

THE ANALYSIS OF BEHAVIOR OF SWITZERLAND COMPANY BY METHODOLOGY OF RADAR CHART.

Miguel Angel Pérez Benedito

Prof. Accounting Department. Faculty of Economic, University of Valencia.
Avda. del Tarongers s/n 46022 Valencia. España.
miguel.a.perez@uv.es
Phon: +34 963828270

ABSTRACT

This study measures the risk of management and justifies the financial situation of Switzerland companies applying the accounting methodology of radar chart (AMRCh). This AMRCh take the average periods of maturation on axes of radar chart. The ratios obtained from applying the theories of cosine and sine of lineal geometry, can measure the management activity as well as the level of the management risk on each area represented on a radar chart. The quantitative analysis adjusted by qualitative analysis justifies the obtaining a singular ratio to measure the management general risk, which gives the same kind of result that on treasures radial ratios. This mater proves the internal and external validity of this methodology and the multidirectional effect on making decisions.

Key words: Strategic behavior. Risk management. Management methodology. Accounting analysis-

1. Introduction

The risk is an element presents on all activity of a company, and the managers need to know it to make decisions in order to achieve the aims that companies have accomplished. Nevertheless, the management risk there is not respect the external activity of company only. The internal decisions affect too the environment of company as changes on labors or staff members, on information systems, etc. The Internal Control of COSO framework takes on account both, the internal and the external risk, and there are several tools to measure the risk of management. The balanced scorecard (Barlett, G.D, 2013) and the methodology to measure Strengths, Weaknesses, Opportunities y Threats (SWOT) (Jackson, E. at al, 2003. Szwed, P. et al 2013. Mehmooda, et al, 2014) are two alternatives tools to evaluate the management of companies and the experience of analysts can correct or adjust the subjective character of these methodologies.

On situations of economic and financial disturbance, the experience can justify make decision according before crises, trying meet conditions of a similar scenario. The economic progress changes the conditions of trading and perhaps the manager do not have historical references on similar economic environment. Actuality, the financial crisis remains despite measures taken by the monetary authorities applying the principles of Monetary Theory. The main aim of monetary authority is the obtaining of indicators to measure the risk of financial market, according the annual report or Bank of International Statements (BIS, 2013), as well as improve the information of financial report by modification of the method accounting to all economic entity (System of National Accounts 2008). These situations, the subjective character of management decision, the instability of financial market and a new accounting standard, are elements, which guest to generate new methodologies to measure the activity of companies.

According the above paragraph, the indicators obtained from the accounting methodology of radar charts are normalized, independent and objective. This kind of indicators are obtained for application of theories cosine and sine of plane geometry on a radar chart and these theories have relation with financial situation of a company because the average periods of maturation are on each axis radial. Thus the systematic process to obtain these indicators is normalized, theirs value depend of variables of financial report but theirs financial significance is got from the financial significance of own radial variables and, at last, the analyst does not involved to get them. In order to apply this methodology on Switzerland companies, the first part of this study presents a resume of previous studies of Perez (2013, 2014) and explains this methodology. The second part explains the criteria to select Switzerland companies and how theirs information have been obtained. The third part explains the result of application of this methodology on Switzerland companies and the last part is dedicated to conclusions.

2. The methodology of radar charts.

The methodology or radar charts aims to measure the management activity of company by the indicators obtained from the application of cosine and sine theorem of plane geometry on radar charts. A radar chart represents the result of management activity. The graphic representation of this result is obtained when the value of the average periods of maturation of a company are on axis of a radar chart. This question is important in this methodology because an average period of maturation is an indicator obtained by relation between accounting variables of financial statement and they are not statistic variables obtained off this last consideration.

An example of radar chart is the graphic 1. It represents the activity of a Switzerland company of twenty companies, which have been selected to do this study. On table 1 there are accounting variables applied to obtain the average period of maturation. An average periods of maturation is a relation between the period of the time that a company take to present its annual accounts and the number of the time that an account of operative activity take to be again on the economic or financial flow which generates it. The last measure is kneed as turnover ratio. So that, the multiply between the turnover ratio and its average period of maturation has ever the constant value of 365 days, the measure of annual commercial year. The expression 1 presents the constant relation

Average period of maturation (APMi) * turnover ratio (TRi) = 365 (1)

i= sales (s), collect (c), payment (p)

The expression 1 is too relevant for the methodology or radar chart. It shows on radar chart the dynamic of activity. Under criteria of efficiency, when a radar is more concentrated than the other one the activity on the first one is more dynamic than on second one. Moreover, when a triangle sides are parallel the financial situations of company are same or equivalent, on both sort and large term. This last characteristic indicates that the orientation of the triangle side of radar chart is relevant to evaluate the activity of company, and applying the theorems of cosine and sine can be obtained the evaluation of financial situation.

Before applying the theories of cosine and sine, the significance of financial situation begin with the obtaining of distances between two average periods of maturation. These distances are named perimetral distances (PDk) in this methodology. The compering of perimetral distances according to an optimal financial situation must obtain six kinds of financial slags in this methodology (Table 2). The following expression is the theorem of cosine and by its application is obtained each PDks

$$PDk^2 = pi^2 + pj^2 - 2 \cos 120 * pi * pj \quad (2)$$

K=1(sales area), 2(treasury area), 3(purchase area)

i≠j; i=j= sales (s), collect (c), payment (p)

The optimal relation of DPk is DP3>Dp2>DP1 and over this relation, comparing two by two as combinations without repetition, the application of sine theorem allows us to obtain of necessary and sufficiency conditions to measure the financial sufficiency and the liquidity of result on each area represented on a radar chart (Table 3). The expression of sine theorem is as follow:

$$PDk \div \text{sine } 120 = pi \div \text{sine } \alpha K = pj \div \text{sine } \beta k \quad (3)$$

K=1(sales area), 2(treasury area), 3(purchase area)

i≠j; i=j= sales (s), collect (c), payment (p)

To control the valuation of angular relations on table 3, which measures the sufficiency and liquidity result conditions, the expression 4 must be meted. The expression 4 is an equity relation because adjusts the proportional relations on a radar chart among the angular coefficients respect to results of each one of management area and it is as fallow:

$$\text{Sine } \alpha 1 \div \text{sine } \beta 1 * \text{sine } \alpha 2 \div \text{sine } \beta 2 * \text{sine } \alpha 3 \div \text{sine } \beta 3 = 1 \quad (4)$$

Moreover, comparing the expression of liquidity result it is possible obtain the general expression to measure the risk of management, and too this expression allows to control, at same time, the validity of the condition of liquidity result on treasure area. The following expressions measure the general management risk, where VAT is the acronym of Value Added Tax.

$$1 > \beta_1 \div \alpha_2 * \beta_2 \div \alpha_3 * \alpha_1 \div \beta_3 > [\text{Purchases} * (1 + \text{VAT}) \div \text{Sales} * (1 + \text{VAT})]^2 \quad (5a)$$

$$\beta_1 \div \alpha_2 * \beta_2 \div \alpha_3 * \alpha_1 \div \beta_3 > 1 > [\text{Purchases} * (1 + \text{VAT}) \div \text{Sales} * (1 + \text{VAT})]^2 \quad (5b)$$

The five expressions study the multiplicative effect of expression the liquidity of result. The expressions 5a and 5b are according to the positive and negative financial slack of table 2, respectively. The table 2 presents the management criteria to measure the making decisions. The financial slack of “A” kind shows the market trusts on management of company and the DP3 perimetral distance is the highest of them all and, opposite it, the financial slack of “C” kind is according when the market do not trust on management of company. At same time, the liquidity of financial market is present in the criteria to do the ranking of financial slack on table 2. Therefore, when the market has not liquidity the financial position must be the smallest of all perimeter distances (PD2) that the company can achieve on its management.

According the above paragraph, when a company manages its activity based on the credit to clients, the financial slacks are negative, and the interpretation of the activity management must be according to the financial position of company. The evaluation of Switzerland companies has been made according the different financial slacks of the table 2, and not considering the best criteria of management. This criterion is according the financial slack “B” and “D” when the credit is obtained or granted to market, respectively. Any analyst can apply the above optimal criterion of management, but the evaluation of companies sample on this study researches the effect of companies on financial crisis in of theirs own financial slack, as they respond to financial crisis and without considering the economic sector where they belong.

3. Empirical analysis of Switzerland companies

3.1. The Selection of database

This study is made through accounting information of Switzerland companies on database ORBIS. The Switzerland is a country in the center of Europe and has not any communication with the sea. This situation allows us to study of the management of their companies, which support a cost of location supplied by a high level of communication. To evaluate a continued activity through this accounting methodology, the Switzerland’s companies selected on this study are maintaining a higher level of employment a long of ten last years, about 100 employees, and within this sample the first 25 company with a higher level of sales has been selected. Moreover, as the period of study contains the last years, it allows evaluate what has been the general effect of financial crisis on this country, because the companies have not selected respect to an economic sector.

The evaluation of management behavior of above companies is made by accounting methodology of radar chart (AMRCh). This methodology uses the average periods of maturation on radar axes to evaluate the activity of company, and on table 1 there are the accounting variables applied to obtain this kind of averages. The Cost of Good Sales is the ad of Consume of Material, the Cost of Employment and the Amortization & Depreciation, and the Consume of Materials adjusts for Variation of Stocks is the purchases of companies. The bellow expressions are the average periods of maturation, where VAT is the acronym of value-added tax.

$$PS = (365*AS)/CGS; PC = (365*AD)/[S*(1+VAT)]; PP = (365*AC)/[P*(1+VAT)] \quad (6)$$

The valuation of sales and purchases with VAT represents all credit that companies obtain from and give to the financial market for a period of study, respectively. That is to say, a company has economic and financial relations within its business activity. The financial valuation of purchases and sales from the economic transactions are affected with the VAT because the debtors (AD) and creditors (AC) of balance sheet have included the VAT on their respective values. The expression 6 is a proportional relation and their variables must have same criteria of valuation. This matter is relevant and it shows for why a statistic average of collect and payment periods are not accept in this accounting methodology, it due these variables have not relation with accounting statements and cannot explain the behavior of company in this methodology.

Before to continue, it is need to advice that this study is applied only on non-financial companies and not all of them have activity along of period of study. Nevertheless, radial chart indicators allow making longitudinal and transverse studies, so that the numbers of observations are more important that number of used companies in this study. The graphic 2 presents a company selected on this study and the tables 5 and 6 are the radial variables applied to evaluate the management of companies of this study. The number of observations for company and year are 25. When on a year fulfils the conditions of financial sufficiency and liquidity result the area of management present a value 1 on table 6 and for getting an management optimum the three areas must fulfil all conditions at same time on a year.

3.2. *The management analysis.*

The Switzerland companies have different behaviors of management. The financial slacks on table 7 are different on period of study and the kind A present the high level of them. It indicate the financial market trust on theirs management, as well as there is a high level of activity on years 2009 and 2010. The chi square test [$X^2_{95\%}(40) = 0.99564766$] proves there is relation between the financial slacks and the economic situation of years. To prove this last matter, the table 8 present the times of companies get positive or negative financial slacks on a year as well as along of period of study. At same time, the table 9 present the financial situation of company through ratios of financial autonomy, which is the relation between the Equity and the Liability on short and long term of companies. This ratio measures how many times the Equity can pay all Liability of companies and when this ratio takes a value superior to one, the company get autonomy financial and can pay the Liability of companies. The two criteria to measure the result of management of table 8 and table 9 are represented on graphic 3, where there are relations between financial slacks (PFS, NFS) and ratios of financial autonomy (RFAs).

The financial situation of companies changes along of period of sturdy according the evolution of financial crisis. This subject can see it on graphic 3 where the principal Y axes are the proportional times of PFS and RFA when it has a value less than one, and the secondary Y axes represents the proportional times of NFS and RFA when it has a value superior to one. On 2005 year, there are not any economic and financial perturbations because the PFS and NFS are adjusted to RFAs, so that we can say the effects of financial crisis beginning on 2006 year and 2009 year present the high level of financial perturbation. The sequent years, from 2010 to 2013, the companies adjust their financial positions. This analysis can see better through coefficients of correlations among the radar accounting ratios (RARs). These measure the conditions of sufficiency and liquidity result on each management area and the change of decisions between years can been measured because one decision on an area affects to all management of company. In other words, if a company have the same management along of period its RARs will not change and will have the same behaviour on each year. According this matter, the table 10 and 11 present the average of RARs of each Switzerland companies, and the table 12 are the coefficient of correlations of years for a transversal analysis.

The value of coefficient of correlations to year 2008 has a high level from it to 2012 on table 12, and before years 2008 its level of correlation is too lower. Moreover, the coefficients of correlation to years 2005, 2006 and 2007 have a high value between them. The year 2013 is a new situation, which have its beginning on 2011 year. According the graphic 3, the behaviour of Switzerland companies is adjusting on 2013 to similar position of the 2005 year, when there are not any economic and financial perturbation.

The relation between radial ratios and financial situation of companies can explain the strategic behaviour of companies. When there are not any economic disturbances on markets, they can give credit to company and the positive financial slack (PFS) have relation with an external financial of company because the ratio of financial autonomy (RFA) is less than one. At same time, in the absence of economic shocks, the company adopt a negative financial slack because the companies trust on solvency of markets and the NFS take the same tendency of RFA. This subject is on graphic 3 and it is analysed by relations of radial ratios of PFS and the RFA and ratios of NFS and the RFA on next paragraph.

3.3. The relation of kind of financial slack and the financial situation

This study pursues the analysis of management behaviour of several companies on a Country, regardless of the economic sector to which they belong. It wishes analyse the answers of companies on period of financial crisis between 2005 and 2014 years through the AMRCh. On this kind of period, the companies get to continue their activity by adjusting its management decision, according to the external and internal conditions of economic environment. So that, we explain their decisions trough financial slack adopted on their management. That is to say, a company can adjust its activity on a year, but this adjust can be due according to conditions of the market and it does not have why to be due to conditions of its economic sector, necessarily

The analysis for areas is made by different kind of financial slacks. The kind of positive and negative radial ratios are according to the kind of financial slack, and this information is on table 13. The purchase area will be firstly analysed by graphic 4. The management on this area shows decreasing of financial sufficiency ratios on two kinds of financial slacks (RSF POS, RSF NEG) but the liquidity result ratios (RLR POS, RLR NEG) improve for a two kind of financial slacks on last years. However, it is need warn that the ratio of financial sufficiency is ever below the one value, when companies are on negative financial slacks, and never get a financial sufficiency. That is to say, when strategic behaviour of companies is giving credit to the market, or the management of Debtors portfolio have relevance on their strategic behaviour, companies need external financing on purchases area to maintain their strategic position.

The management on sales area (graphic 5) presents ever a financial sufficiency higher than one but it is better when the management is according to negative financial slack ($RFS\ NEG > RFS\ POS > 1$). However, liquidity result on negative financial slacks is rather than to positive financial slacks. The last ratio (RLR POS) is higher than to one from 2007 to 2013 on graphic 5 and it is indicating the financial position on this area is not adjust of management result. Therefore, the management risk increases and companies need external financial to maintain their financial positions on short term on this area. In order to maintain the economic activity, the companies adopt the negative financial slack and the management of client portfolio is the key to improve the financial positions of companies. The analysis of treasure area is according to this kind of management, because the graphic 6 shows as the liquidity result improves from 2011 to 2013 on two kinds of financial slacks and the financial sufficiency of treasure decrease but never is lowest than one. So, the ratio of financial autonomy is higher than one and the Equity is the kind of financing that allows maintaining the activity to companies according to the result of management on sales area and the kind of financial slacks, how it has been explain on above graphic 3.

The evolution of treasure area shows the financial needs of companies on graphic 6. The continued lines are referred to principal Y-axes and they are the evolutions of sufficiency financial ratios of two kinds of financial slacks. Their evolutions are indicating the financial difficult of companies on two kinds of financial slacks. At same time, the ratio of financial autonomy takes a value high to one from 2007 year up to 2013 year. This ratio is represented on dashed lines and it is referred to secondary Y-axes. Its evolution is according to kind of financial slack and to describe it, we consider the significance of liquidity result, which are represented by dashed lines and they are referred to secondary Y-axes too. These last ratios represent the measure of management risk on two kinds of financial slacks. When the ratio RLR POS increase the management risk increase too on positive financial slacks, so its increase up to 2011 and the decreasing of ratio financial sufficiency deteriorates the financial situation of companies, which have their management on this kind of financial slack. The behaviour of companies, which are adopted the negative financial slack, improve their financial situation because the ratio of liquidity result increase too, although the ratio the financial sufficiency decreases, but never is less to one value and the last year (2013) increases. The general loss of financial sufficiency is covered by Equity financing, according to the kind of negative financial slack. This evolution explain the external validity of MARCh. This subject will be study later on other paragraph dedicated to analyse RG-AG and WI companies, which present a short information on tables 5 and 6. Now, we know that a radar chart is not only a picture, it have accounting information to study the management behaviour of companies.

3.4. The general analysis of Switzerland companies through kind A of financial slack.

The management analysis of radar chart take as basic information the average of accounting radar ratios of Switzerland companies. The values of variables on this analysis are longitudinal to evaluate the behavior companies along of period. Consider firstly the coefficient correlation on table 14. The result obtained shows that the commercial area (Area 1) presents the best relation between the financial sufficiency and its liquidity result (0.9517). On other two areas, the ratios of financial sufficiency of purchases and treasure areas have a high correlation (0.9812). The lineal dependency of financial sufficiency ratios are presented on graphic 7 and their values are on table 10. The three areas get financial sufficiency because their values are superior to one and companies do not need external financial due the level of management risk of area treasure is less than to one on graphic 8, and it fulfils the conditions of liquidity result of table 3.

The correlation of liquidity result coefficients measure the evolution of management risk and have a high level on three areas (about 0.87) on table 14. The evolutions of these radial ratios are on graphic 8 and show how the three level of the risk of management increase along the period of study. When these ratios (RLRA1, RLRA2, RLRA3) fulfill the conditions of table 3, the results of management areas allow get financial sufficiency and each area do not need a financing external to itself, so that the company gets an optimal management. According the strategic of companies, the losses of financial sufficiency on purchases and treasure areas are being cover by its increasing on the sales area (graphic 7). Nevertheless, the sales area do not fulfil an optimal management (graphic 8) and their instabilities can be maintain through the management on purchases and treasure area, which levels of management risk fulfill the condition of table 3.

The result on above paragraph indicates the companies' Switzerland game financial sufficiency on sales areas but do not get the liquidity result and do not fulfill the management optimum on this area. This result presents an inconsistency with the general opinion for the companies' sample. Nevertheless, this criterion of evaluation is obtained by average of radial ratios on table 3, and we know that an average is a statistic obtained among values, which can be not concentrated, and thus its value do not adjust to the behavior of element subjects to study. The table 11 shows a hard change of tendency on indicator $\beta_1/\alpha_1 * \beta_2/\alpha_2 * \beta_3/\alpha_3$, but the indicator $\beta_1/\alpha_2 * \beta_2/\alpha_3 * \alpha_1/\beta_3$ have the same tendency of RLRA2 (indicator α_1/β_3). The last indicator measure the liquidity management result on treasure area and can be applied to explain the behavior of company, as we have said about the utility of expressions 5a and 5b to measure the general risk of management of companies

The table 14 shows how many times the companies fulfill conditions of financial sufficiency and liquidity result at same time according to their kind of financial slack. The number of times the companies present management optimums on sales area (96) is higher than purchases area (65) and the chi square test [$X^2_{95\%}(16) = 0.998580839$] fulfill the null hypothesis, and there are dependency between management of companies and the economic situations on period of study. Nevertheless, the companies take the positive financial slack as management strategy (table 8). These results are indicating that the quality variables have more relevant than quantitative variables when the analysis is not singular for a company in accounting methodology or radar chart (AMRCh). This matter is present on every kind of static study and it is adjust by not considering any outlier in results. So that, every conclusion in AMRCh must overcome the quantitative and qualitative results, and all it justified the internal and external validity of its radar ratios. Therefore, the Switzerland companies maintain its management strategy on sales area and translate to Creditors the capacity to financial their economic activity, changing their management towards positive financial slack. This aspect shows that you cannot perform an analysis without considering the uniqueness of the kind of strategy adopted and, in addition, measure business activity under optimal criteria (financial slack of kind A) not allows us to reach a solid analysis of the economic reality. A singular study over two companies will show this matter.

3.5. The singular application of accounting methodology of radar chart (AMRCh)

The application of AMRCh on companies RGAG and WI will explain the decision made on management and will justify the general tendency describe on above paragraph 3.3. The behaviors of RHAG and WI are on table 6 and the graphic 9 presents their radar chart. The perimetral distances of sales area (DP3) are parallel on years 2003 and 2015 for two companies. This situation do not changes the financial positions of companies on sales area, but they improve on purchases area and treasure area, improving the financial situation of companies because the general risk of management decreases (graphic 10) and the financial autonomy ratio decrease. The decreasing of the last ratio is due to increasing the average period of payment and it indicates the market trusts on the activity of companies. The management strategy on period of study supposes maintain the positions on portfolio of clients and improve its financial positions on purchase area. This situation changes its financial slacks as well as the autonomy financial ratio, indicating that market trust on management decisions.

The tow companies are on different economic sectors (the RHAG Company is on 2110 sector and the WI Company is on 0910 sector) and the test t Student confirm its independency on their management risk (table 15). Nevertheless, we know that tow companies adopt the same behavior on period of study (graphic 10), as the coefficient of correlation it indicates (0.8075). The obtaining a general indicator for to measure the management risk allows the evaluating of the behavior of companies for a general and singular study. However, on AMRCh it is possible to get a singular analysis by each management area to explain how and why the companies made its decisions (table 6). It is need to advise, the result of management is the relation between accounts of the annual profits and losses account affect with the VAT. Comparing these management results, we know the management purchases is where companies get profit because the ratio $CGS/S*(1+vat)$ increases on 2013 respect the evolution of others two ratios. According this methodology (AMRCh) this management ratios are compared with the financial situation of companies on sort term on each area, and evaluate their adjustment to management of company. Therefore, the increasing of management ratio of sales get worsen the financial situation on this area from 2008 to 2013 because the ratio of management risk (β_2/α_3) do not change its value and the fulfilling the condition of liquidity result is more adjust on 2013 than 2008. The external validity of this methodology get here reason to be, because the effect of activity on sort term have effects on all financial structure of companies, which has been measured through the ratio of financial autonomy, according it has been said on paragraph 2. That to say, the decision of purchases area changes the financial slack: increasing the ratio of financial sufficiency (α_1/β_2) and improve the risk of management (β_1/α_2 & $P*(1+VAT)/CGS$). The effect of this change gives liquidity and the financial situation improving the radar ratios on treasure area as well as the financial structure of companies because the ratio of financial autonomy changes too. Therefore, the evolution of kind of financial slacks and the ratio of financial autonomy have now its explication.

4. Conclusion

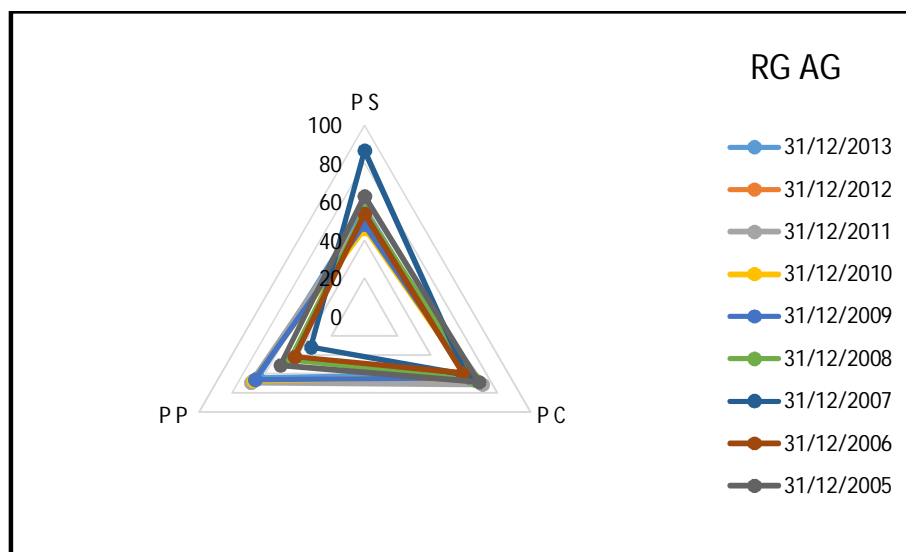
The Accounting Methodology of Radar Chart (AMRCh) applied on Switzerland companies confirm the relation between the management of short term and the financial structure of companies. The study made by each management areas shows that qualitative and quantitative analysis need get a same result on every analysis. Moreover, the analysis through cluster of kinds of financial slack gets more significance adjustment the statistic variables obtained to make the analysis of management behavior of Switzerland companies. This analysis strategic following on 3.3 paragraph proves the companies have different result on their management according to their kind of financial slacks on a year. It makes us to choose among 6 kinds of financial slacks for each year.

The economic situations of Switzerland companies worsen form 2005 to 2013 but according to the kind of financial slacks. For positive and negative financial slacks, the critical situations are on 2010 and 2011 years, because within evolution of treasure area on graphic 6, the ratios of finical sufficiency, liquidity result and financial autonomy presents a critical situation. On the next years (2012, 2013) the economic situation change of each one but it depends of adopted kind of financial slack for companies. In other words, the general decision adopted by government and monetary authority do not justify if they do not know how is the behavior management of companies because their strategic are too different on a same environment economic. In addition, this methodology can be applied to justify or the management decisions adopted respect economic politic or to critic the economic politic adopted from fiscal and monetary authority.

The AMRCh shows the effect of management decision on areas represented on a radar chart. A decision on an area have multidirectional effects on the other areas and it can be measured through financial analysis and management result. So that, a radar chart says a think more than a simple graphic. The AMRCh has internal and external validity and can explain if economic measures are according the financial situation of companies or if decision made are according the economic environment of a country. Moreover, applying the normalized, independent and objective radar ratios on prospective and retrospective analysis can have better results than those one obtain through the variables with a subjective load, on either the construction of estimation model or on the value of variables. The quantitative analysis has difficult on period of financial crisis but it can adjust by a parallel qualitative analysis how it has proved. Nevertheless, the general management risk ratio can justify our position on analysis of Switzerland companies and it can confirm that the AMRCh have its own consistency to be applied on several kind of analysis.

References

1. Bartlett, G.D. and Johnson, E.N. and Reckers, Ph., 2013. Accountability and Role Effects in Balanced Scorecard Based Performance Evaluations When Strategy Timeline Is Specified. *European Accounting Review*. Available at SSRN: <http://ssrn.com/abstract=2250111>.
2. Jackson, E., Joshi, A. and Erhard, N.L., 2003. Recent Research on Team and Organizational Diversity: SWOT Analysis and Implications. *Journal of Management* 2003; 29; 801. DOI: 10.1016/S0149-2063_03_00080-1. <http://jom.sagepub.com/cgi/content/abstract/29/6/801>.
3. Mehmooda, F., Hassannezhada, M. and Abbasb, T., 2014. Analytical investigation of mobile NFC adaption with SWOT-AHP approach: A case of Italian Telecom. *Procedia Technology* 12, 535 – 541.
4. Perez Benedito, M.A.:2013 a.
5. Szwed, P. Skrzynski, P. and Grodniewicz, P., 2013. Risk Assessment for SWOP Telemonitoring System Based on Fuzzy Cognitive Maps. *Communications in Computer and Information Science* Volume 368, pp 233-247.
6. United Nations (UN), 2008. System of National Accounts 2008. <http://unstats.un.org/unsd/nationalaccount/sna2008.asp>.



Graphic 1. Average period of maturation of ROCHE HOLDING AG (RH AG)

Table 1. Variables applied on obtaining of average period of maturation.

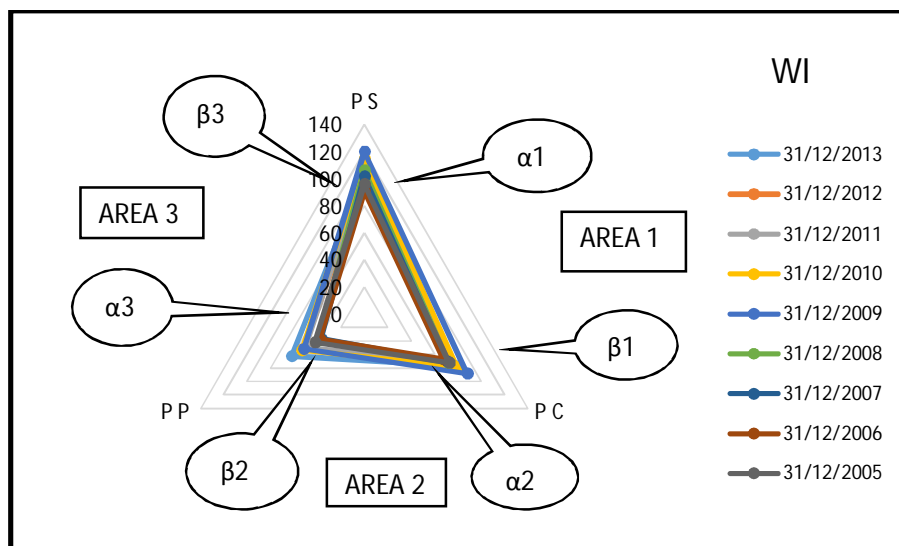
Average period of maturation	Accounts of Profit & Sales (P&S)	Accounts of Balance Sheet (BS)
Days Sales of Inventory (PS)	Costs of goods sold (CGS)	Average Stock (AS)
Days Sales Outstanding (PC)	Sales (S)	Average Debtors (AD)
Days Payable Outstanding (PP)	Purchase (P)	Average Creditors (AC=)

Table 2. The kind of financial slack.

Positive Kind	PD3>PD1	PD1>PD3	Negative kind
A	PD3>PD1>PD2	PD2>PD1>PD3	D
B	PD3>PD2>PD1	PD1>PD2>PD3	E
C	PD2>PD3>PD1	PD1>PD3>PD2	F

Table 3. The necessary and sufficiency conditions on financial slack B of table 2.

Areas	Necessary conditions		Sufficiency conditions	
			Financial Sufficiency	Liquidity result
Area 1	$A1 < 30$	$B1 > 30$	$\alpha2/\beta3 > 1$	$1 > \beta2/\alpha3 > CGS/S*(1+VAT)$
Area 2	$A2 > 30$	$B2 < 30$	$\beta1/\alpha3 > 1$	$1 > \alpha1/\beta3 > P*(1+VAT)/S*(1+VAT)$
Area 3	$A3 > 30$	$B3 < 30$	$\alpha1/\beta2 > 1$	$1 > \beta1/\alpha2 > P*(1+VAT)/CGS$



Graphic 2. Angular coefficients of WEATHERFORD INTERNATIONAL LTD.(WI)

Table 5. Radial variables.

	RH AG 2013	RH AG 2008	RH AG 2005	WI 2013	WI 2008	WI 2005
AVERAGE PERIOD OF MATURATION	2013	2008	2005	2013	2008	2005
P S	56,22	54,64	62,89	103,97	106,33	96,15
P C	60,58	65,60	68,81	77,09	72,18	72,70
P P	64,38	45,17	50,71	62,35	39,36	42,08
PERIMETRAL DISTANCES	RH AG 2013	RH AG 2008	RH AG 2005	WI 2013	WP 2008	WP 2005
DP1	101,18	104,28	114,09	157,38	155,53	146,69
DP2	108,23	96,47	103,90	120,98	97,98	100,57
DP3	104,52	86,57	98,57	145,53	130,54	122,72
ANGULAR COEFFICIENTS	RH AG 2013	RH AG 2008	RH AG 2005	WI 2013	WP 2008	WP 2005
α_1	31,235	33,012	25,416	25,101	23,698	25,416
β_1	28,765	26,988	34,584	34,899	36,302	34,584
α_2	31,004	23,921	21,246	26,506	20,358	21,246
β_2	28,996	36,079	38,754	33,494	39,642	38,754
α_3	27,764	33,137	42,725	38,222	44,863	42,725
β_3	32,236	26,863	17,275	21,778	15,137	17,275

Table 6. Angular ratios of management risk.

Years	RH AG 2013	RH AG 2008	RH AG 2005	WI 2013	WI 2008	WI 2005
Kind of Perimetral distance	B	D	D	F	F	F
$\beta_1/\alpha_2 * \beta_2/\alpha_3 * \alpha_1/\beta_3 (***)$	0,9389	1,5096	1,4158	1,3298	2,4668	2,1723
AREA 1	0	0	0	1	1	1
$\alpha_2 / \beta_3 > 1 (*)$	0,9618	0,8905	0,9451	1,2171	1,3449	1,2298
$\beta_2/\alpha_3 (**)$	1,0444	1,0888	1,0433	0,8763	0,8836	0,9071
$CGS/S*(1+IVA)$	0,6757	0,4435	0,8431	0,6986	0,5607	0,5967
AREA 2	1	0	0	0	0	0
$\beta_1/\alpha_3 > 1 (*)$	1,0360	0,8144	0,8501	0,9131	0,8092	0,8095
$\alpha_1/\beta_3 (**)$	0,9690	1,2289	1,1900	1,1526	1,5656	1,4712
$P*(1+IVA)/S*(1+IVA)$	0,2118	0,2622	0,3757	0,6942	0,6154	0,8246
AREA 3	1	0	0	0	0	0
$\alpha_1/\beta_2 > 1 (*)$	1,0772	0,9150	0,8997	0,7494	0,5978	0,6558
$\beta_1/\alpha_2 (**)$	0,9278	1,1282	1,1403	1,3166	1,7832	1,6278
$P*(1+IVA)/CGS$	0,3134	0,5912	0,4455	0,9938	1,0977	1,3819
Financial Autonomy	0,4500	1,4071	0,9295	0,5955	1,0116	1,9450

(***) The general risk of management, (**) the condition of liquidity of result and the risk of management on areas, (*) the condition of financial sufficiency.

Table 7. Financial slacks.

	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	
A	5	8	6	6	7	5	2	3	3	4	45
B	2	2	3	4	4	4	4	2	3	1	28
C	2	2	3	4	5	3	4	5	4	4	32
D	0	0	0	0	0	1	0	1	1	1	3
E	1	2	3	2	2	2	2	3	3	0	20
F	4	5	4	4	2	4	4	2	2	4	31
	14	19	19	20	20	19	16	16	16	14	159

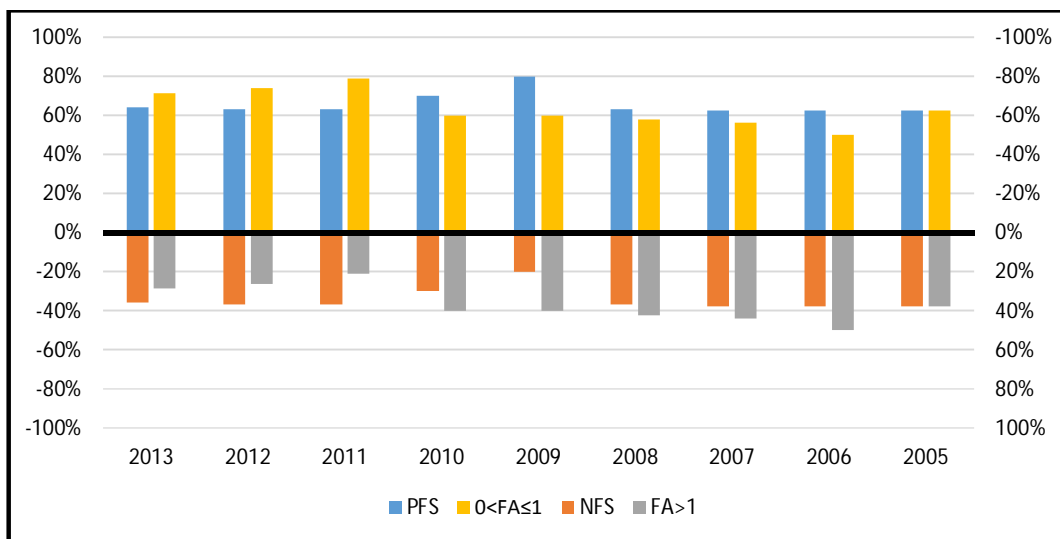
Table 8. The financial significance of financial slack.

	2013	2012	2011	2010	2009	2008	2007	2006	2005	
FINANCIAL SLACK POSITIVE	9	12	12	14	16	12	10	10	10	105
FINANCIAL SLACK NEGATIVE	5	7	7	6	4	7	6	6	6	54
	14	19	19	20	20	19	16	16	16	159

Table 9. Ratio of Financial Autonomy

RFA(*)	2013	2012	2011	2010	2009	2008	2007	2006	2005	
0<RFA≤1	10	14	15	12	12	11	9	8	10	101
RFA>1	4	5	4	8	8	8	7	8	6	58
S U M A S	14	19	19	20	20	19	16	16	16	159

(*) RFA is acronym of Ratio of Financial Autonomy



Graphic 3. Financial slack and Ratio of Financial autonomy. PFS is positive financial slack; NFS is negative financial slack; FA is financial autonomy.

Table 10. Average of radar accounting ratios of financial sufficiency (RARsFS).

Years	2013	2012	2011	2010	2009	2008	2007	2006	2005
$\alpha_2 / \beta_3 > 1$	1,493	1,334	1,294	1,313	1,280	1,296	1,116	1,069	1,023
$\beta_1/\alpha_3 > 1$	1,261	1,543	1,512	1,543	1,621	1,561	1,403	1,497	1,688
$\alpha_1/\beta_2 > 1$	1,201	1,567	1,541	1,536	1,615	1,536	1,337	1,458	1,665

Table 11. Average of radar accounting ratios of liquidity results (RARsLR).

Years	2013	2012	2011	2010	2009	2008	2007	2006	2005
β_2/α_3	2,321	2,115	2,112	1,952	1,868	1,653	1,103	1,080	0,991
α_1/β_3	0,902	0,916	0,884	0,872	0,841	0,921	0,788	0,765	0,751
β_1/α_2	0,968	0,915	0,878	0,897	0,863	0,969	0,874	0,827	0,803
$\beta_1/\alpha_2 * \beta_2/\alpha_3 * \alpha_1/\beta_3$	0,895	0,924	0,837	0,824	0,776	0,961	0,848	0,776	0,761
$\beta_1/\alpha_1 * \beta_2/\alpha_2 * \beta_3/\alpha_3$	2,027	1,773	1,640	1,527	1,356	1,475	0,760	0,683	0,598
$\beta_1/\alpha_2 * \beta_2/\alpha_3 > \alpha_1/\beta_3$ (a)	yes	yes	yes	yes	yes	yes	no	no	no
$\alpha_1/\beta_3 > \beta_1/\alpha_2 * \beta_2/\alpha_3$ (a)	no	no	no	no	no	no	yes	yes	Yes

(a) This relation show the change of tendency on 2008 year.

Table 12. The coefficient of correlations.

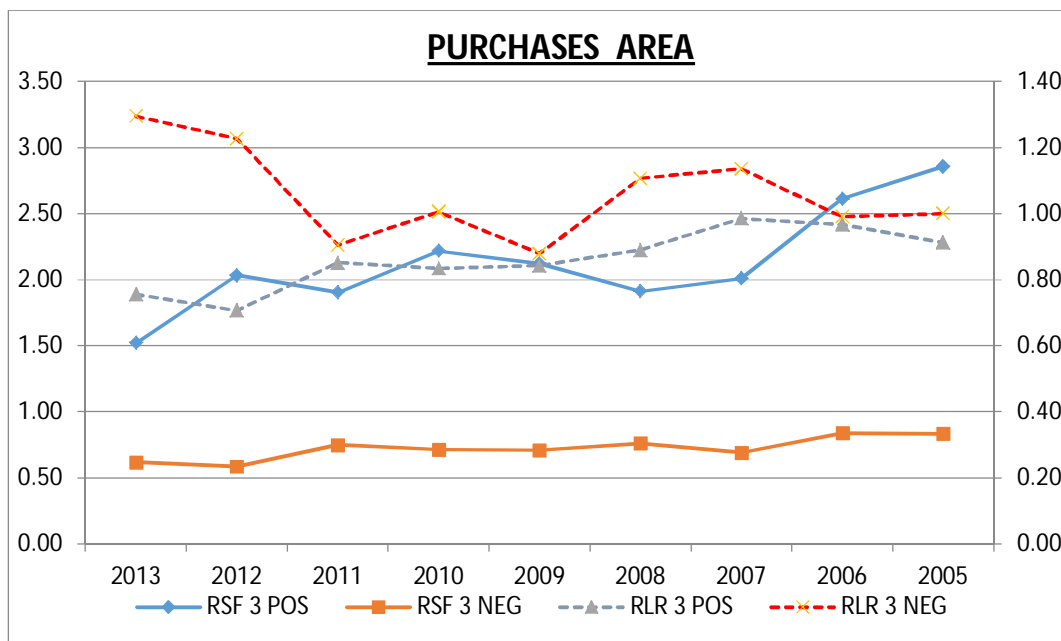
	2013	2012	2011	2010	2009	2008	2007	2006	2005
2013	1								
2012	0,9073	1							
2011	0,9077	0,9992	1						
2010	0,8719	0,9922	0,9935	1					
2009	0,7968	0,9681	0,9702	0,9902	1				
2008(*)	0,7549	0,9477	0,9478	0,9767	0,9952	1			
2007	0,4043	0,7017	0,7027	0,7770	0,8520	0,8923	1		
2006	0,3263	0,6593	0,6607	0,7359	0,8212	0,8625	0,9920	1	
2005	0,1669	0,5406	0,5411	0,6219	0,7232	0,7720	0,9572	0,9844	1

(*) There a change of tendency on 2008 year up to 2012.

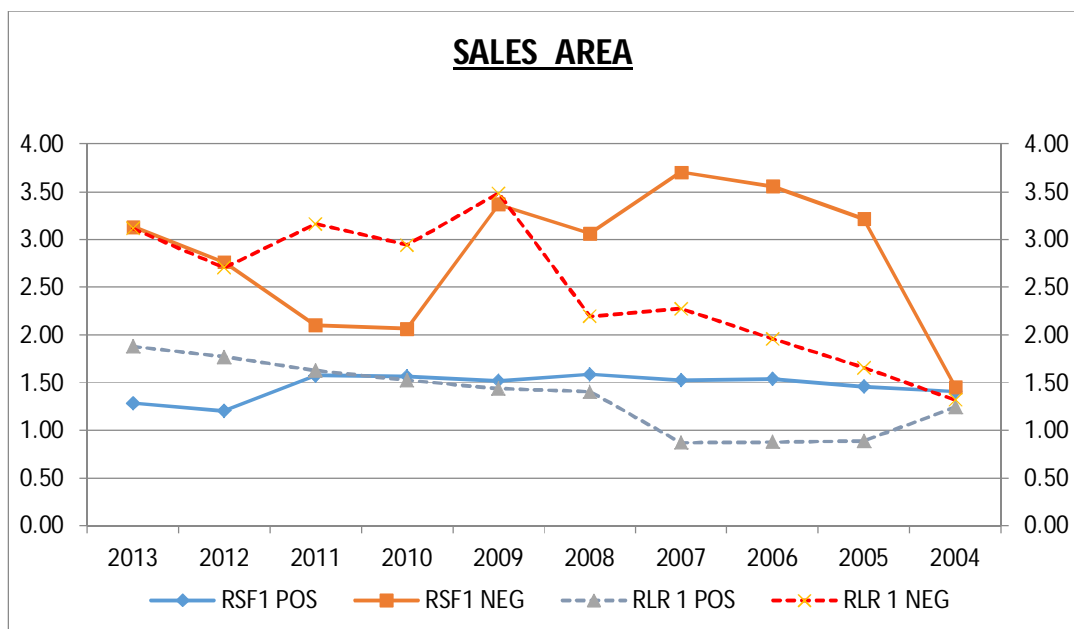
Table 13. Average or radar ratios according to the kind of financial slack.

Ratios (*)	FS(**)	2013	2012	2011	2010	2009	2008	2007	2006	2005
RSF1 POS	POS	1,28	1,20	1,57	1,56	1,52	1,59	1,53	1,54	1,46
RSF2 POS	POS	1,53	1,97	1,84	1,87	1,87	1,96	2,12	2,41	2,76
RSF 3 POS	POS	1,52	2,03	1,90	2,22	2,12	1,91	2,01	2,61	2,86
RLR 1 POS	POS	1,88	1,77	1,63	1,53	1,44	1,40	0,87	0,88	0,89
RLR 2 POS	POS	0,74	0,76	0,77	0,75	0,74	0,74	0,75	0,72	0,68
RLR 3 POS	POS	0,76	0,71	0,85	0,83	0,84	0,89	0,99	0,97	0,91
GRM POS	POS	0,58	0,60	0,61	0,59	0,58	0,58	0,57	0,50	0,44
Ratios (*)		2013	2012	2011	2010	2009	2008	2007	2006	2005
RSF1 NEG	NEG	3,13	2,76	2,10	2,06	3,37	3,06	3,71	3,56	3,22
RSF2 NEG	NEG	1,74	1,61	1,76	1,80	2,75	2,77	3,29	3,16	2,96
RSF 3 NEG	NEG	0,62	0,58	0,75	0,71	0,71	0,76	0,69	0,84	0,83
RLR 1 NEG	NEG	3,12	2,71	3,16	2,94	3,48	2,20	2,27	1,96	1,66
RLR 2 NEG	NEG	1,19	1,19	1,13	1,16	1,21	1,30	1,34	1,22	1,24
RLR 3 NEG	NEG	1,30	1,23	0,90	1,01	0,88	1,11	1,14	0,99	1,00
GRM NEG	NEG	1,46	1,55	1,31	1,38	1,53	1,77	1,90	1,54	1,58

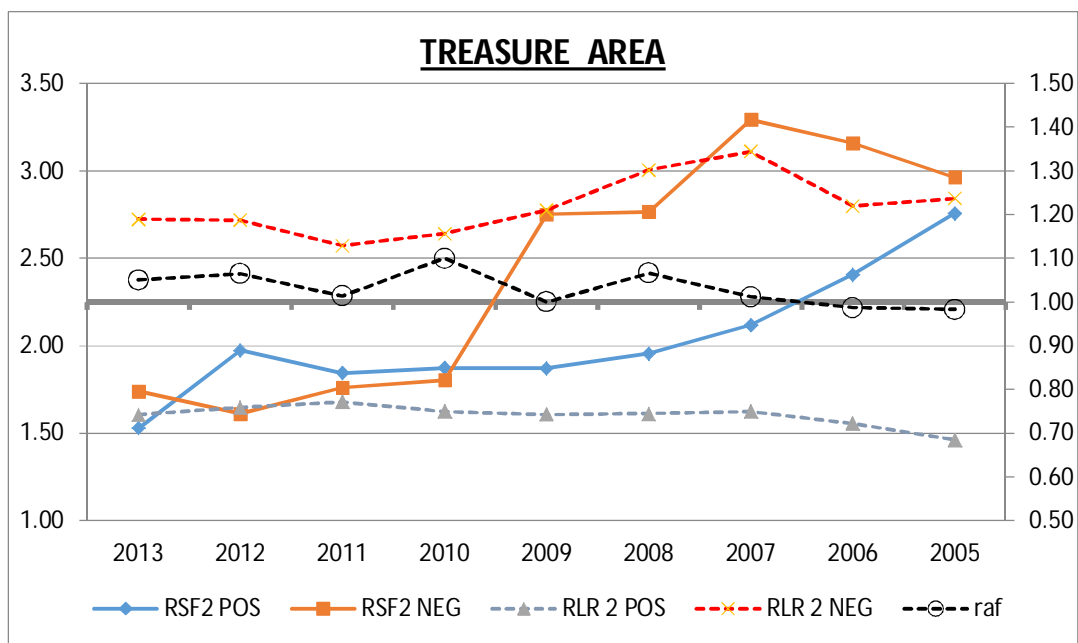
(*) RSF_xPOS variable are ratios of financial sufficiency; RLR_xNEG variables are ratios of liquidity result; GRM_{xxx} are the general risk of management. (**) FS is acronyms of financial slack.



Graphic 4. The evolution of coefficients of financial sufficiency (RSF) and liquidity result (RLR) for positive and negative financial slack on purchases area. The dashed lines referred to secondary Y-axes.



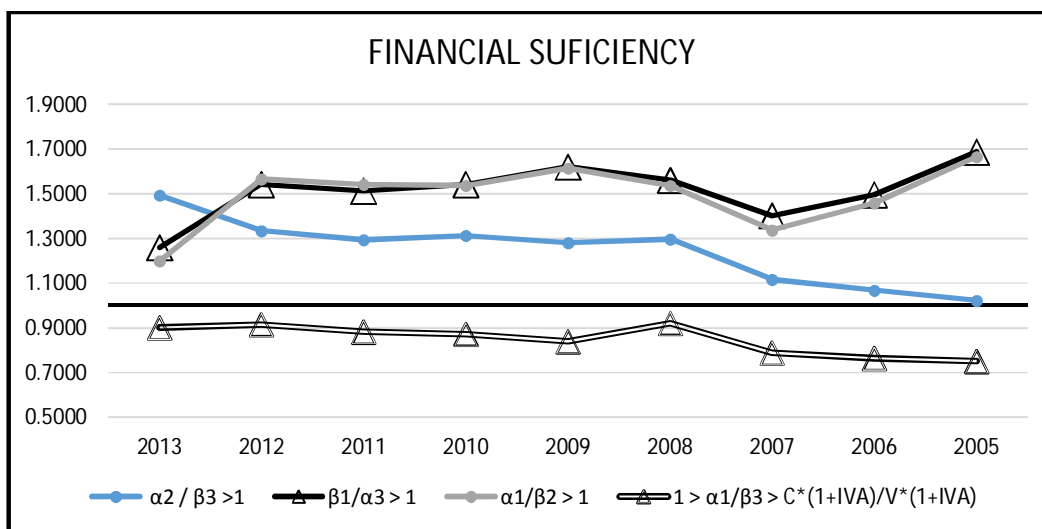
Graphic 5. The evolution of coefficients of financial sufficiency (RSF) and liquidity result (RLR) for positive and negative financial slack on sales area. The dashed lines referred to secondary Y-axes



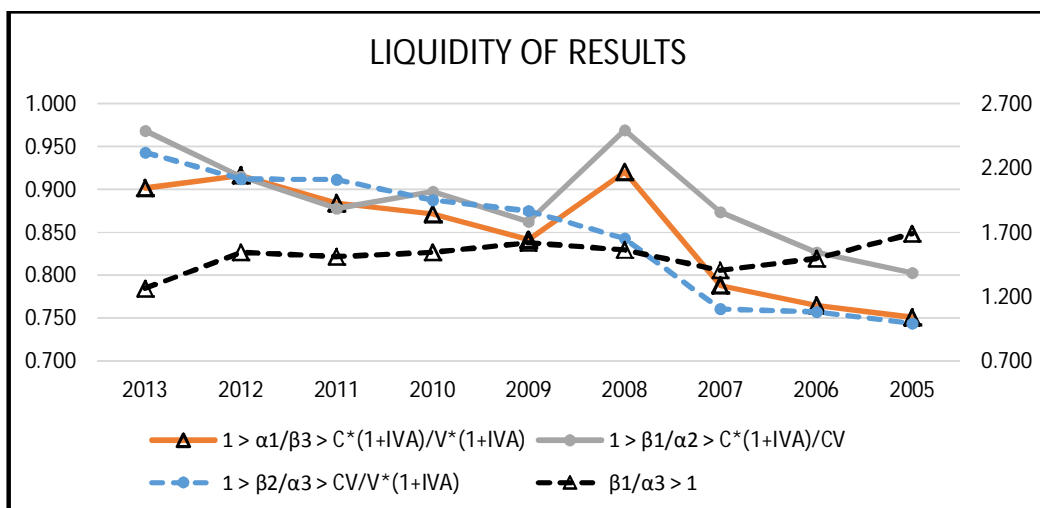
Graphic 6. The evolution of coefficients of financial sufficiency (RSF) and liquidity result (RLR) for positive and negative financial slack on treasure area (raf). Evolution of ratio financial autonomy (The dashed lines referred to secondary Y-axes)

Table 14. Coefficients of correlations of accounting radar ratios.

	α_2/β_3	β_1/α_3	α_1/β_2	β_2/α_3	α_1/β_3	β_1/α_2	$\beta_1/\alpha_2 \cdot \beta_2/\alpha_3 \cdot \alpha_1/\beta_3$
	RFS A1	RFS A2	RFS A3	RLRA1	RLRA2	RLRA3	GMR
RFS A1	1						
RFS A2	-0,499	1					
RFS A3	-0,385	0,982	1				
RLRA1	0,952	-0,337	-0,186	1			
RLRA2	0,895	-0,264	-0,133	0,876	1		
RLRA3	0,847	-0,539	-0,48	0,685	0,879	1	
GMR	0,616	-0,383	-0,32	0,486	0,809	0,895	1



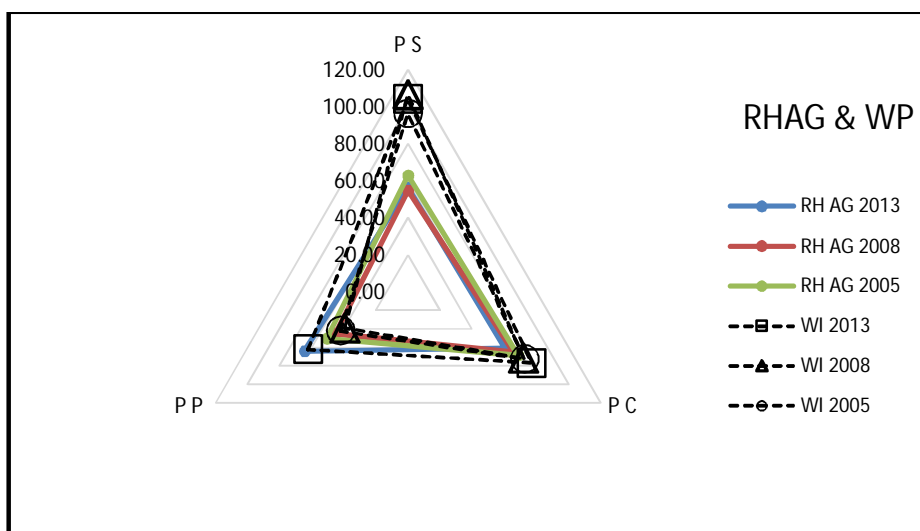
Graphic 7. Coefficients of financial sufficiency and the ratio of management risk on treasure area (parallel line ▲)



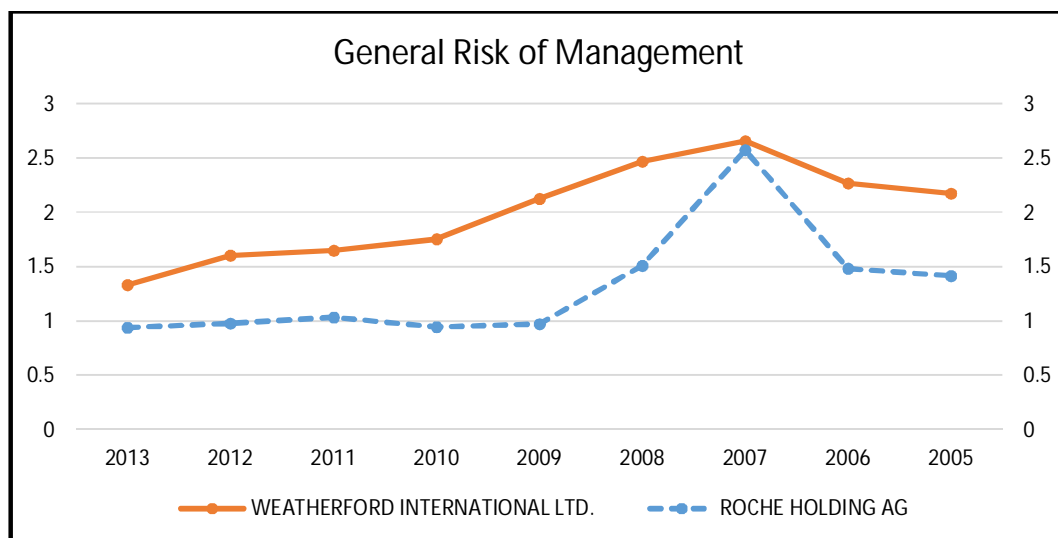
Graphic 8. Level of the risk on management areas. The dashed line is represented on the second Y axes.

Table 14. Number of times the conditions of table 3 are fulfilled

	2013	2012	2011	2010	2009	2008	2007	2006	2005	
AREA 1	10	12	13	12	13	11	9	7	9	96
AREA 2	10	13	15	17	17	14	13	14	14	127
AREA 3	4	4	5	9	11	8	7	8	9	65
	24	29	33	38	41	33	29	29	32	288



Graphic 9. R20adar chart of companies RHAG and WI to yeas 2005 (circles o) and 2013 (square □)



Graphic 10. The evolution of ratio $\beta_1/\alpha_2*\beta_2/\alpha_3*\alpha_1/\beta_3$. The dashed line is represented on secondary Y axes.

Table 15. Test t Student on general management risk.

Test of t Student for two averages to two match samples

	<i>RHAG</i>	<i>W I LTD.</i>
Average	1,31480638	2,002847915
Standard deviation	0,53114089	0,440781107
Pearson's variation Coefficient	0,4039689	0,220077173
Observations	9	9
Pearson's correlation coefficient	0,80751047	
Hipotetic difference of averages	0	
Degree of freedom	8	
Estatistic t	-6,58370319	
P(T<=t) a tail	8,6146E-05	
Critic value of t (a tail)	1,85954804	
P(T<=t) two tails	0,00017229	
Critic value of t (two tails)	2,30600414	