

Drafting Multiannual Local Budgets by Economic-Mathematical Modelling of the Evolution of Revenues

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***Abstract.** Although seen as a sector with a high degree of inertia and conservatism the public administration system determines the public institutions to record a set of influences both from the internal and external environment. The public administration system is influenced by the frequent legislative changes and recently by the requirements claimed by the European Union. Given the complexity and dynamics of the competitive environment the approach of strategic management tools at the level of public administration becomes more and more important and necessary. One of the main types of exercise of strategic management is represented by financial planning moulded into policies, strategies, plans and programmes whose generation is based on multiannual budgets.*

Key words: economic-mathematical modelling; multiannual budgeting; regression; income sources for the local budget; determinants.

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JEL Codes: H71, H72.

REL Codes: 10C, 10E, 10G.

1. Strategic management and multiannual budgeting

The character of the public administration sector consists in a high level of structural and functional rigidity, as well as in a static and conservatory organisational culture, as compared to the private sector. The forecast management models used in the public administration are most often static and linear, which hampers the process of strategy generation and implementation process, especially if this implies also the reshaping of the management system of the public institution. Moreover, if we admit that public administration is a continuous balance between power and responsibility, then we have to highlight the fact that the Romanian public administration pitched for the power and took too easy the responsibility issue.

Practising strategic management in public institutions becomes more and more a necessity and a success factor that ensures management and economic performances to public administration authorities. Within the specific coordinates of strategic management the approach of the public institution as a complex system requires that both the long-term strategies and strategic options they set forward are not the result of a simple extrapolation of the present but also the consideration of the changes and factors that will influence the future. Basically, “strategic management is the art of controlling the destiny rather than accepting it as such” (Gelinier, 1986).

The strategic dimension of management is ensured by the existence of a strategic way of thinking and the organisational culture open to changes and performance in an

external competitive environment as main forms of applying the strategic management, the experience in the field shows:

1. *The management based on financial planning* whose objective is the identification of the “good practice” and new possibilities which allow the improvement of the budgeting processes at local level. To this end, generating annual and multiannual budget as well as their analysis in dynamics constitutes a practice that could ensure an efficient administration to the local community.

2. *Forecast management* assumes medium and long-term forecasts related to the interaction between the organisation and the external environment. In performing the forecasts, we analyse the external environment, its impact on the activity of the public institution, the determinants, which affect the dynamics of the main economic-financial key indicators and we create strategies to rectify the threats and to take advantage of the opportunities.

One of the limits of the present budget practices refers to the fact that the annual time horizon taken into account when drafting the budget for revenues and expenses impairs the decision-making process in a public institution related to the possibility to establish possible budget alternatives. A recent report of the Organisation for Economic Co-operation and Development (OECD, 2003) states that “annual budgeting can improve the short-term strategic option of decisional factors, but at the same time, the main negative effect consists in the fact that local authorities ignore the cost of the future decisions related to the identification of the best options of mixing budget

allocations with the proper moments to expend”.

Within the annual budgeting procedure common to public institutions it can often be noticed that the end of the budget exercise coincides with an explosion of expenses, as the institution is forced to have expenses at least equal to those planned, in order not to lose the grants coming from the state budget for different projects. Also, observing the annual budget based on the financial levels of previous budget exercises poses problems at the level of the public organisation at the moment when this tries to make important investments, which cannot be supported by an annual budget.

Starting from these facts, the European Council drafted a set of regulations in the field of budgeting procedures, to be differently applied by each state. Most of the OECD countries have adopted a medium-term budget policy, whose purpose is to integrate the loans for the annual expenses within medium-term projections (OECD, 2007). In such a way, public authorities are obliged to be aware of the consequences of the present budgeting decisions over the future public finances and to take into consideration the changes of the structural and demographic factors that influence their level and evolution.

Considered as an useful and flexible budgeting practice (both at the level of central and local administration), the multiannual budgeting makes possible the transfer of the grants from a budget exercise to the next one and at the same time allows the annual loans slip within the next budget exercise. The multiannual approach of the budget of revenues and expenses creates

certain flexibility at the level of financial planning in the public institution, which is reflected by:

- the prolongation of the time horizon, ensuring the transfer of various projects (especially investment projects) from one budget exercise to another;
- the budget objectives exceed the operational framework and enter the strategic scope, allowing to highlight the trend of increasing expenses which, in the annual budgeting option, were not perceived;
- anticipating some problems related to a possible reduction of revenues (for instance, in case of a structural reduction of the basis for taxation) or increase in expenses.

Multiannual budget drafting uses financial forecasting as a main tool. In this way, the public institution generates projections of the evolution of revenues and expenses for the next period, starting from a set of economic, political, legal and social hypotheses. Practically, multiannual budgets connect annual budgets to the financial policy of the public institution on the medium-term.

2. Multiannual budgeting features

Through its own mechanisms, the multiannual budgeting process has to fulfil a set of objectives and constraints specific to the organisation. The literature of the field (Diamond, 2002, 2003) reveals a set of possible solutions for drafting and using the multiannual budgets. Their features related to the performed stages and the end of the

financial planning process can be estimated by the following elements:

a. unlike annual budgets, which are generally balanced, the multiannual budgets have as main characteristic a difference between the expenses and revenues, because the forecast methodology used relies on current economic programmes and hypotheses. So, revenues and expenses elements from the budget structure have different rates of increase.

b. Mainly, multiannual forecasts represent extensions of the present investment programmes or estimations of the planned ones. This means that if the real conditions are different from the hypotheses used in the forecast, then both real revenues and expenses will be different from the estimated ones.

c. Multiannual budgeting relies on two main types of analysis: impact analysis, which quantifies the future impact of the present programmes and policies and the variation analysis, which concerns the identification of the possibilities regarding the adjustment of revenues and expenses to the purpose of decreasing the differences between them.

d. The financial planning process corresponding to the multiannual budgeting includes a set of *general activities*:

D1. the analysis of the historic revenues from previous years and formulation of hypotheses on which the revenues estimation relies;

D2. the projection of revenues and expenses over a period between 3 and 5 years starting with the next financial year;

D3. the analysis of data series with the effective expenses from previous years

correlating these levels with the events and economic, social, political or legal conditions;

D4. the estimation of expenses proposed for the next period of time, split into departments and investment projects underway or planned.

Multiannual forecasts represent a strong strategic management tool, which must be used just after an objective analysis of the inherent limits in financial planning and forecast, such as:

1. the lack of historical data regarding past evolutions of revenues and expenses from the local budget structure and of determinants, which makes it impossible to use extrapolation techniques.

2. the low qualifications degree of the specialised personnel as compared to the requirements of the multiannual budget practices, because these imply the usage of complex economic-mathematical models.

3. the long time span of strategic planning, especially for those public institutions that use the tools of financial planning for the first time. A large time span is necessary in order to collect the necessary data for forecasts and to develop and test the forecast methodology.

4. the limits of the forecast techniques due to the large number of variables they use, which reduces the probability to estimate with a sufficient degree of accuracy.

5. problems related to data consolidation and hypothesis formulation. The forecasts may need historical data series over large time periods between 10 and 15 years, in order to obtain relevant results through the regression analysis. For this reason, there

are at least two problems associated with collecting and using historical data: changes in the definition of data and in the rates or computation bases of revenues sources.

6. wrong evaluation and usage of the results of the forecasts. Often, after a forecast is ended and presented in front of the management team the interest to take advantage of it in business decreases considerably. Unfortunately, this approach ignores the importance and necessity of correlating the forecasts with the annual budget process. In this way, the proposed revenue forecasts for the present year are compared with the multiannual forecast, explaining and justifying the existing variations.

3. The necessity of implementing multiannual budgets in local administration. Local public institutions features

At the level of a local public institution the implementation of a multiannual investment programme assumes the usage of new methods, techniques and financial management tools. We project a medium-term horizon in which projects are distributed by years and prioritised by community needs. Drafting the multiannual budget including the investment projects assumes the identification of financing sources, as a result of a financial forecast. Thus, we consider that in case of a city hall, the implementation of multiannual budgets is sustained by a set of *legal, economic, financial and management* arguments, such as:

1. from a legal point of view, this action answers to the rationality requests of financial and nonfinancial information regarding the

investment programmes from the Government Decree no. 45/2003.

2. multiannual budgets ensure the premises of a high degree of coherence in using resources to reach the main objectives, establishing the relation between the development strategy and the annual budgets, as well as between the financial planning and the execution of investment objectives.

3. we harmonise the investment programmes of the city hall with those of other public institutions or business environment.

4. there are conditions to implement the good practices from the EU countries, where there are used budget projections for time periods of 5-6 years.

5. multiannual budgets fulfil the requests of the international financial institutes (IMF, World Bank), related to the development of tools that ensure the acceleration of the access to structural and cohesion funds.

6. the hierarchy of investment programmes is ensured according to the degree to which they fulfil the priorities of the local community.

7. the increase of the credibility of the city hall institution in front of financing institutions and potential investors, which are ensured to be supported by the community for their projects.

8. the high flexibility of annual budgets due to the fact that the necessary fund for co-financing projects are regularly stipulated at the moment of drafting the budget programme.

9. aligning local investment procedures and processes to European and international standards.

10. the increasing budget transparency at the level of transparency in view of ensuring the public character of the decision-

making process entailing financial costs for the community. The budget transparency is one of the best guarantees related to the fact that the actions of the public institutions correspond to the community's interests and "public money" is used just in its interest.

4. Economic-mathematical modeling of the evolution of revenues within a city hall. Case study

4.1. Identification of financial sources for the local budget

After having identified general sources of financing for the local budget it resulted that there are 6 categories of main sources for the city hall under study. These sources ensure over 90% of the revenues in the local budgets. We consider that the detailed analysis by determinants only for these categories is justified. In this respect, there are representative data series collected from the Regional Unit of Statistics, Bucharest. In order to determine the weight of each revenue source in the total revenues of the local public institution under analysis year 2006 was taken as reference (Table 1).

Main sources of revenues to the local budget

Table 1

No.	Revenue source	Weight in the total revenues in local budget (%)
1	Tax on buildings from natural persons	3
2	Tax on buildings from legal persons	11
3	Stamp tax on notary activity	6
4	Rates from the income tax	46
5	Amounts allocated for balancing local budgets	6
6	Amounts from the VAT for local budgets	19

1. Tax on buildings from natural persons – the level of this revenue source is

influenced from a legal point of view by the tax rate on buildings and the tax value on sq.m., both established by decisions of the competent authorities.

2. Tax on buildings from legal persons – it is influenced by the decision of Local Council, which sets the tax rate applied on the balance sheet value of buildings used by legal persons.

3. Stamp taxes on notary activity – they are established by Government Decree no. 12/1998, amended with the subsequent provisions regarding the adjusted levels.

4. Rates from the income tax – income tax collected at the city hall level is influenced by the economic development of the area reflected inter alia by regional GDP, the number of firms in the area, the volume of gross investments, the average number of employees and the monthly net average salary.

5. Amounts allocated for balancing local budgets – they are influenced both by the development of the economic sector and by the increase of the percentage of income tax collected and allocated for balancing local budgets, from 8.5% to 11%, starting with 2005, as a measure of decentralisation of the local public administration system.

6. Amounts from the VAT for local budgets – these amounts are established on an annual basis by the Local Council according to the priorities of the geographic area and the amounts from the VAT from the state budget for the local budget under study.

To sum up, the extrapolation of revenues sources to the local budget and of the determinants will be achieved at two levels:

a. The extrapolation of the revenues sources in the local budget, using multiple nonlinear regression on the basis of the

identification of the functions that describe the evolution of each revenue source.

b. The extrapolation of determinants of the revenue sources to the local budget using the simple linear or nonlinear regression according to the specificities of each determinant, according to the time factor.

4.2. The variables of the forecast model

The economic-mathematical forecast model for the local budget revenues will operate with the following variables:

1. T-the reference year.
2. INF-inflation rate.
3. IMPCPF-tax on buildings from natural persons.
4. IMPCP-tax on buildings from legal persons.
5. TTMB-stamp tax on notary activity.
6. CDEF-rates from the income tax.
7. ECHLB-amounts allocated for balancing local budgets.
8. DEFTVA-amounts from the VAT for local budgets.
9. COTAPF-tax rate on buildings for natural persons (%).
10. VIMPF-value for taxation of buildings on sq.m for natural persons.
11. COTAPJ- tax rate on buildings for legal persons (%).
12. VTMBR-rate of increase of the stamp tax value on notary activity as compared to the previous year; decree no. 12/1998, amended with the subsequent provisions (%).
13. VALOC-percentage of collected income tax allocated to local budgets according to the Law of Local Public Finances (%).
14. VECHILB-percentage of collected income tax allocated for balancing local budgets (%).

15. PSTVA-weight of amounts from VAT in the city hall budget (%).

16. PIBR-GDP of the geographic area where the city hall is situated (mil. lei).

17. NRF-number of firms registered in the area.

18. INVB-volume of gross investments in the geographic area under study (mil. lei).

19. POPS1-population from the geographic area under study.

20. SMNL-monthly average net salary earned by employees in the area.

21. SUPLOC-the inhabited area per person/sq.m. in the area.

22. TVAPMB-amounts from the VAT from the Country Council budget (thousand lei).

23. POPMB-total population in the geographic area where the city hall is situated.

2.3. The forecast of the evolution of determinants

Based on the study of the Pearson correlation coefficient and the results of the statistical analysis of the evolution of determinants between 2002 and 2006 we draw the conclusion that the significant determinants for which the determination of the regression function is justified are the following:

1. INF-inflation rate.
2. PIBR-regional GDP (the geographical-administrative area where the city hall is situated (mil. lei).
3. INVB-the volume of gross investment in the geographic area (mil. lei).
4. TVAPMB- amounts from the VAT from the County Council budget (thousand lei).

We still have to say that we have started from the premises that most of the legal determinants would not be modified during the forecast time span and, accordingly, would not be considered in the analysis process.

In order to identify the relations that define the evolution of each determinant analysed we used the forecast programmes CurveExpert 1.3. This programme allows us to identify the single-variable regression function. Next, we present the results processed by this software and the regression functions that describe the evolution of the determinants, their graphs as well as the values of standard deviations and correlation coefficients.

Characteristics of the regression function used for the forecast of the evolution of the inflation rate

Table 2

Indicator	Inflation rate
Abbreviation	INF
Regression models analysed	Bleasdale, Rational, Cuadratic, Polinomial, Logaritmico, Hipebolic, Linear, Richards, MMF
Regression models used	Bleasdale
Formula	$INF = (-72.481 + 0.0364 \times t)^{-1/0.3099}$
Number of iterations	16
Standard deviation	0.567
Correlation coefficient	0.997

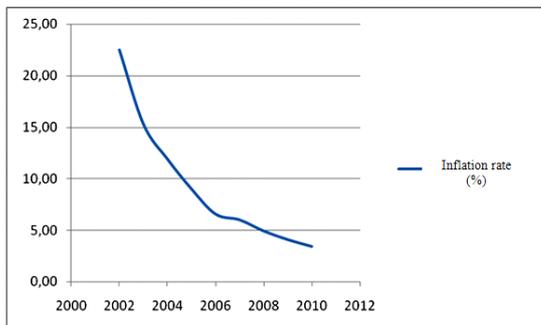


Figure 1. Graph of the regression function used for the forecast of the evolution of the inflation rate

Characteristics of the regression function used for the forecast of the evolution of “regional GDP”

Table 3

Indicator	Regional GDP in Sector 1
Abbreviation	PIBR
Regression models analysed	Gaussian, Linear, Logaritmico, Cuadratic, Polinomial, Bleasdale, MMF, Richards
Regression models used	Gaussian
Formula	$PIBR = 88953.94 \times e^{\frac{-(t-2010.84)^2}{2 \times 6.89^2}}$
Number of iterations	12
Standard deviation	884.441
Correlation coefficient	0.999

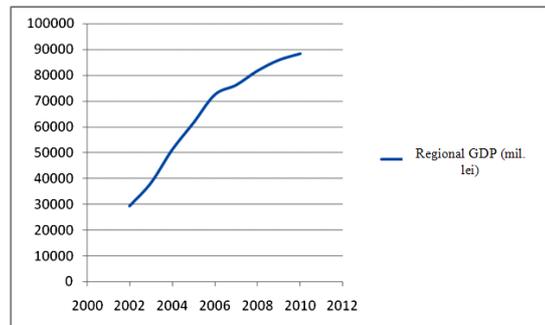


Figure 2. Graph of the regression function used for the forecast of the evolution of the regional GDP

Characteristics of the regression function used for the forecast of the evolution of “volume of gross investment in the geographic area”

Table 4

Indicator	Volume of gross investment in the geographic area in Sector 1
Abbreviation	INVB
Regression models analysed	Gaussian, Cuadratic, Polinomial, Bleasdale, Richards, MMF, Logaritmico
Regression models used	Gaussian
Formula	$INVB = 56166.538 \times e^{\frac{-(t-2010.912)^2}{2 \times 4.56^2}}$
Number of iterations	15
Standard deviation	501.74
Correlation coefficient	0.999

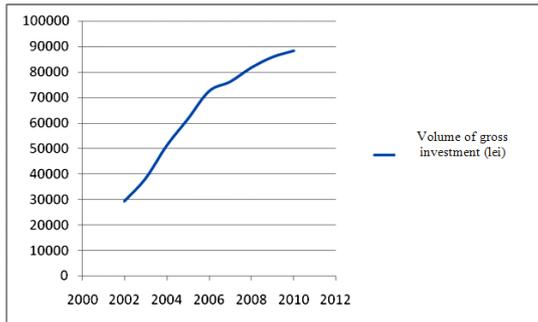


Figure 3. Graph of the regression function used for the forecast of the evolution of the “volume of gross investment in the geographic area”

Characteristics of the regression function used for the forecast of the evolution of “amounts from the VAT from the County Council budget”

Table 5

Indicator	Amounts from the VAT consolidated budget of the Council of Bucharest
Abbreviation	TVAPMB
Regression models analysed	Saturation rate, Cuadratic, Exponential, Geometric, Linear, Logaritmnic, Polinomial, Richards, MMF
Regression models used	Saturation rate
Formula	$TVAPMB = \frac{202.701 \times t}{t - 2014.357}$
Number of iterations	6
Standard deviation	2102.57
Correlation coefficient	0.958

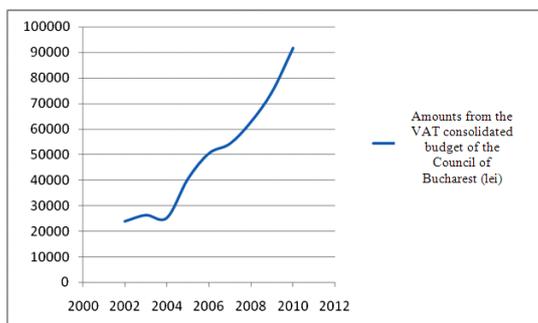


Figure 4. Graph of the regression function used for the forecast of the evolution of the “amounts from the VAT from the County Council budget”

4.4. The forecast of revenues collected in the local budget of the city hall during the period 2007-2010

Next, we present the results of the forecast of the evolution of the main revenue sources to the local budget based on the significant determinants. The extrapolation process was conducted in two phases, starting from the forecast evolutions of determinants:

1. determining the regression function of each revenue source according to each determinant.
2. identifying the forecast values of revenue sources as results of the functions defined previously.

4.4.1. The forecast of tax on buildings from natural persons

Regression of the revenue source of “tax on buildings from natural persons” according to the determinant “inflation rate”

Table 6

Indicator	Tax on buildings from natural persons
Abbreviation	IMPCPF
Regression models analysed	Polinomial, Cuadratic, Weibull, MMF, Linear
Regression models used	Polinomial
Formula	$IMPCPF = 2669.131 \times INF^3 - 75544.835 \times INF^2 + 155922.11 \times INF + 15312796$
Number of iterations	31
Standard deviation	5937.703
Correlation coefficient	0.999

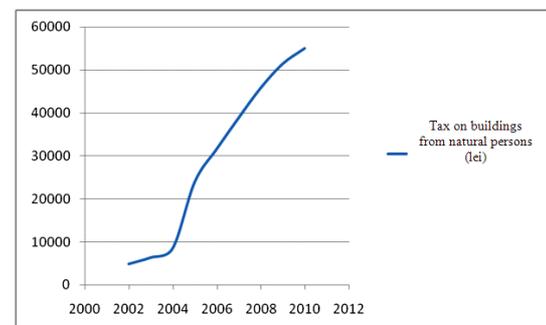


Figure 5. Graph of the regression of the revenue source “tax on buildings from natural persons” according to the determinant “inflation rate”

4.4.2. Forecast of the tax on buildings from legal persons

Regression of the revenue source of “tax on buildings from legal persons” according to the determinant “inflation rate”

Table 7

Indicator	Tax on buildings from legal persons
Abbreviation	IMPCPJ
Regression models analysed	Rational, Hiperbolic, Hoerl, Cuadratic, Logistic, MMF, Polinomial, Weibull, Logaritmico, Sinusoidal, Richards, MMF
Regression models used	Hoerl
Formula	$IMPCPJ = 339894112 \times 0.981^{INF} \times INF^{-0.789}$
Number of iterations	15
Standard deviation	2795.069
Correlation coefficient	0.994

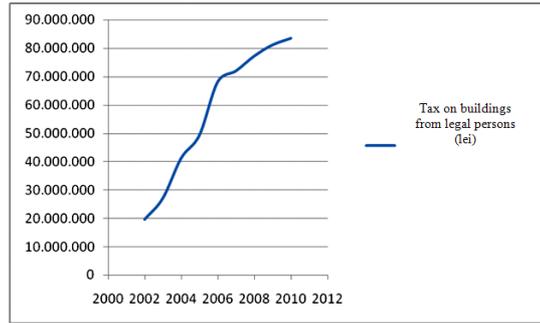


Figure 7. Graph of the regression of the revenue source “tax on buildings from legal persons” according to the determinant “regional GDP”

Regression of the revenue source of “tax on buildings from legal persons” according to the determinant “volume of gross investments in the geographic area”

Table 9

Indicator	Tax on buildings from legal persons
Abbreviation	IMPCPJ
Regression models analysed	Power, Exponential, Hoerl, Gaussian, Cuadratic, Geometric, Polinomial, Logaritmico, Liniar, MMF
Regression models used	Power
Formula	$IMPCPJ = 305826,953 \times INVB^{0.521}$
Number of iterations	9
Standard deviation	7137,57
Correlation coefficient	0.946

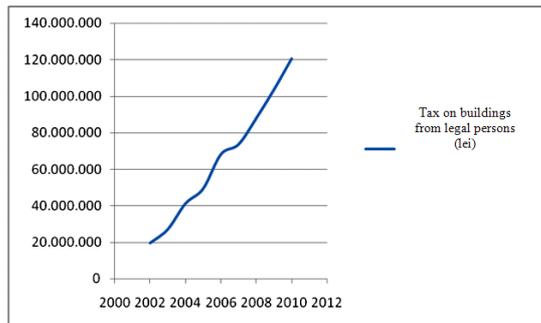


Figure 6. Graph of the regression of the revenue source “tax on buildings from legal persons” according to the determinant “inflation rate”

Regression of the revenue source of “tax on buildings from legal persons” according to the determinant “regional GDP”

Table 8

Indicator	Tax on buildings from legal persons
Abbreviation	IMPCPJ
Regression models analysed	Power, Exponential, Hoerl, Gaussian, Cuadratic, Geometric, Polinomial, Logaritmico, Liniar, Hiperbolic, MMF
Regression models used	Power
Formula	$IMPCPJ = 905.399 \times PIBR^{1.0038}$
Number of iterations	92
Standard deviation	2287.99
Correlation coefficient	0.994

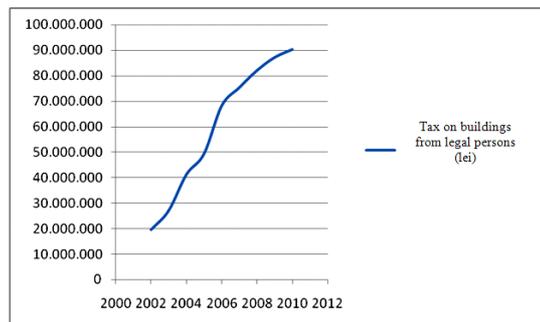


Figure 8. Graph of the regression of the revenue source “tax on buildings from legal persons” according to the determinant “volume of gross investments in the geographic area”

4.4.3. The forecast of stamp tax on notary activity

Due to the fact that for any of the stamp tax on notary activity no proper Pearson correlation coefficient was obtained, we determined the forecast values using the Forecast function related to the time factor. The results are presented in Table 10.

Regression of the revenue source of “stamp tax on notary activity” related to the time factor

Table 10

Year	Stamp tax on notary activity (thousand lei)
2002	17.231.344
2003	24.785.599
2004	23.020.679
2005	33.985.435
2006	36.880.102
2007	41.480.020
2008	48.409.731
2009	52.157.023
2010	57.231.344

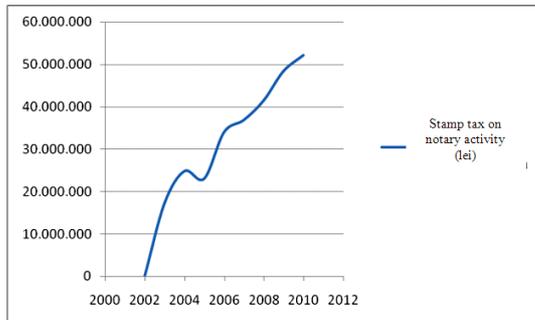


Figure 9. Graph of the regression of the revenue source “Stamp tax on notary activity” related to the time factor

4.4.4. The forecast of rates from the income tax

Regression of the revenue source of “rates from the income tax” according to the determinant “inflation rate”

Table 11

Indicator	Rates from the income tax
Abbreviation	CDEF
Regression models analysed	Geometric, Hiperbolic, Hoerl, Logistic, Cuadratic, Weibull, Logaritmico, Liniar, Sinusoidal
Regression models used	Geometric
Formula	$CDEF = 36725103.112 \times INF^{\frac{7.0104}{INF}}$
Number of iterations	9
Standard deviation	8082.288
Correlation coefficient	0.994

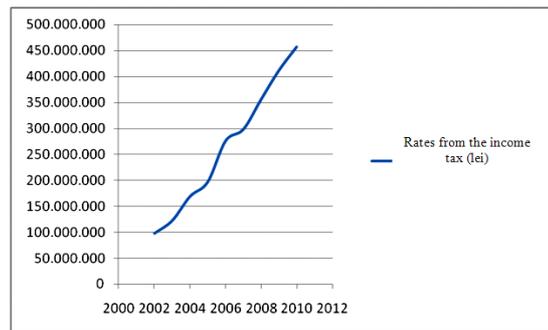


Figure 10. Graph of the regression of the revenue source “rates from the income tax” related to the “inflation rate”

Regression of the revenue source of “rates from the income tax” according to the determinant “regional GDP”

Table 12

Indicator	Rates from the income tax
Abbreviation	CDEF
Regression models analysed	Power, Exponential, Gaussian, Hoerl, Logaritmico, Polinomial, Cuadratic, Logistic, MMF
Regression models used	Power
Formula	$CDEF = 49651055 \times 1.000023^{PIBR}$
Number of iterations	96
Standard deviation	8409.281
Correlation coefficient	0.994

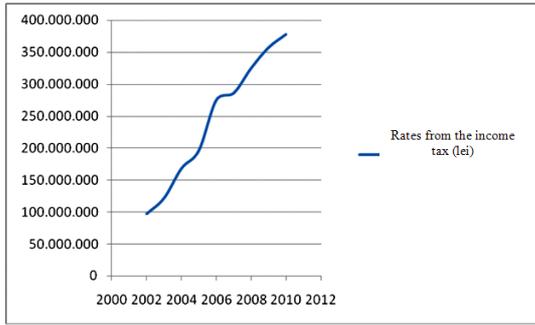


Figure 11. Graph of the regression of the revenue source “rates from the income tax” related to the “regional GDP”

Regression of the revenue source of “rates from the income tax” according to the determinant “volume of gross investments in the area”

Table 13

Indicator	Rates from the income tax
Abbreviation	CDEF
Regression models analysed	Polinomial, Cuadratic, Logaritmico, Power, Weibull, Gaussian, MMF, Hoerl, Richards
Regression models used	Power
Formula	$CDEF = 2304235 \times INVB^{0.455}$
Number of iterations	7
Standard deviation	26541.077
Correlation coefficient	0.943

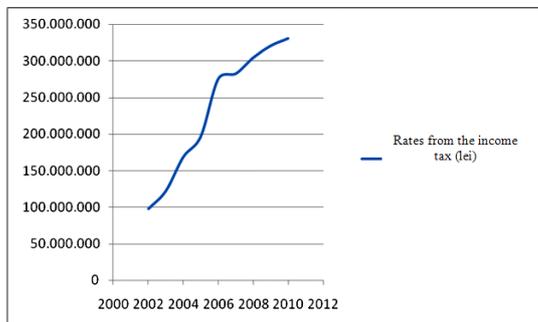


Figure 12. Graph of the regression of the revenue source “rates from the income tax” related to the “volume of gross investments in the area”

4.4.5 The forecast of amounts allocated for balancing local budgets

Regression of the revenue source of “amounts allocated for balancing local budgets” according to the determinant “inflation rate”

Table 14

Indicator	Amounts allocated for balancing local budgets
Abbreviation	VECHILB
Regression models analysed	Power, Exponential, Hoerl, Cuadratic, Polinomial, Gaussian, Richards, MMF, Bleasdale
Regression models used	Power
Formula	$VECHILB = 142882760 \times 0.818^{INF}$
Number of iterations	13
Standard deviation	975.906
Correlation coefficient	0.998

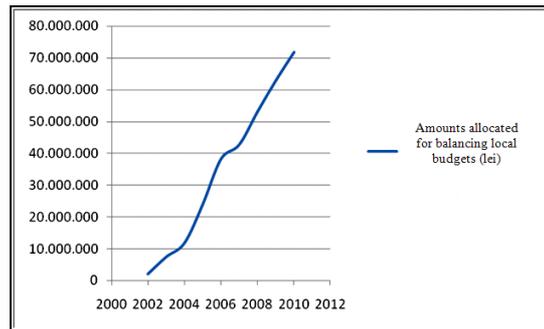


Figure 13. Graph of the regression of the revenue source “amounts allocated for balancing local budgets” related to the “inflation rate”

Regression of the revenue source of “amounts allocated for balancing local budgets” according to the determinant “regional GDP”

Table 15

Indicator	Amounts allocated for balancing local budgets
Abbreviation	VECHILB
Regression models analysed	Exponential, Linear, Cuadratic, Polinomial, Harris, Sinusoidal, Richards, Gaussian, Hoerl, Bleasdale
Regression models used	Gaussian
Formula	$VECHILB = 104315122 \times e^{\frac{-(x-121209.57)^2}{2 \times 34440.634^2}}$
Number of iterations	17
Standard deviation	1730.232
Correlation coefficient	0.996

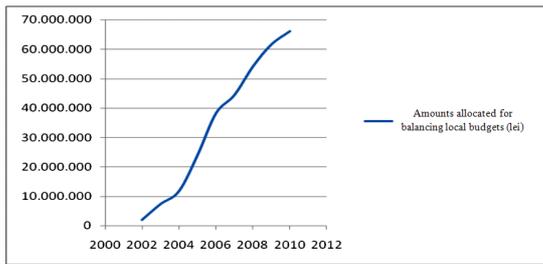


Figure 14. Graph of the regression of the revenue source “amounts allocated for balancing local budgets” related to the “regional GDP”

4.4.6. The forecast of amounts from the VAT for local budgets

We determined the forecast values using the function Forecast related to the time factor. The results are presented in Table 16.

The regression of the revenue source “amounts from the VAT for local budgets” related to the time factor

Table 16

Year	Amounts from the VAT for local budgets (thousand lei)
2002	39.854.657
2003	45.201.456
2004	58.169.884
2005	84.164.452
2006	102.635.000
2007	115.362.194
2008	136.542.574
2009	155.757.757
2010	172.020.650

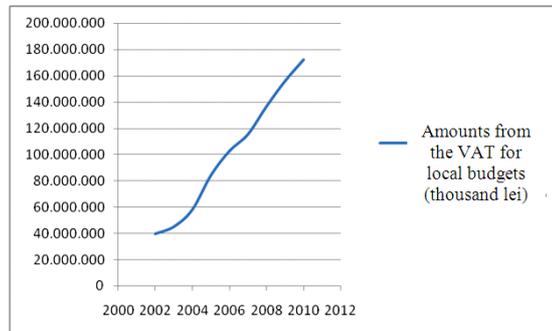


Figure 15. Graph of the regression of the revenue source “amounts from the VAT for local budgets” related to the “regional GDP” related to the time factor

As a result of the forecast process, we determined the future evolution of the six main revenue sources to the local budget for a time period of four years (2007-2010). The results of the forecast are presented in Table 17.

The consolidated situation of the forecast evolution for the six main revenue sources to the local budget of the city hall

Table 17

Year	Tax on buildings from natural persons (lei)	Tax on buildings from legal persons (lei)	Stamp tax on notary activity (lei)	Rates from the income tax (lei)	Amounts allocated for balancing local budgets (lei)	Amounts from the VAT for local budgets (lei)	Total (lei)
2002	10.978.162	19.634.670	-	97.523.021	2.075.496	39.854.657	170.066.006
2003	9.590.670	27.150.680	17.231.344	122.140.772	7.430.294	45.201.456	228.745.216
2004	10.927.564	41.253.856	24.785.599	168.616.999	11.813.373	58.169.884	315.567.275
2005	12.580.515	49.390.074	23.020.679	196.724.946	23.975.340	84.164.452	389.856.006
2006	13.825.658	68.171.137	33.985.435	275.519.959	38.230.536	102.635.000	532.367.725
2007	14.804.825	74.996.253	36.880.102	290.292.368	43.615.106	115.362.194	575.950.848
2008	15.132.160	83.329.519	41.480.020	340.217.417	53.637.915	136.542.574	670.339.605
2009	15.870.069	89.213.915	48.409.731	388.833.717	62.267.251	155.757.757	760.352.440
2010	16.529.477	95.199.611	52.157.023	440.110.069	68.985.097	172.020.650	845.001.927

The graph of the evolution of the revenues to the local budget of the city hall under analysis as a result of the change in revenue sources is illustrated in Figure 16.

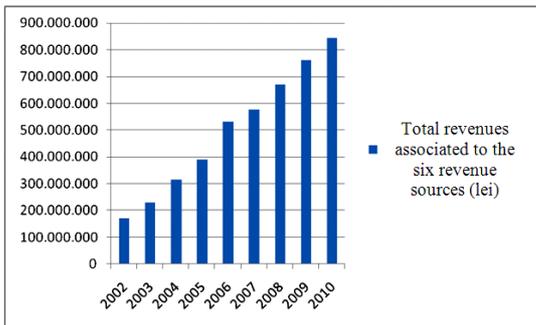


Figure 16. The forecast evolution of the total revenues drawn to the local budget of the city hall from the six revenue sources included into the analysis.

5. Conclusions

Given the estimations obtained and the methodology used we can state the following conclusions:

1. in order to conduct the forecast, the six main revenue sources to the local budget

of a city were considered; they were selected according to their weight in the total budget of the city hall.

2. due to the low relevance of the revenue sources that were not considered in this study, we recommend that the extrapolation of their values should be done either by linear simple regression or nonlinear simple regression as related to the time factor in order to achieve as precise forecasts as possible.

3. as a result of the descriptive statistical study conducted on data series that describe the evolution of the determinants during 2002-2006, as well as a result of the computation of the Pearson correlation coefficients, we selected four representative determinants for which significant values of the correlation coefficient were obtained.

4. in order to forecast the determinants we use the simple nonlinear regression related to the time factor using the software CurveFinder.

5. the forecast of the evolution of the six main revenue sources was conducted

based on the identification of the regression functions for each revenue source related to each of the determinants. Next, we established the extrapolated values as results of the previously defined functions.

6. the forecast horizon is four years. This is actually the maximum time span for which we can get data with a sufficient accuracy level, given the small dimension of the available statistical data.

7. in view of drafting annual budgets based on multiannual budgets it is required that the annual values be split on calendar time periods (months or quarters) according to the seasonality coefficient. This coefficient is determined for each revenue source and each calendar time period based on the analysis of the budget execution from the last four years - monthly or at least once in a quarter.

Obviously, the implementation of the multiannual budgeting practices in the public administration should not be just optional at the decision-making level, but an extremely necessary tool for a good strategic management focused on efficiency and effectiveness of administrative processes. Unfortunately, in Romania there are few public administration institutions that have defined long-term strategic plans and, as a consequence, are able to exceed the limits of traditional annual budgeting. Nevertheless, we argue that as the planning process becomes more important higher interest will be paid to strategic planning as an instrument of drawing financial resources, which are necessary to support investment projects. This arises first of all due to the necessity of correlating this activity with the formal financial forecast and planning.

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