effectiveness and efficiency in resource management and the consequent use of decision-making indicators, is in an early stage. In addition, within public sector, relevant institutions are not accountable for failing to achieve specific and measurable objectives, bearing in mind that citizen's equity which is affected from financial results, does not have a specific shareholder belonging to community. According to this issue and considering that the criteria of dealing with accounting events and transactions are gradually converging between private and public sector, such as their measurement, recognition, presentation and disclosure, the corresponding convergence of the budgetary mechanisms and their control still differ. In other words, while in the financial accounting context, the introduction of IPSAS is an act of convergence between the public and the private sector, the budget and control mechanisms continue to diverge. In this point arises the necessity of this research (Figure 1). IPSASs aim to improve the quality of financial statements that are prepared by public sector entities, by providing information about the allocation of government resources to society. At the same time, they ensure transparency and accountability for the management of public finances. Governments, by implementing IPSAS, ensure the quality and comparability of the financial information.

2. Literature Review

The connection between efficiency and administration, in public sector operational procedures, first appeared in 1970. Until then, efficiency was only in connection with private sector (Radnor and McGuire, 2004) [1]. New Public Management (NPM) is based on two doctrines: the narrowing of differences between private and public sector and the change in the way which public agencies operate, specifically from the commitment to the rules towards their orientation on results (Hood, 1995) [2].

The focus of NPM trend was the adoption by the public sector of critical aspects like how Private Sector is organized and managed (Dawson and Dargie, 2002) [3]. According to Christiaens, J., Reyniers, B., & Rollé, C. (2010) [4], a clear connection is made between IPSAS implementation and NPM principles. Moreover, according to Bellanca, S., Cultrera, L., & Vermeylen, G. (2015) [5], the implementation of European Directive 2011/85/EU is part of the NPM trend. Managerial accounting and budgeting in public sector should be business orientated so that public administration to be relied on specific goals and results (Veggeland, 2015) [6].

The rules of Public Accounting are under constant review and the reporting process has become an important point in the direction of fiscal recovery (Naughton & Spamann, 2015) [7]. In addition, Public Accounting raises an international interest in issues such as Fiscal Policy, Budget Reports, European and International Public-Sector Accounting Standards (IPSAS), Harmonization of Public Accounting, Government Accounting and National Accounts (Rossi et al., 2015) [8]. Adaptations from cash-based accounting to accrual-based accounting are of primary importance with respect to the final deficit or surplus while at the same time, questions have raised regarding the reliability of the reported deficits or surpluses (Jesus & Jorge, 2015) [9]. On the other hand, there are arguments that EPSAS promotion which are based on IPSAS standards, may lead to a misunderstanding of public sector's accounting importance and to highlight it as a neutral technical tool, ignoring its strong influence on the economic, social and political life of the Communities (Mussari, 2014) [10]. Since accrual based financial statements also present cash flow statements, cash and accruals basis should be treated as complementary and not as competing methods (Marti, 2006) [11]. The Member States of the European Union are in the direction of using modern accounting methods based on the accrual basis close to IPSAS (Bellanca & Vandernoot, 2014) [12]. Public consolidated financial statements should be drawn up according to different approaches, especially the "audit approach" or "budget perspective" which the audit has a key role (Bisogno et al., 2015) [13].

The dissemination of accrual-based accounting is partly based on local governments (Pina et al., 2009) [14] and the compilation of consolidated financial statements (CFS) has become quite complicated (Grossi & Soverchia, 2011) [15], pointing out the need for consecutive improvement, such as the establishment of supplementary international standards for budgets (Grandis & Mattei, 2014) [16]. In addition, the importance of local authorities to overcome the problems created by the economic crisis has been highlighted, making the financial performance of municipalities an important factor in this direction (Askounis et al., 2016) [17]. Finally, the efficiency measurement of the

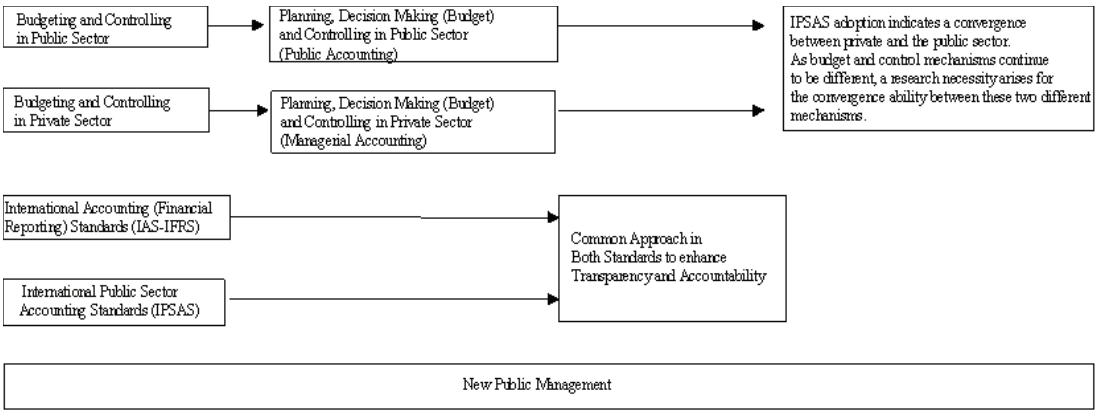

Figure 1

operation in Greek municipalities has been a research point in the last period, with the export of models based on the financial statements of the municipalities (Doumpos, Cohen, 2014) [18].

The use of Private Sector models for predicting financial distress (Altman, 2000) [19] has been a research point for assessing the financial health of municipalities (Fischer et al, 2015) [20]. Groves et al. (1981) [21] and Nollenberger (2003) [22] integrate the financial situation of a local government in its capacity to finance service provision on a continuous basis, distinguishing the cash solvency, the financial solvency, the long-term solvency and the solvency at service level (Ritonga et al., 2012) [23]. According to Kloha et al. (2005) [24], the financial situation is dealt with distress and the ability to carry out activities, debt servicing and meeting the needs of society on a long-term basis. Berne & Schramm (1986) [25] link financial situation of a local government to the possibility of fulfilling their financial obligations to their creditors (Ritonga et al, 2012) [23]. Rivenbark & Roenigk (2011) [26] define the financial position of local government as its ability to meet short-term liabilities, services and capital requirements as they result from their financial statements. In addition to the method which is developed in this research, the Browns Ten Point Test (Brown,1993,1996) [27, 28], the measurement of the financial condition in local governments, has been researched by scientists and institutes-organizations.

According to the Canadian Institute of Certified Accountants (CICA, 1997) [29], the financial condition of a local government is the same as the financial health which is measured on sustainability, vulnerability and flexibility within a comprehensive framework that governs the economic and financial environment. Wang et al. (2007) [30] defines the financial position of the local government which is separated from its financial performance. Furthermore, Jones & Walker (2007) [31] present the financial distress as the lack of ability to preserve the same level and the nature of services

which are provided to citizens. Hendrick (2004) [32] links the economic situation of local government to the ability of a local government to meet its financial obligations and community services.

3. Data

To approach the research question, the methodology is developed on six levels (Figure 2). The data of this research is used at a) the level of feasibility, b) the mechanical co-operation of public and private sector accounting, c) the technical proposal from private sector, d) the implementation of this technical proposal in a public sector entity, e) the comparison between public and private sector methods of measuring financial condition (Brown's ten point test and Altman's z score) and f) the level of sensitivity analysis to variables of budgetary procedure during by the application of AFN models within Public Sector. At the level of the feasibility (a) i.e. whether there are indications that budgetary and control process becomes improved by the conversion of accrued financial data into cash flow statements, the data is derived from the financial report of the Greek State for the period 1958-2008. The report was obtained from Hellenic Statistical Authority in the field of special public finance publications. Data refer to cash transactions of the state and the amounts have been converted into euro based on the exchange rate of 340,75 drachmas. Moreover, the amounts have been weighted by the effect of inflation and have been used as accounting information as such. To obtain a general overview of cash transactions, each item of revenue, finance or expense was classified as an independent variable (Liapis& Spanos, 2015) [33].

At the level of mechanical co-operation between Public and Private Accounting (b), the data results from the financial statements of Panteion University (Balance Sheet and Profit Loss/Account) and the reporting statements of the executed budget for the years 2014,2015. Every element constituting an accounting event is a variable (stock or flow), the changes of which result in the execution of the budget, the financial results and the subsequent change of the financial structure. The system for managing both revenue and budget costs requires simultaneous accounting movements in both public and private accounting terms. There may be cash transactions in the public entity with financial impact but without Fiscal Basis, such as uncleared disbursements or cash inflows that are not certified yet. These cash movements are data in the context of constructing the cooperative model. The data for the private sector (c) model is indicative and a typical Additional Fund Needed model is presented by using simulation techniques. The data concerning the implementation of the technical proposal (d)

derives from the financial statements of the Municipality of Marathon (Greece) for the years 2013 and 2014.

Regarding the comparison between Brown's ten point for Public Sector and Altman's z score for Private Sector (e), the data used in the research is officially provided from the Ministry of the Interior for all Greek municipalities and concern the year 2014. Data is related to budget execution information and to elements of the balance sheet for the Municipalities of the whole territory. The system of codifying revenue and expenditure elements for budgets-reports of the municipalities in Greece, is part of the budget classification system that Municipalities are obliged to inform and submit to the Ministry of the Interior. Finally, at the latest level of the research approach (f), data derives from official Property Tax Statistics announcement (2016) of the General Secretariat for Public Revenues of the Ministry of Finance. In addition, GDP for the year 2015 was calculated based on the data posted to Eurostat and from Hellenic Statistical Authority was used data for urbanization grade.

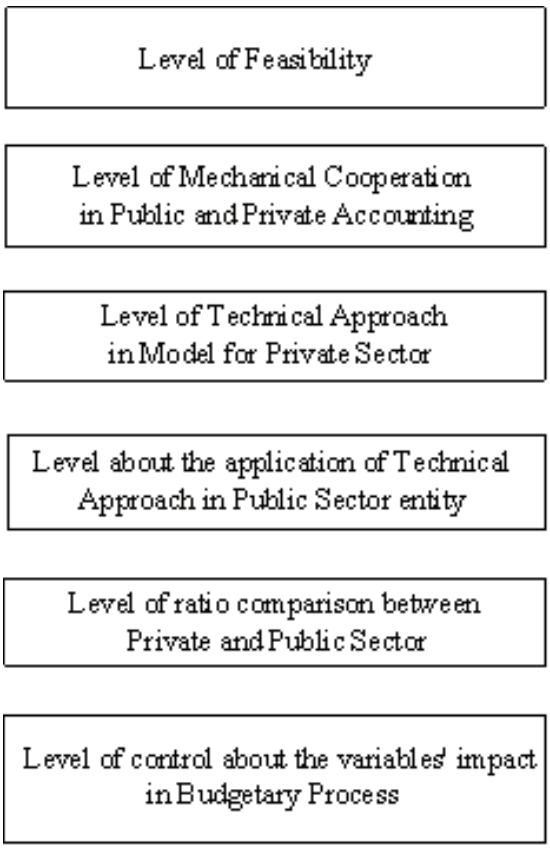

Figure 2: The six levels of the research approach.

4. Methodology

Initially, the feasibility of the research process is checked through the ability of functional and effective conversion of the financial public accounting elements into cash flow statements, fact that carried out in the case that the central government of Greece for 51 years. Each component of the public financial data belongs to one of the three categories of cash flows, flows from operating, investing and financing activities. Furthermore, the mechanism of accounting co-operation in the case of Panteion University is researched for the capability of presenting a common integrated management system for financial events while meeting Public and Private Accounting requirements. Cash flow statements which are presented at IAS/IFRS and IPSAS, are the basis for an effective parallel control of the two systems, indicating in the financial statements under International Accounting Standards the possibility of integrating public accounting procedures. The combination of the two systems in the cash flow statement leads to the need to present a modern model for the conversion of the financial statements of private entities into a budget and control tool based on the AFN methodology, which is the level of the technical proposal. This model is open to stochastic methods and operational research techniques, is a modern proposal for public-sector entities. The application is effectively carried out in a case study of an indicative public-sector entity (Marathon Municipality). Taking into consideration the fact that the budget control is carried out by means of appropriate indexes, the financial condition of municipalities on the basis of already existing models for municipalities (Brown's ten-point test) is contrasted to financial health by using Altman's z score in the case of all the municipalities of the country, especially in the liquidity ratio of this technique. For the implementation of Brown's ten-point test method in the case of all Greek Municipalities, it was necessary to be separated into four sub-categories of the population range according to the latest population census. These include municipalities of up to 10,000 (81), municipalities of 10,000 to 20,000 (83), municipalities of 20,000 to 40,000 (78) and municipalities of 40,000 or more (83). A necessary step in assessing the financial condition is to calculate the 10 key financial ratios according to the figures of budgets, reports and balance sheets. These data had to be converted according to the criteria of the operational, investment, financing and subsidized activities and adapted to the existing data for the municipalities of Greece.

The introduction of AFN model as the appropriate pro-forma financial statement technique into Public Sector entities, requires the research of parameters that affect the variables of its mechanism. In this respect, from the revenue side and at region

level, the income from Property Tax is corelated with a) GDP of the regions and b) the degree of urbanization. The multiple regression method extracts the relation that links the amount received from each region with these independent variables. Figure 3 below presents the budgetary and accounting mechanisms for Public and Private Sector and their convergence into budget and control models based on the structure of the financial statements, considering the IAS/IFRS and IPSAS provisions.

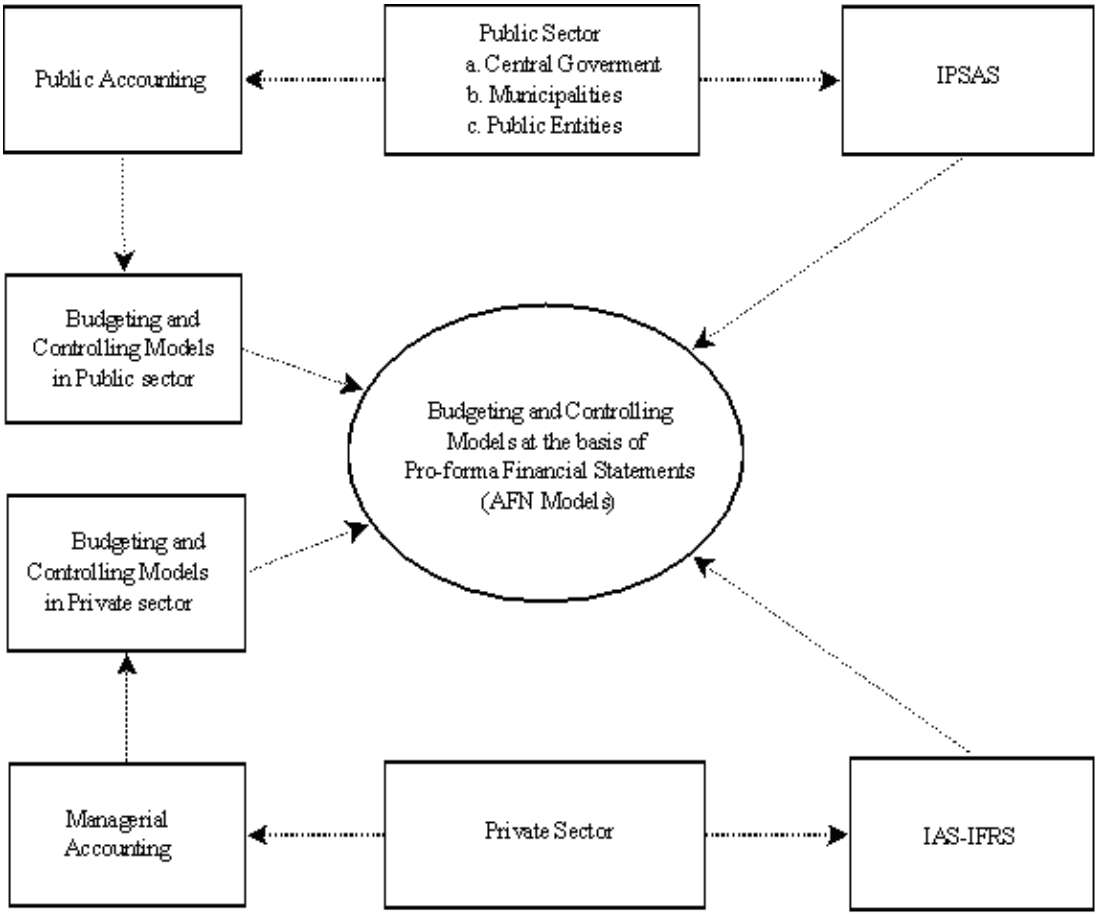

Figure 3: Research approach for public and private sector financial mechanisms.

The convergence between IPSAS and IAS/IFRS is calculated from the harmonization trend of IPSAS to existing IAS/IFRS. To calculate the convergence trend, the following methodology is used: (a) International Accounting Standards for Public and Private sector (irrespective the existence of the relevant IAS/IFRS) are divided into pairs (total 41 pairs) (b) it is taken into consideration the years of IPSAS implementation, beginning from 2001, the starting year for the implementation of IPSAS 2 and 5 (c) the available information on the years of implementation for both the public and the private sector, that is, until 2019 which is the first year of application of IPSAS 40 (d) taken the IAS/IFRS information for the years 2001 to 2019 with appropriate adjustments for the

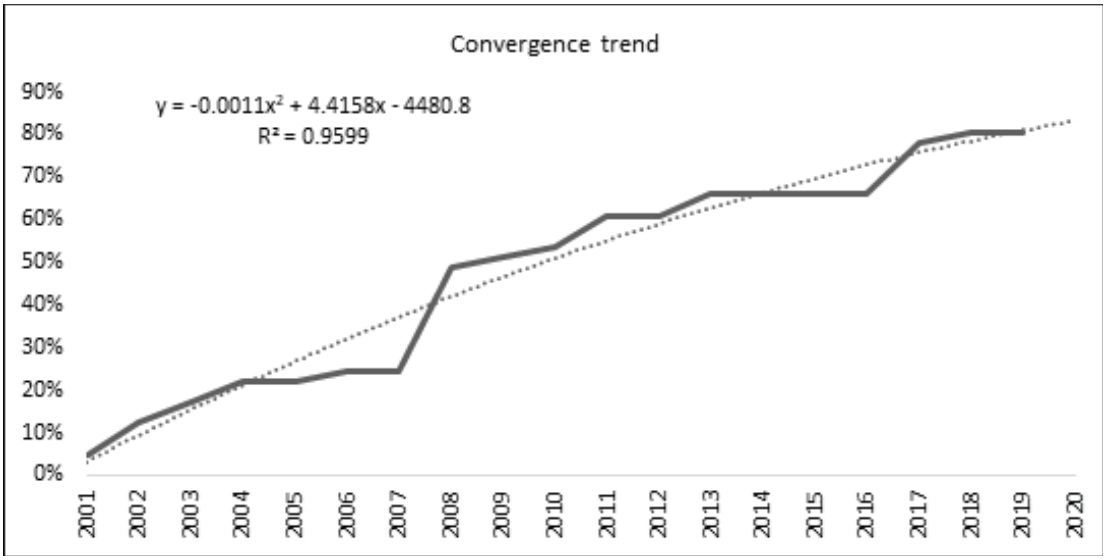

Figure 4: Convergence trend between IPSAS and IAS/IFRS.

abolished (e) the reference value is obtained for each year where is in parallel the implementation of same field international accounting standards for both public and private sector. Zero value (0) is taken for years in which there is no common implementation of the pairs of standards, the opposite is the value (1). Figure 4 below shows the trend of the convergence rate (index) over time between international public and private accounting standards. The diagrammatic presentation shows the increase of the convergence index between the standards, which becomes in maturity in the years 2018, 2019 where the highest convergence of the rate occurs. Correspondingly, the lowest convergence rate is in 2001. The trend analysis shows that after about 20 years of IPSAS implementation, the convergence matures in 2019. Because of the exponential function, there is a saturation point between 80- 85 percent of the convergence, stating that 15 percent-20 percent are the systemic differences between private and public accounting, that is, the profit motivation or the lack of a rigorous budgetary procedure in private sector entities.

Table 1: Convergence Index (Descriptive Statistics).

Convergence Index (Descriptive Statistics)	
Mean	0.476
Standard Error	0.057
Median	0.537
Mode	0.659
Standard Deviation	0.250
Variance	0.062
Kurtosis	-1.396
Skewness	-0.325
Range	0.756
Minimum	0.049
Maximum	0.805
Sum	9.049
Count	19
Confidence Level (95%)	0.120

5. Estimations-Results

5.1. Level 1 of research approach, Greek government case study

At the first level of the research approach, consideration is given to the feasibility of investigating the question, whether the central government's accounts are effectively correlated after appropriate conversion into cash flow statements. This conversion clarifies the effective decrease or the effective increase of the government dept in cash terms or Results from Financing Activities (RFFA). Also, the effective operational management (RFOA) is measured as Results from Operational Activities as well as Results from Investing Activities (RFIA), which enhances accountability and decision-making with simultaneous use of modern analytical methods. Considering the dependent variable as the net cash flows for financing activities (RFFA) and direct taxes (DT), indirect taxes (IT) and outflows for operating activities (OFOA) as independent variables, it is noted that the increase in tax revenues and reduction in operating costs, respectively, reduces net cash flows for financing activities. RFFA is the difference between inputs and outflows for financing activities and assuming that government liabilities for financial outflows are predetermined, lower RFFAs mean less financial inflows.

$$\text{The resulting equation is: } RFFA = -1.24 \times DT - 0.74 \times IT + 0.96 \times OFOA \quad (1)$$

Assuming as the dependent variable the inflows from financing activities or in other words the long-term financial gap of the state and as independent variables the net cash flows from operating and investing activities, we observe that each year's financial gap increases with the results of the net cash flows of both operating and investment activities of the previous year.

$$\text{The resulting equation is: IFFA} = 0.24 \times \text{RFOA (-1)} + 0.45 \times \text{RFIA (-1)} \quad (2)$$

For audit purposes in cash based public financial systems, performance could be used to identify a "break-even" point over which cash management performance is sustainable. The ideal financial environment could be determined according to the following relationships:

$$\text{RFOA} + \text{RFIA} - \text{RFFA} > 0 \quad (3)$$

$$(\text{B/E: RFOA} + \text{RFIA-RFFA} = 0) \quad (4)$$

$$\text{RFOA} + \text{RFIA-IFFA} + \text{OFFA} > 0 \quad (5)$$

$$\text{or RFAA} + \text{RFIA} + \text{OFFA} > \text{IFFA} \quad (6)$$

It is mentioned that analytical results for this case study are presented to previous research K. Liapis& P. Spanos, 2015 [33].

5.2. Level 2 of research approach, Panteion University case study

At the second level of the research approach, the mechanics of the co-operation of Public and Private Accounting in the case of the Panteion University are examined. Each element of budget execution is a flow variable and in parallel, each balance sheet element is a stock variable. Also, budget execution is related to cash results of the financial year taking into consideration that non-cash expenses such as depreciation are not a reference point for the Public Accounting System in Greece. The importance of this case study is that incorporates cash-based budgeting system and accrual based financial system in the same entity. The cooperation table is derived from economic events as shown below (Figure 5).

The following Figure 7 presents the mechanism of the parallel operation of Public and Private Accounting, which forms the corresponding cash result. It summarizes the way in which cash change is resulted of the financial year through the management of

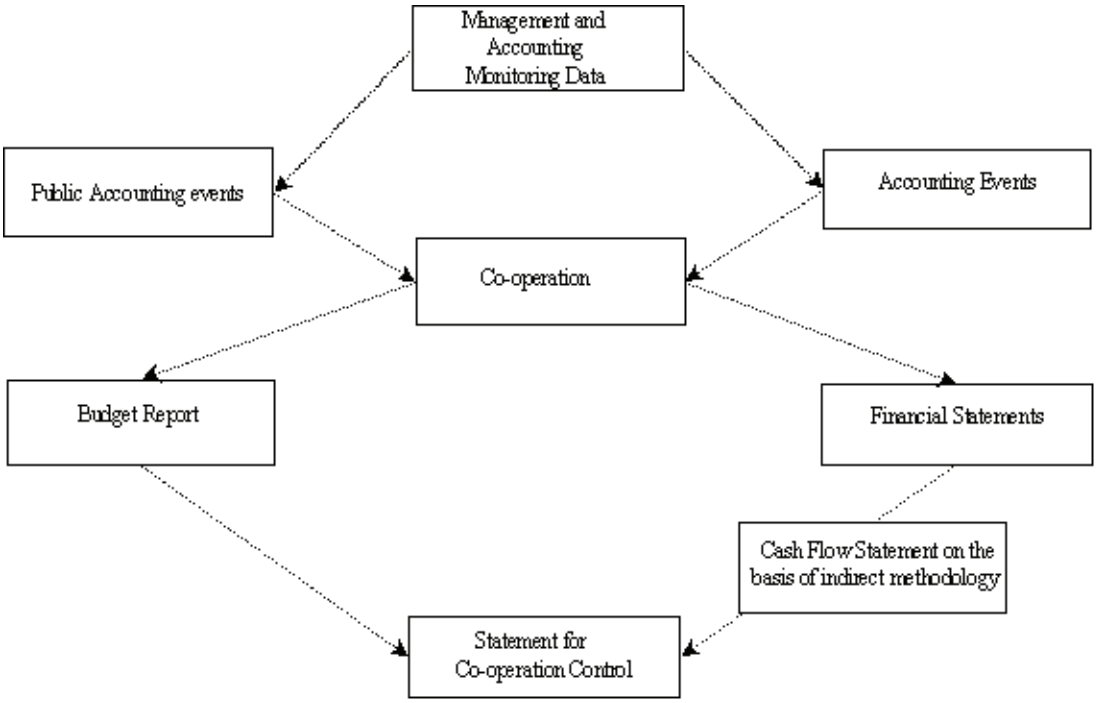

Figure 5: Mechanism of Public and Private Accounting Co-operation.

resources. It is mentioned that cash account after fiscal process coincides and agrees with the cash change from the indirect method of the cash flow statement. The statement for co-operation control integrates the parallel operation of the two systems into a single model, highlighting the ability of simultaneous control of internal processes. In addition, the substance of financial information is concentrated on a cash basis while serving the different purpose of the systems. Finally, the following Figure 6 shows the way that financial facts are recorded to cash based public accounting statements and accrual based financial statements in their time dimension. There are financial facts that affect balance sheet accounts but are not included to cash-based budget report. This is because they are not yet completely incorporated to current budgetary process but on the other hand, affect next year's budget.

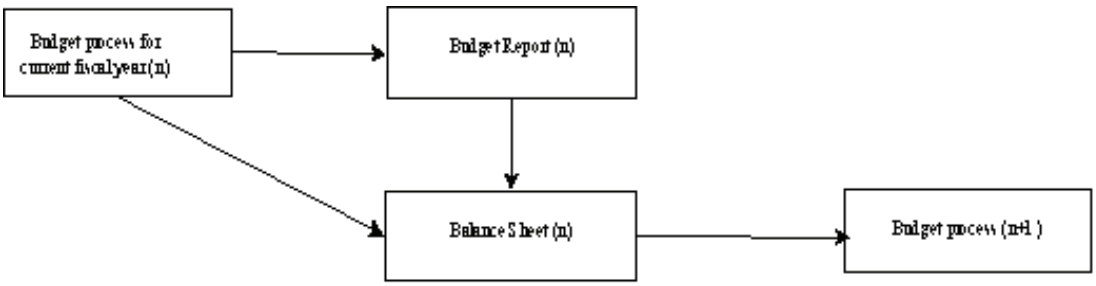

Figure 6: Financial facts in public entity with cash and accrual-based systems.

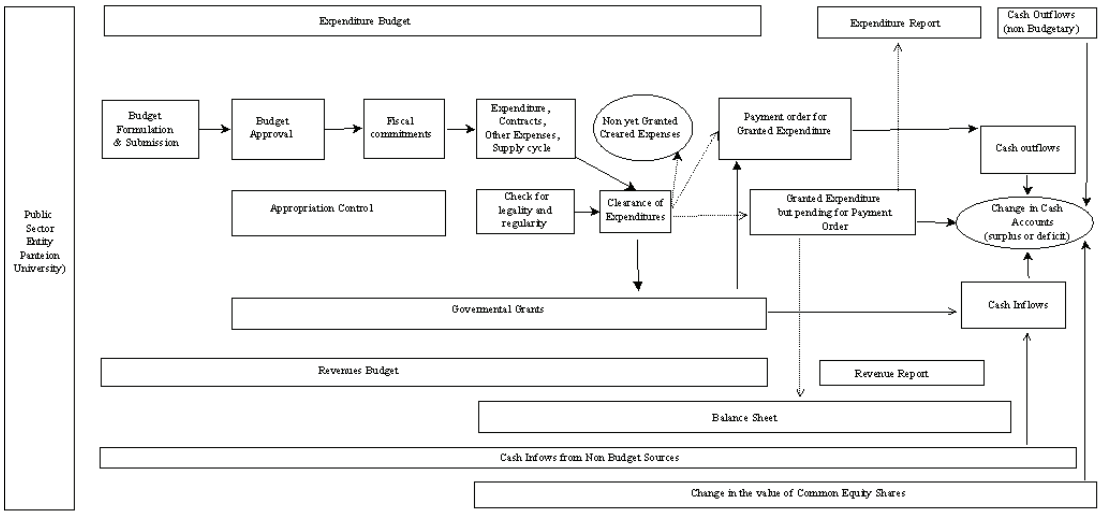

Figure 7: Model of cash change in the context of co-operation between Public and Private Accounting Process (Panteion University Case Study).

5.3. Level 3 of research approach, private sector case study

Most companies predict or budget their capital requirements by constructing pro forma financial statements, that is, statements of a future financial year and a corresponding balance sheet. However, if the financial ratios are expected to remain stable, the budget of the additional required funds may be derived from the AFN equation (Brigham, E.F. and Daves P.R., 2007) [34]. If the growth rate of revenue for the entity is estimated, the pro forma or projected financial statements are prepared. For this purpose, the percentage of revenue method is used. This method expresses the financial statements as a percentage of revenue. In order to support the future volume of revenue in year t + 1, the revenue (or sales) method requires the addition of funds that should support business planning. In other words, the additional capital required (ADDITIONAL FUND NEEDED/AFN (t + 1)) will be the amount of short-term liabilities that will support the forthcoming revenue volume and in a simple indicative case study, should be calculated from the following equation:

$$\begin{aligned} AFN = TA\,(t+1) - APAY\,(t+1) - AL\,(t+1) - NP\,(t) \\ - LTB\,(t+1) - PS\,(t+1) - CS\,(t+1) - REAR\,(t+1) \end{aligned} \tag{7}$$

(TA) Total Assets, (APAY) Accounts Payable, (AL) Accrued Liabilities, (NP) Notes Payable, (LTB) Long Term Bonds, (PS) Preferred Stock, (CS) Common Stock, (REAR) Retained earnings.

Decision-making process in this basis is enhanced by using stochastic process with Monte Carlo simulation. By changing revenue in a range, the additional funds required

will be estimated too. In business economics, econometric models are not usually used because administrative decisions focus mainly on the short term. The historical period could easily consist of data from many years or from various companies in the same industry. Corporate Financial Modeling based on the AFN technique includes historical data that is transmitted through stable ratios over the reporting period. Such models, which are characterized by clarity and scientific documentation, describe the impact on the business process and the formation of the financial position of each entity. While the model is demand-side oriented, it could be adapted to different cost conditions through specific categories of income ratios which could be used. It configures and adopts a control process that can be done in alternative scenarios as a sensitivity analysis tool for each functional factor under certainty or uncertainty. Finally, this model can serve as a basis for policy making by assessing base, adverse and best business scenarios. It is mentioned that analytical results for this case study are presented to previous research, P. Spanos, C. Galanos and K. Liapis, *Corporate Financial Modelling Using Quantitative Methods.*

5.4. Level 4 of research approach, public sector entity case study

As the case study of the application AFN model to a public-sector entity, the Municipality of Marathon, Greece was selected on actual figures for the financial statements at years 2013 and 2014. The question is whether, within four years is effective to develop s programming tool which aims at these points:

i) Assess the current financial position from deterministic approach and the corresponding projection of the results and the change of financial ratios over the next four years

ii) After assessing the current situation, finding the appropriate mix of revenue policy and cost management of operational activities under consideration of the financial environment on the part of the central government, aiming at changing the financial structure of the municipality by keeping stable the leverage. In this case, the possibility of changing the financial structure of the municipality assumes of minimum additional fund needed for the whole programming period

iii) Dynamic presentation of the key ratios of Altman's score

iv) The search for the required adjustments to primary data (ratios or percentages of effect) of the model with the corresponding confidence intervals.

Applying the AFN model allows scenarios to be developed for decision-making under specific constraints. The objective of the scenario is to find the appropriate policy mix according to the critical values of the data based on zero-additional capital and the possibility of increasing the extraordinary revenue to achieve at least a balance of the results (in the best scenario the surplus for the Municipality).

Scenario Purpose: The assessment of the extent to which the municipality's policy mix within the limits of its authorized credit lines is required to be boosted by extraordinary revenue and whether the current financial situation will improve in the programming period according to its existing capabilities.

Variables to be adapted: The accounts that will integrate the financial policy with the corresponding confidence intervals are as follows:

- Cost of services determined in confidence interval from historical accounting data (0.957 to 1.063)
- Administrative expenses that are determined in confidence interval from historical accounting data (0.231 to 0.256)
- Extraordinary revenue determined in confidence interval from historic accounting data (0.136 to 0.446). The minimum is for 2014 and the upper limit is the average of two years 2013-2014.
- Receivables from the sale of goods and services identified in a confidence interval in accordance with the municipal credit policy (0.567 to 0.630)
- Obligations to Suppliers according to credit policy by them or delayed repayments in confidence interval (0.221 to 0.246)
- Increased revenue growth (1 percent to 10 percent)
- Cost of debt in confidence (5.00 percent to 6.00 percent, average 5.5 percent borrowing rate)

Restrictions: The limitations that apply are concerned

- Balanced result or surplus
- Long-term borrowing should be in line with agreed funding lines over a confidence interval (€ 185,910.57 to € 3,185,460.56)
- The interest coverage ratio is more than 2.5 (Rating B1/B +) corresponding to an average interest rate of 5.5 percent.

Objective value: Policy with the minimum Additional Fund Needed (AFN = 0) and the possibility of increasing the rate of extraordinary revenues.

Results: The following results (Table 2) show that the policy mix of revenue growth (as a target), cost reduction and adjustment to credit policies for customers and from suppliers improves the financial ratios.

Table 2: Inputs for scenario.

INPUTS	RATE	MIN	MAX
Revenue target	7.50 %	0.010	0.100
Cost of goods and services	97.17%	0.957	1.063
Administrative expenses	23.08%	0.231	0.256
Borrowing Cost	5.36%	0.050	0.060
Receivables as a percentage of revenue	62.93%	0.567	0.630
Current Obligations to Suppliers as a percentage of the cost of goods services	23.26%	0.221	0.246
Extraordinary revenues	30.11%	0.136	0.446
Total FINAL AFN for support of Municipal Activity for four years	9,534.33		

By applying a operational research method and stochastic process (Monte Carlo simulation), the policy to be implemented includes: Increase in revenue (+ 7.5 percent), decrease in the cost of goods and services to 97.17 percent in terms of revenue, a reduction in administrative expenses to the minimum revenue ratio, no significant changes in the receivables and credit policy of suppliers are required, a significant increase in extraordinary revenue of 30.11 percent in total revenue. From the above it is noted the important role of the extraordinary revenues in improving financial ratios of the municipality, plus the cost constraint which is equally important. Table 3 below shows the outputs for the programming period 2015-2018 to the key factors influencing them according the scenario.

5.5. Level 5 of research approach, Greek municipalities case study

At this level, it is researched the connection between the actual amounts of the Brown's ten-point test ratios and the total score (TOTAL) that results as a score in each municipality by using regression analysis. In this analysis, it is taken as dependent variable the rating of each municipality and as independent variables the results of each point. Therefore, the relation that for the municipalities of the Greek territory is:

$$\text{Total Score} = 0,00001 \times P1 + 13,236 \times P2 - 15,999 \times P3 - 6,521 \times P4 + 1,379 \times P5 + 3,971 \times P6 + 0,052 \times P7 - 10,069 \times P8 + 0,003 \times P9 - 71,169 \times P10 \quad (8)$$

Table 3: Scenario results.

OUTPUTS	2013	2014	E2015	E2016	E2017	E2018
1. Liquidity						
Working Capital	102E+07	8,23E+06	9,19E+06	9,71E+06	1,03E+07	1,09E+07
Liquidity ratio	3.14	2.74	3.66	3.61	3.62	3.63
DSO	276	312	306	301	296	291
DPO	113	90	85	85	85	85
Working Capital/Total Assets AAssets	0.17	0.14	0.15	0.15	0.15	0.15
2. Profitability						
ROTA	0.14	-0.05	0.01	0.01	0.01	0.01
ROE	0.18	-0.06	0.01	0.01	0.01	0.01
ROS	0.75	-0.26	0.04	0.04	0.04	0.04
ROWC	0.85	-0.33	0.05	0.05	0.05	0.05
EBIT to Total Assets	0.14	-0.04	0.01	0.01	0.01	0.01
3. Solvency						
DTE	0.25	0.24	0.24	0.24	0.23	0.23
DR	0.20	0.19	0.19	0.19	0.18	0.18
Equity to total liabilities	3.97	4.09	4.17	4.25	4.33	4.40
Interest coverage ratio	36.73	N/A	2.58	2.67	2.76	2.86
4. Other ratios						
1. EBIT	8.79E+06	-2.47E+06	7.04E+05	7.43E+05	7.86E+05	8.31E+05
2. EBITDA	1.04E+07	-2.52E+06	1.46E+06	1.54E+06	1.63E+06	1.73E+06
3. PROFIT MARGIN	0.03	-0.06	0.03	0.03	0.03	0.03
4. TOTAL REVENUE	3,15E+07	1,94E+07	2,29E+07	2,42E+07	2,55E+07	2,70E+07
5. TOTAL EXPENSES	2,29E+07	2,21E+07	2,24E+07	2,37E+07	2,50E+07	2,65E+07
6. SURPLUS (DEFICIT)	8,63E+06	-2,68E+06	4,59E+05	4,95E+05	5,33E+05	5,74E+05

It is mentioned that analytical results for this case study are presented to previous research, C. Pallis, K. Liapis, P. Spanos (2018) [35]. The above model, which correlates the results of the 10 points with the total score as a dependent variable, concerns the year 2014. The above relationship is a useful tool for assessing the financial condition of Municipalities in Greece, taking into consideration the characteristics of each Municipality point in the total score. The current research point in this case study is the correlation between the financial condition under Brown's ten-point test and the Altman's z score assessment in its liquidity ratio for all municipalities in Greece. From the following regression analysis (Table 4), it appears that Altman's z score is gradually decreasing as financial condition under Browns ten-point test becomes in lower rating. By examining Altman's z score and Browns ten-point total score, a significant positive coefficient is resulted. The use of two stage contributes to find possible endogeneity

in the model by taking into consideration as instrument the Population of each municipality.

Table 4: Regression analysis for Altman's z score and Brown's Rating/Browns ten-point total score as independent variable.

Dependent Variable: ALTMAN_S_Z_SCORE				
Method: Least Squares				
Sample: 1 325				
Included observations: 323				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
BROWN_RATING="A"	0.855371	0.128552	6.653903	0.0000
BROWN_RATING="B"	0.633039	0.120249	5.264395	0.0000
BROWN_RATING="C"	0.499417	0.118906	4.200115	0.0000
BROWN_RATING="D"	-0.111505	0.150740	-0.739718	0.4600
BROWN_RATING="E"	-2.081877	0.325636	-6.393261	0.0000
R-squared	0.213875	Mean dependent var		0.418860
Adjusted R-squared	0.203987	S.D. dependent var		1.264338
S.E. of regression	1.128037	Akaike info criterion		3.094193
Sum squared resid	404.6444	Schwarz criterion		3.152671
Log likelihood	-494.7122	Hannan-Quinn criter.		3.117537
Durbin-Watson stat	1.944944			
Method: Two-Stage Least Squares				
Sample: 1 325				
Included observations: 323				
Instrument specification: POPULATION				
Constant added to instrument list				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOTAL	0.083907	0.012893	6.507847	0.0000
R-squared	0.133315	Mean dependent var		0.418860
Adjusted R-squared	0.133315	S.D. dependent var		1.264338
S.E. of regression	1.177047	Sum squared resid		446.1113
Durbin-Watson stat	1.928234	Second-Stage SSR		512.7252
J-statistic	1.153130	Instrument rank		2
Prob(J-statistic)	0.282895			

5.6. Level 6 of research approach, real estate taxation case study

This level examines the possibility of applying quantitative methods to research AFN model input variables when applied to a Public-Sector entity. A case study of a sensitivity analysis of tax revenue from real estate in relation to GDP and urbanization variable

in regional range. By reversing the variables as logarithms, the following results are obtained:

Table 5: Regression analysis for Property tax revenue and GDP - Urbanization of each region in Greece.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.993[a]	.986	.983	.123

a. Predictors: (Constant), LN_O, LN_GDP

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10.322	2	5.161	343.421	.000[b]
	Residual	.150	10	.015		
	Total	10.473	12			

a. Dependent Variable: LN_REVENUE b. Predictors: (Constant), LN_O, LN_GDP

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta			
1	(Constant)	-4.712	.937		-5.032	.001
	LN_GDP	1.102	.080	1.081	13.732	.000
	LN_O	-.413	.320	-.102	-1.292	.225

a. Dependent Variable: LN_REVENUE

From the above calculations the relation is:

$$LN\,(REVENUE) = -4.712 + 1.102 \times (LN)\,GDP - 0.058 \times LN\,(O) \quad (9)$$

Even though this survey is being carried out at the regional level in Greece, the results are consistent with literature review (J. Norregaard, 2013) [36] regarding the positive impact of per capita GDP on tax revenues from real estate property, in contrast with the degree of urbanization (the coefficient is not statistically significant). As a result, tax revenues from real estate in each region is highly corelated to Gross Domestic Product, which is an indicator that change in GDP could be used as input variable when applying AFN models in Public Sector Entities. The residual analysis allows us to calculate the tax disparity between regions based on the model that determines the total tax revenue from Real Estate Property in Greece (Table 6).

Table 6: Residual analysis for all Regions in Greece.

Region	Std. Residual	LN_REVENUE	Predicted Value	Residual	Difference
Eastern Macedonia and Thrace	0.315	18.58	18.54	0.039	0.21%
Central Macedonia	0.088	19.95	19.94	0.011	0.05%
Western Macedonia	-2.068	17.82	18.07	-0.254	-1.41%
Epirus	-0.132	18.02	18.04	-0.016	-0.09%
Thessaly	0.471	18.89	18.83	0.058	0.31%
Ionian Islands	0.974	18.02	17.90	0.119	0.66%
Western Greece	-0.573	18.71	18.78	-0.070	-0.38%
Central Greece	-1.418	18.54	18.71	-0.174	-0.93%
Peloponnese	-0.207	18.73	18.76	-0.025	-0.14%
Attica	0.273	21.16	21.13	0.033	0.16%
North Aegean	1.134	17.70	17.56	0.139	0.79%
South Aegean	0.449	18.49	18.43	0.055	0.30%
Crete	0.696	18.93	18.84	0.085	0.45%
Dependent Variable: LN_REVENUE					

6. Conclusions

The approach is developed at six sub-levels with references to Public Sector (Central Government), Private Sector (AFN) and hybrid types (Greek Municipalities, Panteion University), incorporating public and private accounting systems. The main conclusions which include findings in respect to research question in this synopsis of PhD thesis, are summarized as follows: (a) There is a convergence between the International Public and Private Accounting Standards/IFRS, which seems to become on maturity in 2019. (b) After about 20 years there is a saturation point between 80-85 percent of the convergence between International Public and Private Accounting Standards, stating that about 15 percent-20 percent is the percentage of the systemic differences between private and public-sector accounting. (c) Cash flow statement is appropriate basis to examine the relationship between surpluses (deficits) and net cash flows in public sector entities, as used respectively in private sector (IAS7). (d) The conversion of public sector accounts (cash basis of public accounting) into cash flow statements improves the budgeting and controlling process by enhancing transparency, reporting and accountability. It is also a useful basis for controlling correlations among accounts in public budgetary process resulting to the improvement of decision-making process. (e) In the case of Panteion University as Public-Sector Entity, a statement of balance of the co-operation of public and private accounting was developed, based on cash flow

statement which enhances transparency, reporting and accountability under IPSAS provisions.

(f) The structure of financial statements under IAS/IFRS and the subsequent applying of AFN model, is appropriate for the use of stochastic methodology (Monte Carlo Simulation) and operational research methods to assist the decision-making process. This technique can incorporate decision making problems for planning and restructuring purposes, in a base, adverse and best business scenarios. (g) Budget and control methodology which is applied to Private Sector Entity, based on the structure and content of the financial statements in accordance with International Accounting Standards, could be applied to public sector entities with some modifications. As a result, budget models based on the structure of the financial statements are the basis for the use of stochastic methodology and modern analytical methods in both private and public entities. (h) The implementation of ten-point test of the financial condition (Brown's ten-point test) is a useful indicator for the assessment of financial distress and bankruptcy possibility in Local Authorities (Municipalities). (i) Also, for Public Sector entities (Municipalities), there is a positive correlation between Brown's ten-point assessment of the financial condition and the financial health from the Altman's z score liquidity ratio. (j) Municipalities with lower rating from Brown's test and higher possibility to bankruptcy from Altman's z score, tend to reduce the difference of Reported Revenues minus Reported Expenditure.

(k) A key indicator of the comparatively optimal financial condition in the case of Municipalities, is the independence from external grands and the more unfavorable point of their financial condition is the inability to serve their short-term liabilities from the normal flow of annual revenues. (l) Finally, there is evidence that the change in GDP can be used as an input revenue estimator during the preparation of AFN budgetary procedure in public sector entities. Briefly, the research results from the need to examine the convergence of public and private sector budget and control systems, while recognizing the different direction of management resources for public and private sector respectively. It was found that the appropriate budgeting process is budgeting based on pro-forma financial statements. These models are flexible budgets and can be used in stochastic, operational research and mathematical programming methods.

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