THE CONTROL OF SMALL MEDIUM BANKS PROFITABILITY USING FINANCIAL MODELING APPROACH UNDER CERTAINTY AND UNCERTAINTY

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Abstract

Following a prototype economic modelling approach for Small-Medium Banks (SMBs) business plans according to structure of Additional Funds Needed (AFN) models this paper examines the volatility of banking efficiency in terms of Key Profitability Variables (KPVs) in order to determine Key Performance Indicators (KPIs). The KPVs are the size and structure of deposits, loans and their interest rates. Initially we examine the intervals in which the KPVs of the SMBs are moving. Then we conduct a sensitivity analysis under certainty. Our paper provides first evidence that business plans following AFN economic models are worthy tools for financial planning of SMBs in order to control their performance, contributing to budgeting and decision making for SMBs strategic planning. Financial planning of SMBs in order to control their performance, contributing to budgeting and decision making for SMBs strategic planning, prove to be a critical process for the overall bank efficiency. With this paper we contribute to debate regarding the introduction economic modelling approaches under certainty and uncertainty in the banking industry.

Keywords: Bank performance, AFN models, Operation Research

JEL Classifications: G21, M41, C44

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1. Introduction

The efficiency of Banking Institutions has been a constant research field for many years. Especially the last decade due to the financial crises of 2008 the volatility of banking efficiency has increased substantially, leading also to an increase of the interest of the scientific research regarding the modelling and forecasting of Key Performance Indicators. Efficiency and profitability are the primary goal of any business formation. The long-term progress of a business cannot be achieved without a substantial level of efficiency and profitability. Therefore, the measurement (quantification) of current, past and future efficiency and profitability is considered imperative and to a significant extent ensures the survival of the business formation. Essentially by using these terms we refer to the ability of the company to generate profits through its activity at the lowest cost and risk.

The calculation of the revenue and expenditure figures shall be considered in respect of the income statement referred to in the course of a given year. It has an actual and budgeted character. At the budgeted level, a forecast of the usage profit status for the upcoming accounting period is formed with the probability of course deviating from the actual data (Don Hofstrand, 2009). Regardless of whether we refer to budgeted or actual efficiency and profitability, its calculation is perhaps the most important measure of success for a business.

It is a fragmentary mention that a company listed with a satisfactory level of efficiency and profitability, higher than that of similar enterprises, can attract more investment funds. This is a comparative advantage and contributes to the ever-increasing possibility of expanding the company's entrepreneurial activity. Thus, the increase in efficiency and profitability is perhaps the most important task of the financial directors. Managers are constantly looking for ways to change the operational structure of the company with the aim of improving efficiency and profitability. Tools in this effort are both the prediction of the results of use and the targeting (partial budget) of the various parts of the business activity. Targeting for example could achieve higher levels of sales or limit the costs of an activity, helping to improve the economic outturn. Efficiency and profitability and efficiency and profitability analysis through a series of indicators also contribute to early perception of problematic situations. It is important both for the control of solvency and for the principle of continuity or going concern in IFRS terminology. It concerns not only the company itself but also a

multitude of others involved and not, such as banking entities, creditors, tax authorities, institutional, supervisory mechanisms and other. Efficiency and profitability indicators are part of the financial analysis of business activity. They are indicators of importance for measuring efficiency and profitability both in terms of sales and in relation to invested capital.

2. Literature review

In the context of the research developed for the banks, in terms of efficiency and profitability and its determinants, the following grouping is noted in the independent variables. Most of the studies classify the factors that study in three major categories:

a) Macroeconomic determinants
b) Sector determinants
c) Internal determinants.

Both the participants in the industry and the factors of the macroeconomic environment are also known as external (external) factors. Studies examining the internal factors that impact on efficiency and profitability, use various variables to express them. Variables are used, such as the size of the business activity, capital, risk management, management of expenses etc. The variables used to express the factors influencing the internal environment vary. The size of the business activity impacts on efficiency and profitability at a statistically high level. The positive effect is formulated by the studies of Akhavein et al. (1997), Smirlock (1985), Short (1979), Bourke (1989), Molyneux and Thornton (1992) and Bikker and Hu (2002). In all the above studies the positive and statistically significant relationship between the size of the business unit and the efficiency and profitability is confirmed. In some of these, the above findings apply mainly to small and medium-sized banks.

The positive relationship between the level of concentration of the industry and efficiency and profitability as well as better quality of administration and efficiency and profitability is concluded by the work of Bourke (1989). Molyneux and Thorhton (1992) agree with these findings and they also, find a negative and statistically significant relationship between liquidity levels and efficiency and profitability. This outcome is considered reasonable because high liquidity levels mean low-risk placements and, by extension, low efficiency and

profitability. In contrast, Eichengreen and Gibson (2001) in their study support the positive and statistically significant relationship between liquidity and efficiency and profitability. In their study they also formulate the positive relationship between leverage and efficiency and profitability, as well as between wage expenditures and efficiency and profitability. Miller and Noulas (1997) formulate the negative impact of financial risk on efficiency and profitability.

High-risk financing (high-risk loans) leads to higher levels of forecasting and inductively lower levels of efficiency and profitability. In this case, the following procedure was followed by Berger et al. (2000), accepting that the trend of efficiency and profitability seems to continue over time, reflecting elements of the concentration of the sector, of sensitivity to macroeconomic shocks etc. Similar results are found in their studies Davydenko (2010), Bashir (2003) and Javaid et al. (2011). Opposite results have been expressed in various studies. The negative and statistically significant relationship of capital with efficiency and profitability is supported by studies of Tregenna (2009) and of Capraru and Jhnatov (2015).

The effect of financial risk (credit risk) on efficiency and profitability appears to vary from study to study. In most of these studies, the financial risk is measured by the subprime estimate ratio to all loans. The course of this factor alters efficiency and profitability in future time. By examining the scientific literature, we see that there have been more than a few approaches regarding the measurement of bank efficiency. For example, for stress testing and credit risk models, Blaschke et al. (2001) report an example in which the nonperforming loan (NPL) ratio is regressed against the nominal interest rate, the inflation rate, the change in real GDP, and the change in the terms of trade. Van den End, Hoeberichts, and Tabbae (2006) propose an alternative method that accounts for simultaneous changes in the macro-economic variables and their interactions as typically present in the macro scenarios derived from structural macro models. Jimenez and Mencıa (2007) apply a three-standard-deviation shock to the GDP and interest rate variables; similarly, Castren, Fitzpatrick, and Sydow (2008) use a five-standard-deviation shock for one macroeconomic variable of the GVAR model. Wong and Hui (2009) describe a model developed at the Hong Kong Monetary Authority to assess liquidity risk and Kapadia et al. (2012) describe the RAMSI model developed by the Bank of England.

3. Data and methodology

Taking our data from the published financial statements of a small non systemic bank in Greece we construct a simplified model that provides a manageable testing approach based only on those essential variables and key performance drivers that are relevant for assessing the bank's profitability. The use of simplified IAS / IFRS structure of financial statements in accordance with Additional Funds Needed (AFN) model, is the basis for the use of sensitivity analysis.

The use of quantitative methods and analytical tools is necessary to identify and analyse the models of this research. Already in *IFRS7 - Financial Instruments: Disclosures*, reference is made to the need to use sensitivity analysis and Monte Carlo Simulation for the purposes of this standard. In addition, *IFRS 9 - Financial Instruments*, refers to the possibility of using regression analysis also for purposes of applying this standard. In this research we make use of the AFN outputs from three forecasting periods in order to conduct a sensitivity analysis as a first steps towards the implementation of Multiple Linear Regression and Monte Carlo simulation technique with the Pert distribution, which will be researched in a future research.

3.1. The AFN models

The AFN banking model comprises of four main worksheets. Presentation, Financial Statements, Loans and Funding. All have a five terms period two of the last officially published annual financial statements (t-1 and t) and three of future annual projections (t+1, t+2 and t+3). As we can observe in Figure 1, all sheets are linked with Presentation interactively.

Inputs, in Presentation worksheet, are taken as calculation data from Loans and Funding worksheets, represent the historic (t-1 and t) volume and product structure of loans and deposits, their yields and nominal interests' rates accordingly, as well as their projected percentage changes in volume and structure, their yields and nominal interests' rates in time (t+1, t+2 and t+3). On the other hand, Inputs concerning Other Expenses and Other Income (not derived from loans and deposits), their historic volume (t-1 and t) and change in (t+1, t+2 and t+3) are being taken as calculation data for Financial Statements worksheet. In return Financial Statements, Loans and Funding, produce summarized data to Outputs in Presentation worksheet, where selected data from worksheet including Profit / Loss after tax

from continuing operations and Additional Funds Needed are presented.

Given the structure of Figure 1 (see Appendix), our model can be analysed into categories of loans and deposits according to European Banking Authority (EBA) prototype formats and have the following indicative amounts, as observed in Tables 1 to 5.

Table 1

Presentation AFN model Inputs

AFN Model Inputs	Units	t-1	t	t+1	t+2	t+3
Assets-Loans						
Increases of Gross Loans (before write-offs)	%			**2%**	**2%**	**2%**
Mortgage		13%	12%	13%	13%	13%
Consumer		3%	3%	3%	3%	3%
Credit cards		2%	2%	2%	2%	2%
Other		3%	3%	3%	3%	3%
Public sector		1%	1%	1%	1%	1%
Large Corporate		28%	27%	28%	28%	28%
SMEs		33%	33%	32%	32%	32%
SBL		19%	19%	19%	19%	19%
All Term of Gross Loans		100%	100%	100%	100%	100%
Average yield on Loans (on av. balances)	%					
Mortgage		2,1%	2,1%	2,2%	2,5%	2,5%
Consumer		3,8%	3,6%	4,0%	4,0%	4,0%
Credit cards		3,4%	3,0%	4,0%	4,5%	5,0%
Other		2,2%	2,0%	2,3%	2,3%	2,3%
Public sector		4,8%	3,4%	4,5%	4,5%	4,5%
Large Corporate		4,5%	3,6%	4,1%	4,1%	4,1%
SMEs		4,5%	3,6%	4,5%	5,0%	5,0%
SBL		5,0%	4,2%	5,0%	5,2%	5,5%
Liabilities-Deposits						
Increases of Deposits from Customers	%			**3%**	**3%**	**3%**
Savings		22%	23%	22%	22%	22%
Sight		26%	28%	28%	28%	28%
Term		51%	49%	49%	49%	49%
Other		1%	1%	1%	1%	1%
All		100%	100%	100%	100%	100%
Nominal deposit interest rates *	%					
Savings		0,7%	0,7%	0,7%	0,5%	0,5%
Sight		1,3%	0,8%	1,2%	1,0%	0,8%
Term		3,0%	2,4%	2,8%	2,5%	2,5%
Other		0,0%	0,0%	0,0%	0,0%	0,0%
AFN charges interest earnings		0,5%	0,5%	0,5%	0,5%	0,5%
Operating Cost	EUR mn					
Staff costs		30	30	34	35	36
Admin expenses		30	30	36	30	30
Depreciation		6	6	6	6	6
Commissions	EUR mn					
Fee & commission income		20	20	22	24	26
Fee & commission expense		4	4	4	5	6
Other operating income		5	5	6	6	6

Source: Authors work

Table 2

Loan Portfolio

Loan portfolio						
Units in EUR mn (unless otherwise stated)	Unit	t-1	t	t+1	t+2	t+3
Loans to Customers - existing portfolio						
Stock						
Gross Loans (before write-offs)	EUR mn	**4.000**	**4.400**	**4.497**	**4.596**	**4.697**
Mortgage		500	510	562	574	587
Consumer		120	130	135	138	141
Credit cards		60	70	67	69	70
Other		120	140	135	138	141
Public sector		40	50	45	46	47
Large Corporate		1.100	1.200	1.259	1.287	1.315
SMEs		1.300	1.450	1.439	1.471	1.503
SBL		760	850	854	873	892
90+ dpd per loan category **(NPEs)**	EUR mn	**1.000**	**1.000**	**1.022**	**1.044**	**1.067**
Mortgage		50	50	51	52	53
Consumer		40	40	41	42	43
Credit cards		20	20	20	21	21
Other		40	40	41	42	43
Public sector		-	-	-	-	-
Large Corporate		150	150	153	157	160
SMEs		400	400	409	418	427
SBL		300	300	307	313	320
Stock of provisions		**1.000**	**1.000**	**1.022**	**1.044**	**1.067**
Provisions charge (per period)		**20**	**20**	**26**	**28**	**31**
Write-offs		-	-	4	6	8
Interest income on Loans	EUR mn	**163**	**146**	**183**	**198**	**205**
Mortgage		11	10	12	14	15
Consumer		5	5	5	5	6
Credit cards		2	2	3	3	3
Other		3	3	3	3	3
Public sector		2	2	2	2	2
Large Corporate		46	42	50	52	53
SMEs		58	50	65	73	74
SBL		36	34	43	45	49
Average yield on Loans (on av. balances)	%	**4,2%**	**3,5%**	**4,1%**	**4,4%**	**4,4%**
Mortgage		2,1%	2,1%	2,2%	2,5%	2,5%
Consumer		3,8%	3,6%	4,0%	4,0%	4,0%
Credit cards		3,4%	3,0%	4,0%	4,5%	5,0%
Other		2,2%	2,0%	2,3%	2,3%	2,3%
Public sector		4,8%	3,4%	4,5%	4,5%	4,5%
Large Corporate		4,5%	3,6%	4,1%	4,1%	4,1%
SMEs		4,5%	3,6%	4,5%	5,0%	5,0%
SBL		5,0%	4,2%	5,0%	5,2%	5,5%

Source: Authors work

Table 3

Funding Sources

Funding Sources						
Units in EUR m (unless otherwise stated)	Unit	t-1	t	t+1	t+2	t+3
Deposits from Customers						
Total deposits (Volume)	EUR mn	**2.720**	**2.870**	**2.956**	**3.045**	**3.136**
of which:						
Savings	EUR mn	600	650	650	670	690
Sight	EUR mn	700	800	828	853	878
Term	EUR mn	1.400	1.400	1.448	1.492	1.537
Other	EUR mn	20	20	30	30	31
Interest expense on deposits	EUR mn	**63**	**43**	**54**	**48**	**48**
of which:						
Savings	EUR mn	3	4	5	3	3
Sight	EUR mn	6	6	10	8	7
Term	EUR mn	54	33	40	37	38
Other	EUR mn	0	0	0	0	0
Nominal deposit interest rates *	%	**2,3%**	**1,5%**	**1,9%**	**1,6%**	**1,6%**
Savings	%	0,7%	0,7%	0,7%	0,5%	0,5%
Sight	%	1,3%	0,8%	1,2%	1,0%	0,8%
Term	%	3,0%	2,4%	2,8%	2,5%	2,5%
Other	%	0,0%	0,0%	0,0%	0,0%	0,0%
*effective nominal rates for each deposit category						
Eurosystem funding						
Total Eurosystem funding	EUR mn	**210**	**407**	**352**	**294**	**212**
AFN charges		1	2	2	1	1

Source: Authors work

Table 4

Projected financial statements of BS and PnL

Projected financial statements of AFN model Units in EUR mn (unless otherwise stated)	t-1	t	t+1	t+2	t+3
Balance Sheet					
Assets					
Cash & balances with Central Bank	50	55	50	50	50
Due from banks	10	6	5	5	5
Loans & advances to customers	3.000	3.400	3.483	3.563	3.645
Gross Loans (en. Balance)	4.000	4.400	4.501	4.602	4.705
Accumulated Provisions (en. balance)	1.000	1.000	1.018	1.038	1.059
Derivative financial instruments	10	10	10	10	10
Securities portfolio	80	60	50	50	50
Investment in subsidiaries & associates	0	0	0	0	0
Property & equipment	100	100	100	100	100
Goodwill, software & other intangibles	40	40	40	40	40
Deferred tax asset	100	90	80	65	44
Other assets	100	100	100	100	100
Total Assets	**3.490**	**3.861**	**3.917**	**3.984**	**4.045**
AFN Deposits(+) Placemnets (-) from/to banks	**210**	**407**	**352**	**294**	**212**
Liabilities					
Deposits from customers	2.720	2.870	2.956	3.045	3.136
Other borrowed funds	10	10	10	10	10
Provision for empl. Benef. & conting. Liab.	30	30	30	30	30
Other liabilities	20	20	20	20	20
Total Liabilities	**2.780**	**2.930**	**3.016**	**3.105**	**3.196**
Total Equity	500	524	550	585	637
Total Liabilities & Equity	**3.280**	**3.454**	**3.566**	**3.689**	**3.833**
Total Liabilities & Equity &AFN	3.490	3.861	3.917	3.984	4.045
Income Statement					
[+] Interest & similar income	163	146	183	198	205
[-] Interest expense & similar charges	64	45	56	50	49
[=] Net interest income	99	101	127	148	156
[+] Fee & commission income	20	20	22	24	26
[-] Fee & commission expense	4	4	4	5	6
[=] Net fee income	115	117	145	167	176
[+] Other operating income	5	5	6	6	6
Total operating income	120	122	151	173	182
[-] Staff costs	30	30	34	35	36
[-] Admin expenses	30	30	36	30	30
[-] Depreciation	6	6	6	6	6
Pre Provision Profit	54	56	75	102	110
[-] Loan loss impairment	20	20	26	28	31
Profit / Loss before tax	34	36	49	73	79
[-] Tax	10	10	14	21	23
Profit / Loss after tax from continuing operations	**24**	**26**	**35**	**52**	**56**

Source: Authors work

Table 5

Presentation AFN model Outputs

AFN Model Outputs (EUR mn)	t-1	t	t+1	t+2	t+3
Loans & advances to customers	3.000	3.400	3.483	3.563	3.645
Gross Loans (en. Balance)	4.000	4.400	4.501	4.602	4.705
Accumulated Provisions (en. balance)	1.000	1.000	1.018	1.038	1.059
Total Assets	**3.490**	**3.861**	**3.917**	**3.984**	**4.045**
Deposits from customers	**2.720**	**2.870**	**2.956**	**3.045**	**3.136**
AFN Deposits(+) Placements (-) from/to banks	210	407	352	294	212
Total Equity	**500**	**524**	**550**	**585**	**637**
Net Interest Income	99	101	127	148	156
Net Fee & commission income other income	29	29	32	35	38
Operating expenses	66	66	76	71	72
Pre Provision Profit	54	56	75	102	110
Provisions	20	20	26	28	31
Profit / Loss before tax	34	36	49	73	79
Profit / Loss after tax from continuing operations	**24**	**26**	**35**	**52**	**56**

Source: Authors work

For Inputs, the percentage of change in volume for Gross Loans and Deposits is required to be fulfilled for the five periods. Also, the average yield on Loans (on average balances) and the nominal deposits from Customers also need to be fulfilled respectively. The main categories of loans and deposits according to EBA specifications are Mortgage, Consumer, Credit Cards, Other, Public Sector, Large Corporate, SMEs and SBL while for deposits these are Savings, Sight, Term and Other. Operating Cost including Staff costs, Admin expenses, Depreciation and Commissions including Fees & commissions income, Fees & commissions expense and Other operating income must be also stated, as they are not products of volume and rates of loans and deposits.

For Outputs, the AFN model, based on the Inputs and the formed data of the other worksheets (Loans, Funding Sources, BS and PnL) is calculating the amounts for the categories as stated below and

for five periods. Loans & advances to customers, Gross Loans (en. Balance), Accumulated Provisions (en. balance), Total Assets, Deposits from customers, AFN Deposits (+) Placements (-) from/to banks, Total Equity, Net interest income, Net Fee & commission income & other income, Operating expenses, Pre- Provision Profit, Provisions, Profit / Loss before tax, Profit / Loss after tax from continuing operations.

3.2. Sensitivity analysis of Profit / Loss after tax from continuing operations

Based on the AFN model and using Palisade econometric software suite we conduct a sensitivity analysis in order to observe the factors and size magnitude of impact that influence Profit / Loss after tax from continuing operations for the forecasting periods of t+1, t+2 and t+3.

4. Findings

We run sensitivity analysis on Profit / Loss after tax from continuing operations for t+1, t+2 and t+3 periods that were forecasted using the AFN bank specific model. As shown below on Table 6 What-If Analysis Summary for Output Profit / Loss after tax from continuing operations / t+1, t+2, t+3 (P/L AT of t+1, t+2, t+3) there are 96 main Inputs Ranked by Percentage Change that influence substantial the output P/L After Tax of t+1, t+2, t+3. Using Palisade TopRank, we run 1 simulation with 1.515 recalculations (iterations) examined three outputs and 303 Auto Vary inputs.

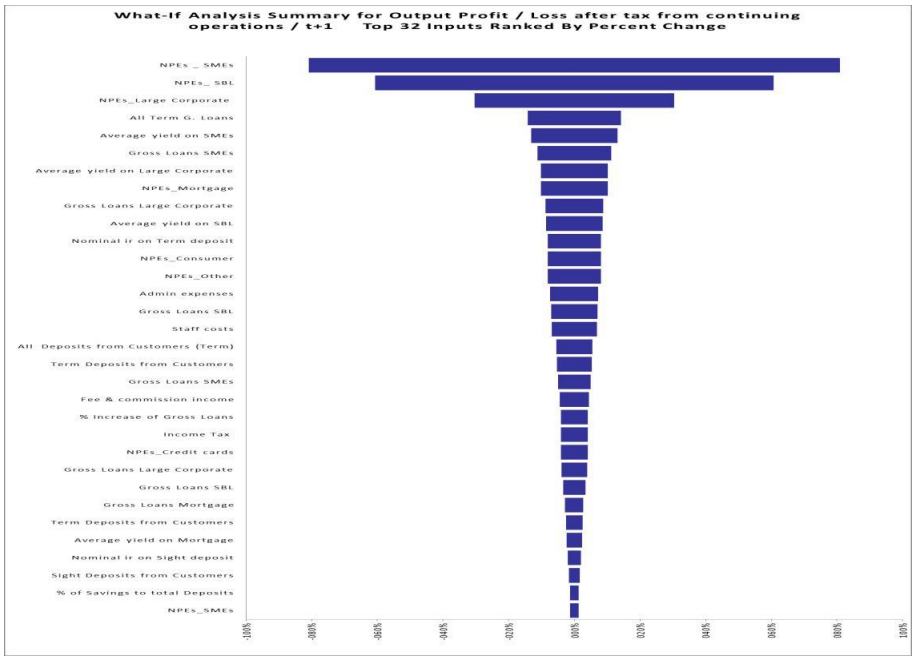
Table 6
What-If Analysis Summary for Output Profit / Loss after tax from continuing operations

TopRank - Summary	
Performed By: Liapis Konstantinos	
Model: AFN FOR BANKS.xlsx	
Run: 1 of 1	
What-If Analysis Summary Information	**Value**
Runs (Simulation s)	1
Recalculations (Iterations)	1.515
Total Outputs	3
Outputs Selected	3
Outputs without Reports (Variation below thresh old)	0
Total Inputs	303
Standard Inputs	0
Auto-Vary Inputs	303
Multi-Way Recalculation s	0
Maximum Number of Inputs	32
Threshold of Inputs	0

Source: Authors work

The results were 3 independent groups (one for each term) of the 32 most influencing variables for each term with tornado graph for each group which helped as visualize the magnitude of influence. For the need of this research paper we present the results in a minimum base, beginning from the tornado graph of t+1 in Figure 2 and its interpretation of What if analysis results.

Figure 2
TopRank - Tornado Graph of What-If Analysis for Output Profit / Loss after tax (t+1) period



Source: Authors work

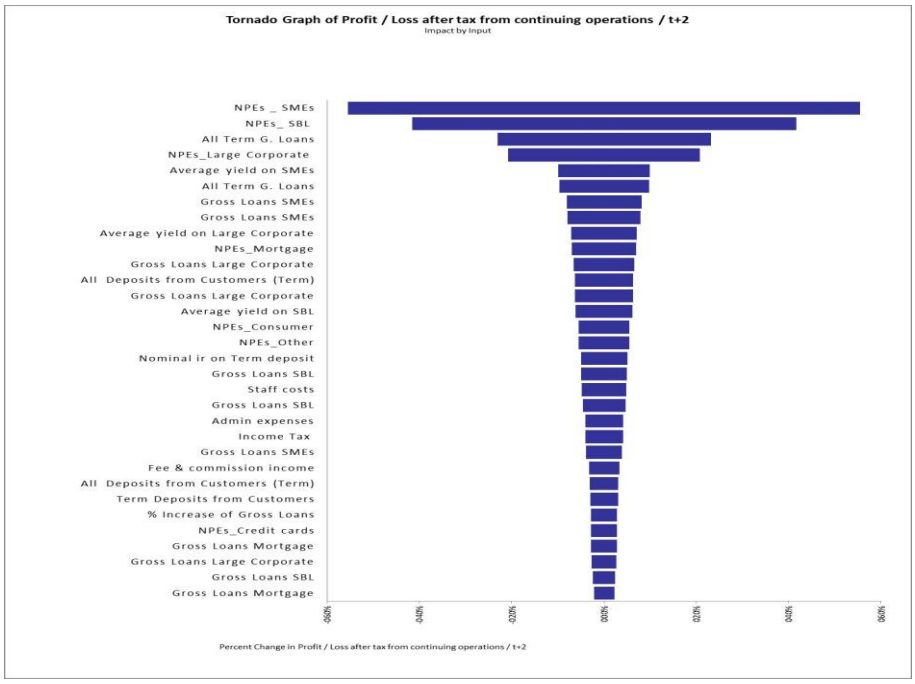
Interpreting the results of sensitivity analysis for the first year of projections (t+1) for a+/- 10% change of inputs, we notice the following:

In terms of impact to the Profit / Loss after tax, 1st comes the input NPEs _ SMEs of Period t+1 from Worksheet Loans with a +/-80,88% change of output. 2nd comes the input NPEs_ SBL of Period t+1 from Worksheet Loans with a +/-60,66% change. 3rd comes the input NPEs_Large Corporate of Period t+1 from Worksheet Loans with a +/-30,33% change. 4th comes the input All Term G. Loans of Period t+1 from Worksheet Presentation with a +/-14,16% change. 5th comes the input Average yield on SMEs of Period t+1 from Worksheet Presentation with a +/-13,2% change. 6th comes the input Gross Loans SMEs of Period t from Worksheet Loans with a +/-11,3% change. 7th comes the input Average yield on Large Corporate of Period t+1 from Worksheet Presentation with a +/-10,24% change. 8th comes the input NPEs_Mortgage of Period t+1 from Worksheet Loans with a +/-10,11% change. 9th comes the input Gross Loans Large Corporate of Period t

from Worksheet Loans with a +/-8,86% change. 10th comes the input Average yield on SBL of Period t+1 from Worksheet Presentation with a +/-8,65% change. 11th comes the input Nominal IR on Term deposit of Period t+1 from Worksheet Presentation with a +/-8,1% change. 12th comes the input NPEs_Consumer of Period t+1 from Worksheet Loans with a +/-8,08% change. 13th comes the input NPEs_Other of Period t+1 from Worksheet Loans with a +/- 8,08% change. 14th comes the input Admin expenses of Period t+1 from Worksheet Presentation with a +/-7,31% change. 15th comes the input Gross Loans SBL of Period t from Worksheet Loans with a +/- 7,05% change. 16th comes the input Staff costs of Period t+1 from Worksheet Presentation with a +/- 6,9% change. 17th comes the input All Deposits from Customers (Term) of Period t+1 from Worksheet Presentation with a +/-5,4% change. 18th comes the input Term Deposits from Customers of Period t from Worksheet Funding with a +/-5,23% change. 19th comes the input Gross Loans SMEs of Period t+1 from Worksheet Loans with a +/-5% change. 20th comes the input Fee & commission income of Period t+1 from Worksheet Presentation with a +/-4,47% change. 21st comes the input % Increase of Gross Loans of Period t+1 from Worksheet Presentation with a +/-4,14% change. 22nd comes the input Income Tax of Period t+1 from Worksheet FS with a +/-4,08% change. 23rd comes the input NPEs_Credit cards of Period t+1 from Worksheet Loans with a +/-4,04% change. 24th comes the input Gross Loans Large Corporate of Period t+1 from Worksheet Loans with a +/-3,88% change. 25th comes the input Gross Loans SBL of Period t+1 from Worksheet Loans with a +/-3,39% change. 26th comes the input Gross Loans Mortgage of Period t from Worksheet Loans with a +/-2,78% change. 27th comes the input Term Deposits from Customers of Period t+1 from Worksheet Funding with a +/-2,57% change. 28th comes the input Average yield on Mortgage of Period t+1 from Worksheet Presentation with a +/-2,39% change. 29th comes the input Nominal IR on Sight deposit of Period t+1 from Worksheet Presentation with a +/- 1,98% change. 30th comes the input Sight Deposits from Customers of Period t from Worksheet Funding with a +/-1,69% change. 31st comes the input % of Savings to total Deposits of Period t+1 from Worksheet Presentation with a +/-1,38% change. 32nd comes the input NPEs_SMEs of Period t from Worksheet Loans with a +/-1,37% change.

Continuing with tornado graph of t+2 in Figure 3 and its interpretation of What if analysis results.

Figure 3
TopRank - Tornado Graph of What-If Analysis for Output Profit / Loss after tax (t+2) period



Source: Authors work

Interpreting the results of sensitivity analysis for the first year of projections (t+2) for a+/- 10% change of inputs, we notice the following:

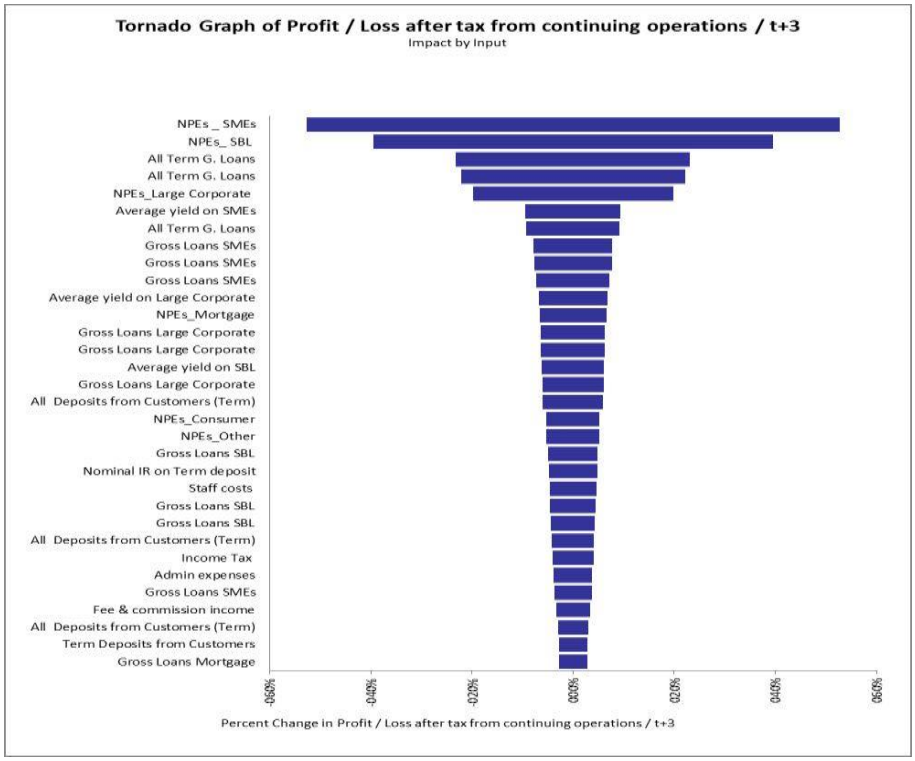
In terms of impact to the Profit / Loss after tax, 1st comes the input NPEs _ SMEs of Period t+2 from Worksheet Loans with a +/- 55,45% change of output. 2nd comes the input NPEs_ SBL of Period t+2 from Worksheet Loans with a +/- 41,59% change. 3rd comes the input All Term G. Loans of Period t+1 from Worksheet Presentation with a +/- 23,1% change. 4th comes the input NPEs_Large Corporate of Period t+2 from Worksheet Loans with a +/- 20,79% change. 5th comes the input Average yield on SMEs of Period t+2 from Worksheet Presentation with a +/- 9,91% change. 6th comes the input All Term G. Loans of Period t+2 from Worksheet Presentation with a +/- 9,71% change. 7th comes the input Gross Loans SMEs of Period t+1 from Worksheet Loans with a +/- 8,1% change. 8th comes the input Gross Loans SMEs of Period t from Worksheet Loans with a +/- 7,88%

change. 9th comes the input Average yield on Large Corporate of Period t+2 from Worksheet Presentation with a +/- 7,11% change. 10th comes the input NPEs_Mortgage of Period t+2 from Worksheet Loans with a +/- 6,93% change. 11th comes the input Gross Loans Large Corporate of Period t from Worksheet Loans with a +/- 6,52% change. 12th comes the input All Deposits from Customers (Term) of Period t+1 from Worksheet Presentation with a

+/- 6,33% change. 13th comes the input Gross Loans Large Corporate of Period t+1 from Worksheet Loans with a +/- 6,33% change. 14th comes the input Average yield on SBL of Period t+2 from Worksheet Presentation with a +/- 6,12% change. 15th comes the input NPEs_Consumer of Period t+2 from Worksheet Loans with a +/- 5,54% change. 16th comes the input NPEs_Other of Period t+2 from Worksheet Loans with a +/- 5,54% change. 17th comes the input Nominal IR on Term deposit of Period t+2 from Worksheet Presentation with a +/- 5,01% change. 18th comes the input Gross Loans SBL of Period t+1 from Worksheet Loans with a +/- 4,92% change. 19th comes the input Staff costs of Period t+2 from Worksheet Presentation with a +/- 4,77% change. 20th comes the input Gross Loans SBL of Period t from Worksheet Loans with a +/- 4,62% change. 21st comes the input Admin expenses of Period t+2 from Worksheet Presentation with a +/- 4,08% change. 22nd comes the input Income Tax of Period t+2 from Worksheet FS with a +/- 4,08% change. 23rd comes the input Gross Loans SMEs of Period t+2 from Worksheet Loans with a +/- 3,92% change. 24th comes the input Fee & commission income of Period t+2 from Worksheet Presentation with a +/- 3,27% change. 25th comes the input All Deposits from Customers (Term) of Period t+2 from Worksheet Presentation with a +/- 3,11% change. “26th comes the input Term Deposits from Customers of Period t+1 from Worksheet FUNDING with a +/- 3,01% change. 27th comes the input % Increase of Gross Loans of Period t+2 from Worksheet Presentation with a +/- 2,82% change. 28th comes the input NPEs_Credit cards of Period t+2 from Worksheet Loans with a +/- 2,77% change. 29th comes the input Gross Loans Mortgage of Period t from Worksheet Loans with a +/- 2,76% change. 30th comes the input Gross Loans Large Corporate of Period t+2 from Worksheet Loans with a +/- 2,66% change. 31st comes the input Gross Loans SBL of Period t+2 from Worksheet Loans with a +/- 2,44% change. 32nd comes the input Gross Loans Mortgage of Period t+1 from Worksheet Loans with a +/- 2,22% change.

Finally, we proceed with tornado graph of t+2 in Figure 4 and its interpretation of What if analysis results.

Figure 4
TopRank - Tornado Graph of What-If Analysis for Output Profit / Loss after tax (t+3) period



Source: Authors work

Interpreting the results of sensitivity analysis for the first year of projections (t+3) for a+/- 10% change of inputs, we notice the following:

In terms of impact to the Profit / Loss after tax, 1st comes the input NPEs _ SMEs of Period t+3 from Worksheet Loans with a +/- 52,69% change of output. 2nd comes the input NPEs_ SBL of Period t+3 from Worksheet Loans with a +/- 39,51% change. 3rd comes the input All Term G. Loans of Period t+1 from Worksheet Presentation with a +/- 23,17% change. 4th comes the input All Term G. Loans of Period t+2 from Worksheet Presentation with a +/- 22,15% change. 5th comes the input NPEs_Large Corporate of Period t+3 from Worksheet

Loans with a +/- 19,75% change. 6th comes the input Average yield on SMEs of Period t+3 from Worksheet Presentation with a +/- 9,42% change. 7th comes the input All Term

G. Loans of Period t+3 from Worksheet Presentation with a +/- 9,22% change. 8th comes the input Gross Loans SMEs of Period t+2 from Worksheet Loans with a +/- 7,76% change. 9th comes the input Gross Loans SMEs of Period t from Worksheet Loans with a +/- 7,65% change. 10th comes the input Gross Loans SMEs of Period t+1 from Worksheet Loans with a +/- 7,26% change. 11th comes the input Average yield on Large Corporate of Period t+3 from Worksheet Presentation with a +/- 6,76% change.

12th comes the input NPEs_Mortgage of Period t+3 from Worksheet Loans with a +/- 6,58% change.13th comes the input Gross Loans Large Corporate of Period t+1 from Worksheet Loans with a +/- 6,34% change. 14th comes the input Gross Loans Large Corporate of Period t from Worksheet Loans with a +/- 6,33% change. 15th comes the input Average yield on SBL of Period t+3 from Worksheet Presentation with a +/- 6,15% change. 16th comes the input Gross Loans Large Corporate of Period t+2 from Worksheet Loans with a +/- 6,06% change. 17th comes the input All Deposits from Customers (Term) of Period t+2 from Worksheet Presentation with a +/- 5,94% change. 18th comes the input NPEs_Consumer of Period t+3 from Worksheet Loans with a +/- 5,26% change. 19th comes the input NPEs_Other of Period t+3 from Worksheet Loans with a +/- 5,26% change. 20th comes the input Gross Loans SBL of Period t+2 from Worksheet Loans with a +/- 4,87% change. 21st comes the input Nominal IR on Term deposit of Period t+3 from Worksheet Presentation with a +/- 4,79% change. 22nd comes the input Staff costs of Period t+3 from Worksheet Presentation with a +/- 4,56% change. 23rd comes the input Gross Loans SBL of Period t from Worksheet Loans with a +/- 4,48% change. 24th comes the input Gross Loans SBL of Period t+1 from Worksheet Loans with a +/- 4,31% change. 25th comes the input All Deposits from Customers (Term) of Period t+1 from Worksheet Presentation with a +/- 4,16% change. 26th comes the input Income Tax of Period t+3 from Worksheet FS with a +/- 4,08% change.

27th comes the input Admin expenses of Period t+3 from Worksheet Presentation with a +/- 3,8% change. 28th comes the input Gross Loans SMEs of Period t+3 from Worksheet Loans with a +/- 3,72% change. 29th comes the input Fee & commission income of

Period t+3 from Worksheet Presentation with a +/- 3,29% change. 30th comes the input All Deposits from Customers (Term) of Period t+3 from Worksheet Presentation with a +/- 2,98% change. 31st comes the input Term Deposits from Customers of Period t+2 from Worksheet Funding with a +/- 2,83% change. 32nd comes the input Gross Loans Mortgage of Period t+1 from Worksheet Loans with a +/- 2,82% change.

In order to summarize our findings, we have constructed a table comparing all 96 significant inputs of all 3 periods respectively to find if there are any inputs of previous terms that influence the output of current terms. The results are as shown below in Table 7.

Table 7

Comparison of each periods' 32 Inputs

t+1			t+2			t+3		
Worksheet	Name	Period	Worksheet	Name	Period	Worksheet	Name	Period
Loans	NPEs _ SMEs	t+1	Loans	NPEs _ SMEs	t+2	Loans	NPEs _ SMEs	t+3
Loans	NPEs _ SBL	t+1	Loans	NPEs _ SBL	t+2	Loans	NPEs _ SBL	t+3
Loans	NPEs _ Large Corporate	t+1	Presentation	All Term G. Loans	t+1	Presentation	All Term G. Loans	t+1
Presentation	All Term G. Loans	t+1	Loans	NPEs _Large Corporate	t+2	Presentation	All Term G. Loans	t+2
Presentation	Average yield on SMEs	t+1	Presentation	Average yield on SMEs	t+2	Loans	NPEs _ Large Corporate	t+3
Loans	Gross Loans SMEs	t	Presentation	All Term G. Loans	t+2	Presentation	Average yield on SMEs	t+3
Presentation	Average yield on Large Corporate	t+1	Loans	Gross Loans SMEs	t+1	Presentation	All Term G. Loans	t+3
Loans	NPEs _ Mortgage	t+1	Loans	Gross Loans SMEs	t	Loans	Gross Loans SMEs	t+2
Loans	Gross Loans Large Corporate	t	Presentation	Average yield on Large Corporate	t+2	Loans	Gross Loans SMEs	t
Presentation	Average yield on SBL	t+1	Loans	NPEs _ Mortgage	t+2	Loans	Gross Loans SMEs	t+1
Presentation	Nominal ir on Term deposit	t+1	Loans	Gros s Loans Large Corporate	t	Presentation	Average yield on Large Corporate	t+3
Loans	NPEs _ Consumer	t+1	Presentation	All Deposits from Customers (Term)	t+1	Loans	NPEs _ Mortgage	t+3
Loans	NPEs _ Other	t+1	Loans	Gross Loans Large Corporate	t+1	Loans	Gross Loans Large Corporate	t+1
Presentation	Admin expenses	t+1	Presentation	Average yield on SBL	t+2	Loans	Gross Loans Large Corporate	t
Loans	Gross Loans SBL	t	Loans	NPEs _ Consumer	t+2	Presentation	Average yield on SBL	t+3
Presentation	Staff costs	t+1	Loans	NPEs _ Other	t+2	Loans	Gross Loans Large Corporate	t+2
Presentation	All Deposits from Customers (Term)	t+1	Presentation	Nominal ir on Term deposit	t+2	Presentation	All Deposits from Customers (Term)	t+2
Funding	Term Deposits from Customers	t	Loans	Gross Loans SBL	t+1	Loans	NPEs _ Consumer	t+3
Loans	Gross Loans SMEs	t+1	Presentation	Staff costs	t+2	Loans	NPEs _ Other	t+3
Presentation	Fee & commission income	t+1	Loans	Gross Loans SBL	t	Loans	Gross Loans SBL	t+2
Presentation	% Increase of Gross Loans	t+1	Presentation	Admin expenses	t+2	Presentation	Nominal IR on Term deposit	t+3
FS	Income Tax	t+1	FS	Income Tax	t+2	Presentation	Staff costs	t+3
Loans	NPEs _ Credit cards	t+1	Loans	Gros s Loans SMEs	t+2	Loans	Gross Loans SBL	t

t+1			t+2			t+3		
Worksheet	Name	Period	Worksheet	Name	Period	Worksheet	Name	Period
Loans	NPEs _ SMEs	t+1	Loans	NPEs _ SMEs	t+2	Loans	NPEs _ SMEs	t+3
Loans	NPEs _ SBL	t+1	Loans	NPEs _ SBL	t+2	Loans	NPEs _ SBL	t+3
Loans	Gross Loans Large Corporate	t+1	Presentation	Fee & commission income	t+2	Loans	Gross Loans SBL	t+1
Loans	Gross Loans SBL	t+1	Presentation	All Deposits from Customers (Term)	t+2	Presentation	All Deposits from Customers (Term)	t+1
Loans	Gross Loans Mortgage	t	Funding	Term Deposits from Customers	t+1	FS	Income Tax	t+3
FUNDING	Term Deposits from Customers	t+1	Presentation	% Increase of Gros s Loa ns	t+2	Presentation	Admin expenses	t+3
Presentation	Average yield on Mortgage	t+1	Loans	NPEs _ Credit cards	t+2	Loans	Gross Loans SMEs	t+3
Presentation	Nominal ir on Sight deposit	t+1	Loans	Gross Loans Mortgage	t	Presentation	Fee & commission income	t+3
FUNDING	Sight Deposits from Customers	t	Loans	Gross Loans Large Corporate	t+2	Presentation	All Deposits from Customers (Term)	t+3
Presentation	% of Savings to total Deposits	t+1	Loans	Gross Loans SBL	t+2	Funding	Term Depos its from Customers	t+2
Loans	NPEs _ SMEs	t	Loans	Gross Loans Mortgage	t+1	Loans	Gross Loans Mortgage	t+1

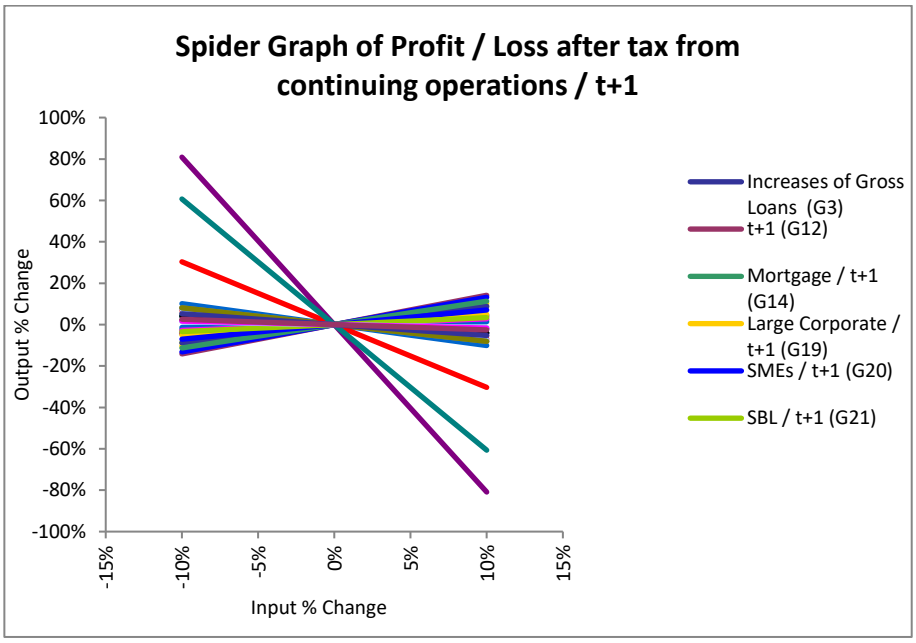
Source: Authors work

What we observe in Table 7 is that the first most significant determinants are NPEs of SMEs and SBLs of every current period in all three terms respectively. Moreover, the most interesting findings have to do with inputs – determinants of past periods, that influence significantly future periods, in particular:

a) All segments of Gross Loans as well as Term deposits of t period, affect significantly Profit / Loss after tax from continuing operations of t+1 period. Also, all segments of Gross Loans of t period and Term deposits with all deposits of t+1 period, affect significantly Profit / Loss after tax from continuing operations of t+2 period. Finally, again, all segments of Gross Loans of t period and all deposits of t+1 period and Term deposits of t+2 period, affect significantly Profit / Loss after tax from continuing operations of t+3 period.

The next step is to interpret the results of the Spider graph for each of the three periods which gives a summarized illustration of all linear relations from AFN model variables given a minus five percentage change (-5%) and their positive or negative influences on Profit / Loss after tax from continuing operations of t+1.

Figure 5
TopRank - Spider Graph Graph of What-If Analysis for Output Profit / Loss after tax (t+1) period



Source: Authors work

We observe that:

% Increase of Gross Loans in period t+1 has a negative relation to earnings of t+1 as for a -0,05 negative change we have a 0,0207 positive change of earnings.

All Term G. Loans in period t+1 has a positive relation to earnings of t+1 as for a -0,05 negative change we have a -0,0708negative change of earnings.

Average yield on Mortgage in period t+1 has a positive relation to earnings of t+1 as for a -0,05 negative change we have a -0,012negative change of earnings.

Average yield on Large Corporate in period t+1 has a positive relation to earnings of t+1 as for a -0,05 negative change we have a -0,0512negative change of earnings.

Average yield on SMEs in period t+1 has a positive relation to earnings of t+1 as for a -0,05 negative change we have a -0,066negative change of earnings.

Average yield on SBL in period t+1 has a positive relation to earnings of t+1 as for a -0,05 negative change we have a -0,0433negative change of earnings.

% of Savings to total Deposits in period t+1 has a positive relation to earnings of t+1 as for a -0,05 negative change we have a -0,0069negative change of earnings.

All Deposits from Customers (Term) in period t+1 has a negative relation to earnings of t+1 as for a - 0,05 negative change we have a 0,027 positive change of earnings.

Nominal ir on Sight deposit in period t+1 has a negative relation to earnings of t+1 as for a -0,05 negative change we have a 0,0099 positive change of earnings.

Nominal ir on Term deposit in period t+1 has a negative relation to earnings of t+1 as for a -0,05 negative change we have a 0,0405 positive change of earnings.

Staff costs in period t+1 has a negative relation to earnings of t+1 as for a -0,05 negative change we have a 0,0345 positive change of earnings.

Admin expenses in period t+1 has a negative relation to earnings of t+1 as for a -0,05 negative change we have a 0,0366 positive change of earnings.

Fee & commission income in period t+1 has a positive relation to earnings of t+1 as for a -0,05 negative change we have a -0,0224negative change of earnings.

Income Tax in period t+1 has a negative relation to earnings of t+1 as for a -0,05 negative change we have a 0,0204 positive change of earnings.

Gross Loans Mortgage in period t has a positive relation to earnings of t+1 as for a -0,05 negative change we have a -0,0139negative change of earnings.

Gross Loans Large Corporate in period t has a positive relation to earnings of t+1 as for a -0,05 negative change we have a -0,0443negative change of earnings.

Gross Loans Large Corporate in period t+1 has a positive relation to earnings of t+1 as for a -0,05 negative change we have a -0,0194negative change of earnings.

Gross Loans SMEs in period t has a positive relation to earnings of t+1 as for a -0,05 negative change we have a -0,0565negative change of earnings.

Gross Loans SMEs in period t+1 has a positive relation to earnings of t+1 as for a -0,05 negative change we have a -0,025negative change of earnings.

Gross Loans SBL in period t has a positive relation to earnings of t+1 as for a -0,05 negative change we have a -0,0353negative change of earnings.

Gross Loans SBL in period t+1 has a positive relation to earnings of t+1 as for a -0,05 negative change we have a -0,017negative change of earnings.

NPEs_Mortgage in period t+1 has a negative relation to earnings of t+1 as for a -0,05 negative change we have a 0,0506 positive change of earnings.

NPEs_Consumer in period t+1 has a negative relation to earnings of t+1 as for a -0,05 negative change we have a 0,0404 positive change of earnings.

NPEs_Credit cards in period t+1 has a negative relation to earnings of t+1 as for a -0,05 negative change we have a 0,0202 positive change of earnings.

NPEs_Other in period t+1 has a negative relation to earnings of t+1 as for a -0,05 negative change we have a 0,0404 positive change of earnings.

NPEs_Large Corporate in period t+1 has a negative relation to earnings of t+1 as for a -0,05 negative change we have a 0,1517 positive change of earnings.

NPEs_SMEs in period t has a negative relation to earnings of t+1 as for a -0,05 negative change we have a 0,0069 positive change of earnings.

NPEs _ SMEs in period t+1 has a negative relation to earnings of t+1 as for a -0,05 negative change we have a 0,4044 positive change of earnings.

NPEs_ SBL in period t+1 has a negative relation to earnings of t+1 as for a -0,05 negative change we have a 0,3033 positive change of earnings.

Sight Deposits from Customers in period t has a negative relation to earnings of t+1 as for a -0,05 negative change we have a 0,0085 positive change of earnings.

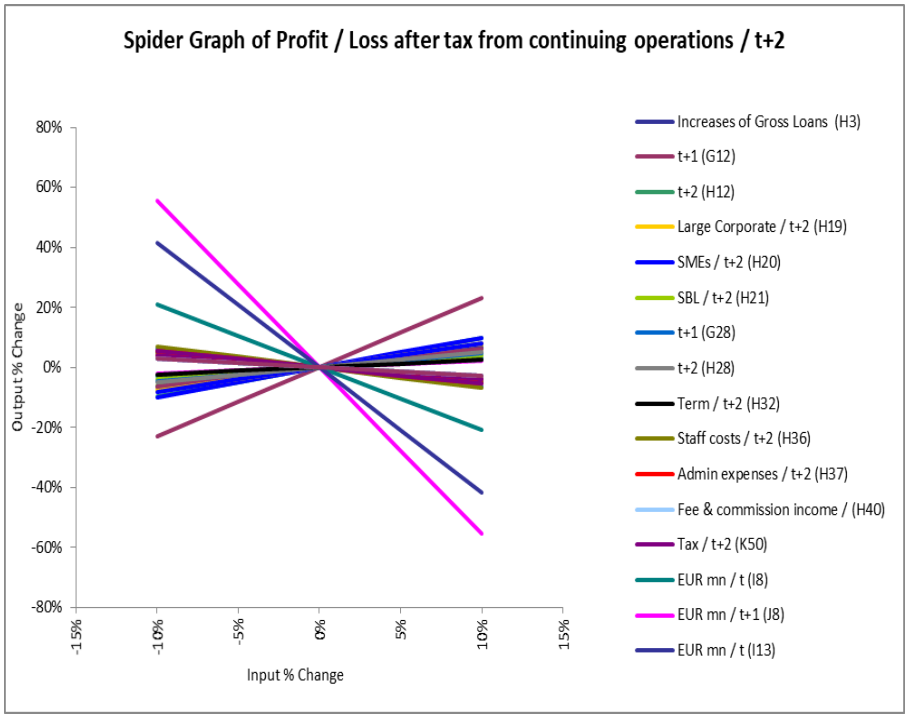
Term Deposits from Customers in period t has a negative relation to earnings of t+1 as for a -0,05 negative change we have a 0,0262 positive change of earnings.

Term Deposits from Customers in period t+1 has a negative relation to earnings of t+1 as for a -0,05 negative change we have a 0,0129 positive change of earnings.

Accordingly, we are going to interpret the results of the Spider graph for Profit / Loss after tax from continuing operations of t+2 as represented on figure 2 Spider graph of t+2.

Figure 6

TopRank - Spider Graph of What-If Analysis for Output Profit / Loss after tax (t+2) period



Source: Authors work

We observe that:

Income Tax in period t+2 has a negative relation to earnings of t+2 as for a -0,05 negative change we have a 0,0204 positive change of earnings.

"Term Deposits from Customers in period t+1 has a negative relation to earnings of t+2 as for a -0,05 negative change we have a 0,0151 positive change of earnings."

"Term Deposits from Customers in period t+1 has a positive relation to earnings of t+2 as for a -0,05 negative change we have a 0,0151 negative change of earnings. "

"Gross Loans Large Corporate in period t has a positive relation to earnings of t+2 as for a -0,05 negative change we have a -0,0326 negative change of earnings. "

Gross Loans SMEs in period t has a positive relation to earnings of t+2 as for a -0,05 negative change we have a -0,0394 negative change of earnings.

"Gross Loans SBL in period t has a positive relation to earnings of t+2 as for a -0,05 negative change we have a -0,0231 negative change of earnings. "

"Gross Loans Mortgage in period t has a positive relation to earnings of t+2 as for a -0,05 negative change we have a -0,0138 negative change of earnings. "

"Gross Loans Large Corporate in period t+1 has a positive relation to earnings of t+2 as for a -0,05 negative change we have a -0,0317 negative change of earnings. "

Gross Loans SMEs in period t+1 has a positive relation to earnings of t+2 as for a -0,05 negative change we have a -0,0405 negative change of earnings.

"Gross Loans SBL in period t+1 has a positive relation to earnings of t+2 as for a -0,05 negative change we have a -0,0246 negative change of earnings. "

"Gross Loans Mortgage in period t+1 has a positive relation to earnings of t+2 as for a -0,05 negative change we have a -0,0111 negative change of earnings. "

"Gross Loans Large Corporate in period t+2 has a positive relation to earnings of t+2 as for a -0,05 negative change we have a -0,0133 negative change of earnings. "

"Gross Loans SMEs in period t+2 has a positive relation to earnings of t+2 as for a -0,05 negative change we have a -0,0196 negative change of earnings. "

"NPEs_Mortgage in period t+2 has a negative relation to earnings of t+2 as for a -0,05 negative change we have a 0,0347 positive change of earnings."

"NPEs_Consumer in period t+2 has a negative relation to earnings of t+2 as for a -0,05 negative change we have a 0,0277 positive change of earnings."

"NPEs_Credit cards in period t+2 has a negative relation to earnings of t+2 as for a -0,05 negative change we have a 0,0139 positive change of earnings."

"NPEs_Other in period t+2 has a negative relation to earnings of t+2 as for a -0,05 negative change we have a 0,0277 positive change of earnings."

NPEs_Large Corporate in period t+2 has a negative relation to earnings of t+2 as for a -0,05 negative change we have a 0,104 positive change of earnings.

NPEs _ SMEs in period t+2 has a negative relation to earnings of t+2 as for a -0,05 negative change we have a 0,2773 positive change of earnings.

NPEs_ SBL in period t+2 has a negative relation to earnings of t+2 as for a -0,05 negative change we have a 0,208 positive change of earnings.

NPEs_ SBL in period t+2 has a positive relation to earnings of t+2 as for a -0,05 negative change we have a 0,208 negative change of earnings.

"All Deposits from Customers (Term) in period t+1 has a negative relation to earnings of t+2 as for a - 0,05 negative change we have a 0,0317 positive change of earnings."

"All Deposits from Customers (Term) in period t+1 has a positive relation to earnings of t+2 as for a - 0,05 negative change we have a 0,0317 negative change of earnings. "

All Term G. Loans in period t+2 has a positive relation to earnings of t+2 as for a -0,05 negative change we have a -0,0486 negative change of earnings.

"Average yield on Large Corporate in period t+2 has a positive relation to earnings of t+2 as for a -0,05 negative change we have a -0,0356 negative change of earnings. "

"Average yield on SMEs in period t+2 has a positive relation to earnings of t+2 as for a -0,05 negative change we have a -0,0496 negative change of earnings. "

"All Deposits from Customers (Term) in period t+2 has a negative relation to earnings of t+2 as for a - 0,05 negative change we have a 0,0156 positive change of earnings."

% Increase of Gross Loans in period t+2 has a negative relation to earnings of t+2 as for a -0,05 negative change we have a 0,0141 positive change of earnings.

Nominal ir on Term deposit in period t+2 has a negative relation to earnings of t+2 as for a -0,05 negative change we have a 0,0251 positive change of earnings.

Staff costs in period t+2 has a negative relation to earnings of t+2 as for a -0,05 negative change we have a 0,0239 positive change of earnings.

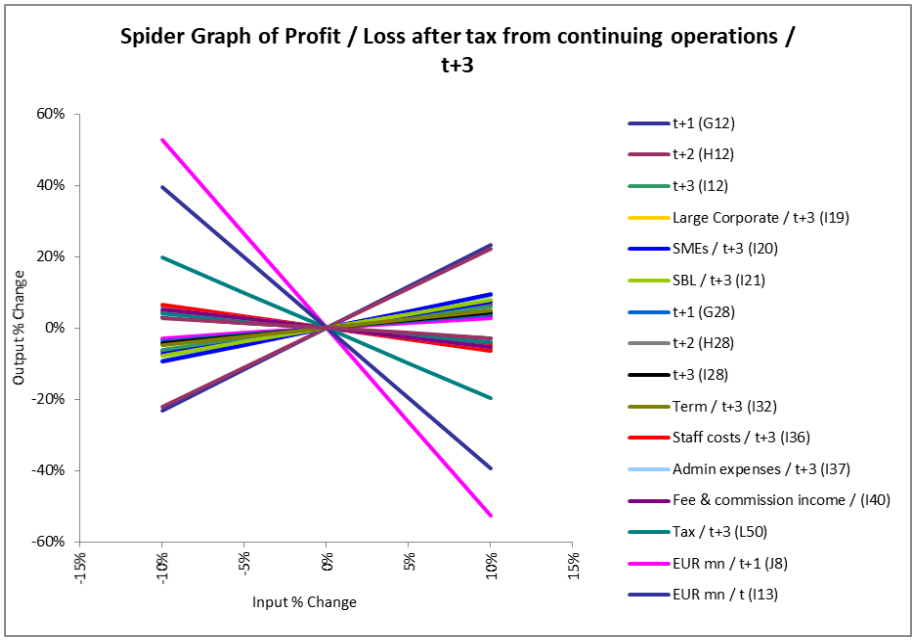
Admin expenses in period t+2 has a negative relation to earnings of t+2 as for a -0,05 negative change we have a 0,0204 positive change of earnings.

Admin expenses in period t+2 has a positive relation to earnings of t+2 as for a -0,05 negative change we have a 0,0204 negative change of earnings.

Finally, we are going to interpret the results of the Spider graph for Profit / Loss after tax from continuing operations of t+3 as represented on figure 3 Spider graph of t+3.

Figure 7

TopRank – Spider Graph of What-If Analysis for Output Profit / Loss after tax (t+3) period



Source: Authors work

We observe that:

Income Tax in period t+3 has a negative relation to earnings of t+3 as for a -0,05 negative change we have a 0,0204 positive change of earnings.

Term Deposits from Customers in period t+2 has a negative relation to earnings of t+3 as for a -0,05 negative change we have a 0,0142 positive change of earnings.

Gross Loans Large Corporate in period t has a positive relation to earnings of t+3 as for a -0,05 negative change we have a -0,0317 positive change of earnings.

Gross Loans SMEs in period t has a positive relation to earnings of t+3 as for a -0,05 negative change we have a -0,0383 positive change of earnings.

Gross Loans SBL in period t has a positive relation to earnings of t+3 as for a -0,05 negative change we have a -0,0224 positive change of earnings.

Gross Loans Large Corporate in period t+1 has a positive relation to earnings of t+3 as for a -0,05 negative change we have a -0,0317 positive change of earnings.

Gross Loans SMEs in period t+1 has a positive relation to earnings of t+3 as for a -0,05 negative change we have a -0,0363 positive change of earnings.

Gross Loans SBL in period t+1 has a positive relation to earnings of t+3 as for a -0,05 negative change we have a -0,0216 positive change of earnings.

Gross Loans Mortgage in period t+1 has a positive relation to earnings of t+3 as for a -0,05 negative change we have a -0,0141 positive change of earnings.

Gross Loans Large Corporate in period t+2 has a positive relation to earnings of t+3 as for a -0,05 negative change we have a -0,0303 positive change of earnings.

Gross Loans SMEs in period t+2 has a positive relation to earnings of t+3 as for a -0,05 negative change we have a -0,0388 positive change of earnings.

Gross Loans SBL in period t+2 has a positive relation to earnings of t+3 as for a -0,05 negative change we have a -0,0244 positive change of earnings.

Gross Loans SMEs in period t+3 has a positive relation to earnings of t+3 as for a -0,05 negative change we have a -0,0186 positive change of earnings.

NPEs_Mortgage in period t+3 has a negative relation to earnings of t+3 as for a -0,05 negative change we have a 0,0329 positive change of earnings.

NPEs_Consumer in period t+3 has a negative relation to earnings of t+3 as for a -0,05 negative change we have a 0,0263 positive change of earnings.

NPEs_Other in period t+3 has a negative relation to earnings of t+3 as for a -0,05 negative change we have a 0,0263 positive change of earnings.

NPEs_Large Corporate in period t+3 has a negative relation to earnings of t+3 as for a -0,05 negative change we have a 0,0988 positive change of earnings.

NPEs _ SMEs in period t+3 has a negative relation to earnings of t+3 as for a -0,05 negative change we have a 0,2635 positive change of earnings.

NPEs_ SBL in period t+3 has a negative relation to earnings of t+3 as for a -0,05 negative change we have a 0,1976 positive change of earnings.

All Term G. Loans in period t+1 has a positive relation to earnings of t+3 as for a -0,05 negative change we have a -0,1159 positive change of earnings.

All Deposits from Customers (Term) in period t+1 has a negative relation to earnings of t+3 as for a - 0,05 negative change we have a 0,0208 positive change of earnings.

All Term G. Loans in period t+2 has a positive relation to earnings of t+3 as for a -0,05 negative change we have a -0,1108 positive change of earnings.

All Deposits from Customers (Term) in period t+2 has a negative relation to earnings of t+3 as for a - 0,05 negative change we have a 0,0297 positive change of earnings.

All Term G. Loans in period t+3 has a positive relation to earnings of t+3 as for a -0,05 negative change we have a -0,0461 positive change of earnings.

Average yield on Large Corporate in period t+3 has a positive relation to earnings of t+3 as for a -0,05 negative change we have a -0,0338 positive change of earnings.

Average yield on SMEs in period t+3 has a positive relation to earnings of t+3 as for a -0,05 negative change we have a -0,0471 positive change of earnings.

Average yield on SBL in period t+3 has a positive relation to earnings of t+3 as for a -0,05 negative change we have a -0,0308 positive change of earnings.

All Deposits from Customers (Term) in period t+3 has a negative relation to earnings of t+3 as for a - 0,05 negative change we have a 0,0149 positive change of earnings.

Nominal IR on Term deposit in period t+3 has a negative relation to earnings of t+3 as for a -0,05 negative change we have a 0,024 positive change of earnings.

Staff costs in period t+3 has a negative relation to earnings of t+3 as for a -0,05 negative change we have a 0,0228 positive change of earnings.

Admin expenses in period t+3 has a negative relation to earnings of t+3 as for a -0,05 negative change we have a 0,019- positive change of earnings.

Fee & commission income in period t+3 has a positive relation to earnings of t+3 as for a -0,05 negative change we have a -0,0165 positive change of earnings.

The above examination of the positive or negative influence of the top 96 variables influencing Profit

/ Loss after tax from continuing operations, is of a main importance as it examines the relations of our deterministic AFN model and we can have a comparison analysis with the variables of our multiple linear regression model which will follow in our research.

5. Conclusions

From the above initial examination of AFN banking model and its sensitivity analysis for the three annual future periods, we can observe ninety-six main inputs taken from a pool of 303 inputs from all five time periods of AFN model, which have a significant impact in determining the main output of Profit / Loss after tax from continuing operations, in every future time period (t+1, t+2, t+3). The most interesting inputs are those of past terms that are already realized. Given this relationship, there is strong evidence that an econometric model can significantly assist the proforma budget financial statements for a 3-year programming period, which is also required at the level of administrative accounting and supervisory authorities in Greece (BoG) and EU (EBA).

The use of administrative accounting information by combining the AFN methodology to construct a static model is the first step in order to access banking efficiency. Because AFN model as a static model is influenced by exogenous factors, mainly macroeconomic variables of economic circumstances like economic crisis therefor a selected group of internal bank performance variables, is examined here and can be forecasted using econometric methodology together with exogenous factors like GDP growth rate, Inflation rate, Euribor, and dummy variance of economic crises.

We believe and are researching to prove that, AFN for banks methodology coupled with the econometric approach through multiple linear regression and the control of uncertainty through Monte Carlo simulation can form a compact and solid framework to access the effectiveness and control of a banking non-systemic institution. To further control and reinforce our findings, the model should be tested in other domestic and multinational bank configurations as well as the possibilities of using methodologies of genetic algorithms and artificial intelligence.

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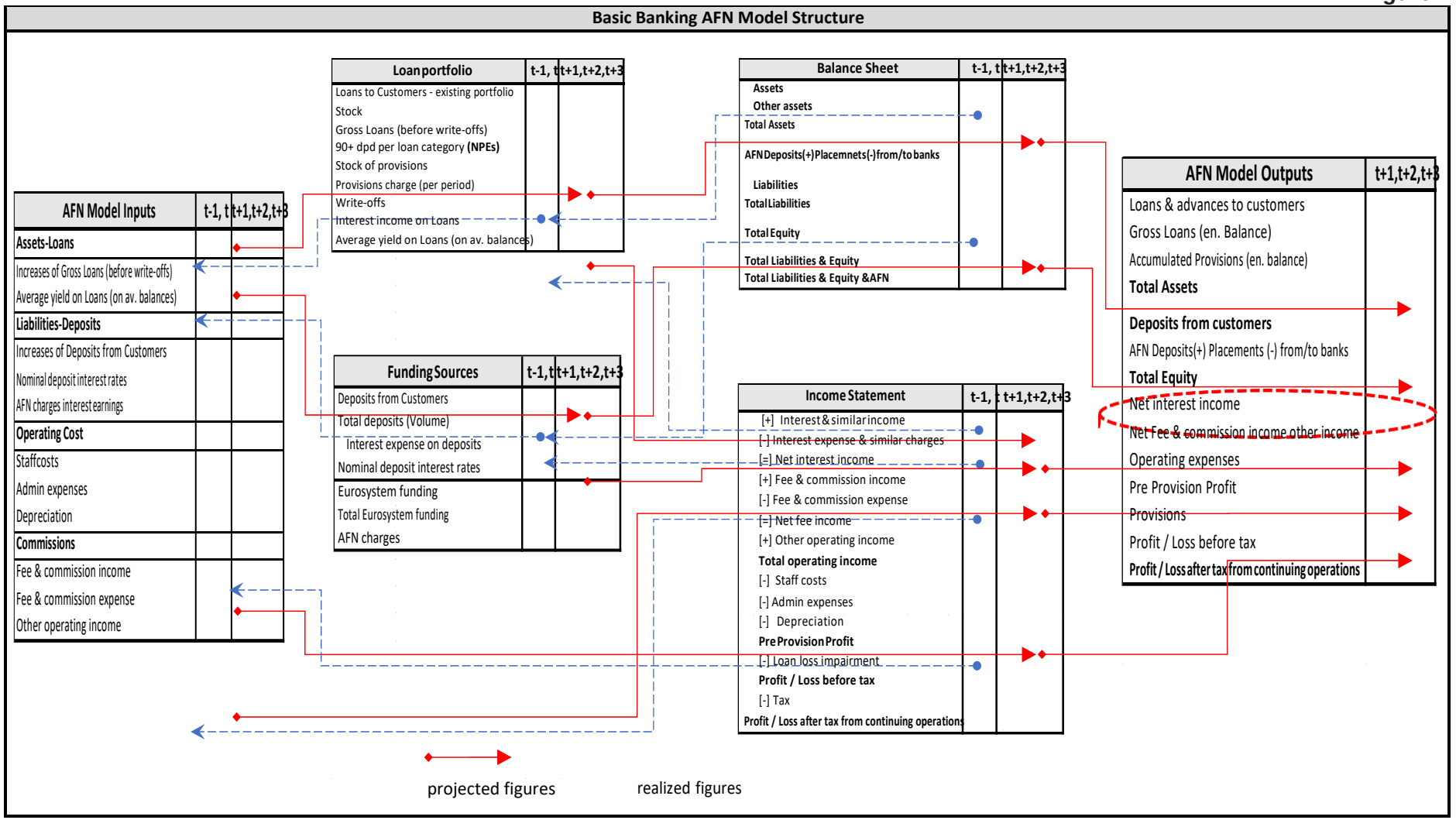
APPENDIX

Figure 1



Source: Authors work