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CUSTOMER CONCENTRATION VERSUS FRAGMENTATION AND ITS IMPLICATIONS IN CORPORATE RISK

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Abstract

This research explores on one side, the composition and structure of databases of clients in a total of 204 multi-sectorial companies based in Spain, Thailand and Indonesia. The criterion used to differentiate a customer´s database structure relates to its degree of "fragmentation" versus "concentration". Also, the research has determined a risk model using a statistical Monte Carlo simulation method in each company. Both, risk levels expressed as certainty to obtain levels of profits and type of customer´s database structure have been analyzed under an Anova test and multiple correlation analysis exploring a total data of N=1020. Results are quite relevant with a conclusion that the volatility of sales affects significantly the changes in the values of certainty of profits, (although not directly to the levels of risk or certainty) related to the achievement of certain results in profits. Consequently, managers should be aware of the importance of a robust quantitative and qualitative accurate sales forecasting method which will contribute with no doubt to decrease corporate risk being extremely helpful when presenting plans or forecasts in front of any kind of stakeholders.

Keywords: Customer´s Database, Risk Analysis, Sensitivity Analysis, Management Strategy

1. Introduction

Initially, this research tries to identify possible links, relationships and causality between the kind of customers which compose a database (database structure) and the levels of risk of the company. For this purpose, the research starts defining two types of possible structures related to the number and weight of the customers in the composition of sales. The classification will lead us to "concentrated databases" and "fragmented databases". The first ones are characterized by representing companies which sell big portions of their sales revenue to a few number of customers while the second ones are characterized by having a big number of customers which buy from the company only small percentages of the total sales volume.

Firstly, a questionnaire based in a convenience sample has been given to managers of companies based in Spain, Thailand and Indonesia, who can obtain the correct information in order to answer the questions. The questionnaire was quite short and simple, being the information objectives as follows: 1. Type of database of customers which appears in the analyzed company. 2. Equation of *Profits= sales-costs* (so, lately can be possible to run simulations which belongs to the company. Through this information, we have access to the desired or target level of profits of each company. 3. Possible fluctuations in each company/case in "sales" and "costs"

taking into account a triangular distribution between the best, likeliest and worst-case scenarios. Note that all this information has been created and submitted by managers themselves.

Secondly, a statistical Monte Carlo simulation has been performed in all 204 companies in order to obtain values related to the probabilities of obtaining any profit, obtaining the desired profit, the sensitivity of the sales fluctuations and the sensitivity of the costs fluctuations.

Thirdly, all data has been incorporated in a software package and an Anova and a correlation analysis test has been performed searching for causality between the structure and composition of the databases (Concentrated versus Fragmented) and the rest of the variables which determine risk.

2. Literature Review

The strategic value of a good customer profitability analysis has been demonstrated (van Raaij, 2005), also applications in the field of services are relevant (Jiang and Talaga, 2006). The strategic implications of an activity-based cost of customer bases have also been explored (Smith and Dikolli, 1995), while maybe the most prominent work in customer concentration applied to debt contracting has been made by Yang (2017).

On the literature review of the application of the Monte Carlo simulations to risk analysis, there are abundant articles which support the utilization of the Monte Carlo simulations in the academic literature, becoming this a usual process when analyzing risk. We can see applications in the fields of real estate (Loizou and French, 2012), (Hoesli *et al.* 2006) and more specifically in real estate activities applied to high-rise developments (Gimpelevich, 2011). Other authors in the industry of real estate apply the risk analysis for evaluating portfolios as (Amédée-Manesme *et al.* 2013). Also, analysis on sustainability and risk in Swiss residential buildings has been developed by Meins and Sager (2015).

Other fields and industries have been tested as well with successful academic publications like the ones applied to the evaluation of cost-risks based in sensitivity analysis (Okmen and Oztas, 2015). Stochastic models using Monte Carlo simulations are also implemented (Shi *et al.* 2013). Interesting models testing capacity planning have been successfully made by Yang *et al.* (2001). Risk analysis applications to the aero engine multiple failures have been also conducted (Li *et al.* 2016). The risks associated to the supply chain and outsourcing process have been evaluated (Olson and Wu, 2011). As stated by Farid *et al.* (2010), it is very appropriate to use the Monte Carlo simulations when evaluating the investment risks in the Stock Exchange. Finally, Kalff (1980) applied the risk analysis to the chances of obtaining several levels of profits, in the same way that this research project does. Liquidity Adjusted Value at Risk has been target of research also by Uslu and Evren (2017) as entrepreneurial activity and preference for avoiding uncertainty on national economic growth made by Martinovic *et al.* 2017).

3. Methodology and Research

Initially, a questionnaire was developed and given to European and Asian companies based on a convenience sample of 215 where 11 companies had to be discarded for lack of data given resulting in an exact number of 204 companies analyzed. As a part of the questionnaire, we asked executives to identify the structure of the databases of the companies where they work. The definition of the structure in these cases has been stated as it follows: Concentrated database of customers (CDC) are those ones made by large customers which purchase big amounts of money from the company. An example of a concentration index would be a database with 5 main customers who purchase 80% of the selling capacity of the company, this concentration index could be expressed as $C_5^{80.}$ On the other side, we have identified a second type of database structure, “Fragmented database of customers” (FDC) is made by many customers big in number which they represent a small amount of purchases. A total of 119 companies belong to the first classification (CDC), while 85 belong to the second one (FDC).

Also, included in the questionnaire, we asked the executives to inform of the possible fluctuations of their sales and costs for the next year and expected corporate profitability. We asked the managers to identify in a triangular distribution the maximum possible level of sales in

the most optimistic scenario, the likeliest scenario (expressed always in base 100%), and the most pessimistic scenario of sales. An example to illustrate, this could be a maximum expectancy of 127% of sales, likeliest 100%, and worst-case scenario of 78%. The same information was collected referring to the total costs of the company and their possible fluctuations. This information collected, give us a very basic equation where Operation Profit will be obtained through deducting from ·sales-income· the" total costs" of the company.

3.1. Statistical Monte Carlo Simulation

After collecting all results of the participant companies, a Monte Carlo simulation has been performed with 5000 iterations in each case, so total iterations on the research have been 5000 x 204 cases = 1,020,000 iterations in total as it is showed in Figure 1. Some of the statistics which appear in the example given include values related to the value of the case which is 25, a value of 26.22 of the mean, a value of 25.91 of the median, standard deviation of 9.99, Skewness of 0.0935, Kurtosis 2.44, Coefficient of Variation 0.3811, minimum 1.06, maximum 52.20 and Mean standard error of 0.14.

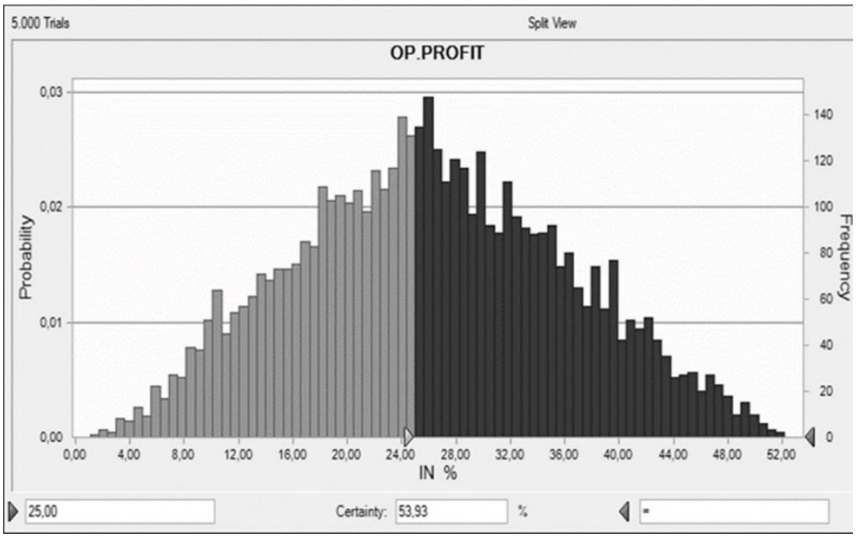

Figure 1. Example of Monte Carlo simulation for one company expressing the probabilities of achieving the desired profit (certainty percentages) after running 5000 trials

After each simulation in each company/case, a sensitivity analysis has been made, understanding the importance of the variables (Sales and Costs) which affects more significantly in the volatility of the distribution. See Table 1 as an example.

Table 1. Example of sensitivity analysis over Sales and Costs

Variable	Sensitivity over the Operational Profits
Sales	99.2%
Costs	-0.8%

Source: Own elaboration

Consequently, and after obtaining all data related to the 204 cases, results have been organized with SPSS software creating the following variables:

- Variable #1: "Goalprofits": The certainty associated to a desired % of profit expected by the company after running 5000 iterations using Monte Carlo Method. The measure of this variable is scale.

- Variable #2: “Confrag”: This is a nominal scale due to the fact that results of databases which are concentrated are coded a 1, and results from databases which are fragmented are coded by 2.
- Variable #3: “Zeroprof”. The certainty associated to making a profit > 0 (zero). This variable has been obtained after running 5000 iterations using Monte Carlo Method. The measure of this variable is scale. So, in this case, we test the % of probabilities of making “some form of profit” or at least not losing money.
- Variable #4. “Salesfluct”. This variable has been obtained as a result of the sensitivity analysis made after the Monte Carlo Simulation. In each case, we obtain a % which identifies the impact of the variable to possible significances or dispersions in the distribution. This is critical element to identify the importance of the fluctuations or volatility of sales in a risk model.
- Variable #5. “Costsfluct” Same as variable #4 but applied to the evolution and volatility of the corporate costs.

3.2. Anova Test

After the organization of the different variables, a one-way Anova test has been applied in order to identify and answer the research question: Up to what extent the structure of the database of customers can potentially affect/impact or be determinant on the levels of profitability risk?

As we can see in Table 2, initially the normality of the obtained data has been checked and the results are positive with Levene´s test indicating in all cases 0.087, 0.613, 0.838. As we can see in all cases is > 0.05. After this initial check has been applied, Anova can be run properly.

The research process understands the factor (independent variable) as a nominal variable which refers to the type of structure of the database of customers, (Concentrated vs Fragmented) and the rest of variables as dependent. They are as follows: Percentage (%) of probabilities to achieve a desired level of profit, percentage (%) of probabilities to make any profit when profit >0, percentage (%) of sensitivity of the sales fluctuations, percentage (%) of sensitivity of the costs fluctuation).

Table 2. Normality Test

	Levene	Df1	Df2	Sign.
SALESFLUCT	4.00	1	202	0.087
GOALPROFITS	0.26	1	202	0.613
ZEROPROF	0.04	1	202	0.838
COSTFLUCT	4.00	1	202	0.087

4. Results

Referring to the Anova test results showed in Table 3, the variable database of customer (CDC or FDC) does not present significance in front of the levels of certainty of achieving the desired profit p=0.971 or certainty of achieving the desired profit, p=0.633. On the other side, the significance of the database structure at the level p=0.001 has been found either in sales and costs fluctuation.

Referring to the correlation analysis expressed in Table 4, it is important to say that only the variables “Confrag” (which relate to the structure of the database) present levels of significance p=0.000 and show a high correlation of 0.76 which presents negative and positive correlation due to the fact that both variables sum=1, so perfectly normal from a statistically point of view.

Table 3. Anova Test

		Sg.Sum	Df	Average Sq.	F	Sign.
Salesfluct	Betw.Groups Intra Groups Total	83240.29 59379.65 142619.94	1 202 203	83240.29 293.96	283.17	0.001
Goalprofits	Betw.Groups Intra Groups Total	44.24 39068.92 39113.16	1 202 203	44.24 193.41	0.23	0,633
Zeroprof	Betw.Groups Intra Groups Total	0.11 16371.58 16371.69	1 202 203	0.11 81.05	0.00	0.971
Costfluct	Betw.Groups Intra Groups Total	83240.29 59379.65 142619.94	1 202 203	83240.29 293.96	283.17	0.001

Table 4. Correlation Analysis Results

		Confrag	Goalprofits	Zeroprof	Salesfluct	Costfluct
Confrag	Correlation Pearson Sign. (2-tails) N	1.00 204	0.03 0.633 204	0.00 0.971 204	-0.76 0.000 204	0.76 0.000 204
Goalprofits	Correlation Pearson Sign. (2-tails) N	0.03 0.633 204	1.00 204	0.71 0.000 204	0.02 0.802 204	-0.02 0.802 204
Zeroprof	Correlation Pearson Sign. (2-tails) N	0.00 0.000 2014	0.71 0.000 204	1.00 204	-0.01 0.901 204	-1.00 0.901 204
Salesfluct	Correlation Pearson Sign. (2-tails) N	-0.76 0.000 204	0.02 0.802 204	-0.01 0.901 204	1.00 0.000 204	-1.00 204
Costfluct	Correlation Pearson Sign. (2-tails) N	0.76 0.000 204	-0-02 0.802 204	0.01 0.901 204	-1.00 0.000 204	1.00 204

5. Conclusion

The research performed rejects the fact that the composition-structure of a database of clients can cause directly higher or lower levels of risk-profitability. Still, the results obtained in group one (concentrated-structure databases) present higher average sensitivity to the sales fluctuations than in group two (fragmented-structure databases) taking to a result of 75.9% versus 24.05% respectively. A rational explanation would argue that the impact of winning or losing one or a few customers is stronger in a database concentrated, so the less number of customers and the bigger the purchase in % the higher the impact on sales fluctuation. Still, this does not represent a direct impact on risk levels, due to the fact that both groups show similar certainty levels in both cases, (desired and minimum) levels of profitability and the volatility of the costs apply as well. Taking the hypothesis that a company which sells only to one customer is riskier to than a company which sells to a number of them, as its expressed in most Portfolio Modern Management theories, this statement cannot be demonstrated here directly, although the research shows that fragmentation or concentration can contribute to fluctuations and volatility in sales, so consequently and indirectly in risk profiles.

References

Amédée-Manesme, C.-O., Barthélémy, F., Baroni, M., and Dupuy, E., 2013 Combining Monte Carlo simulations and options to manage the risk of real estate portfolios. *Journal of Property Investment & Finance*, 31(4), pp. 360-389. https://doi.org/10.1108/JPIF-09-2012-0042

Farid, D., Rajabipoor Meybodi, A., Mirfakhraddiny, S. H., 2010. Investment risk management in Tehran Stock Exchange (TSE) using technique of Monte Carlo Simulation (MCS). *Journal of Financial Crime,* 17(2), pp. 265-278. https://doi.org/10.1108/13590791011033944

Gimpelevich, D., 2011. Simulation-based excess return model for real estate development: A practical Monte Carlo simulation-based method for quantitative risk management and project valuation for real estate development projects illustrated with a high-rise office development case study. *Journal of Property Investment & Finance*, 29(2), pp. 115-144. https://doi.org/10.1108/14635781111112765

Hoesli, M., Jani, E., and Bender, A., 2006. Monte Carlo simulations for real estate valuation. *Journal of Property Investment & Finance*, 24(2), pp. 102-122. https://doi.org/10.1108/14635780610655076

Jiang, P. and Talaga, J., 2006. Building a customer base in the electronic marketplace: An empirical exploration of the e-tailing industry. *Journal of Services Marketing,* 20(7), pp. 429-438. https://doi.org/10.1108/08876040610704865

Kalff, H., 1980. What chance to profit? *European Journal of Marketing*, 14(8), pp. 458-465. https://doi.org/10.1108/EUM0000000004921

Levent C. Uslu, Burak Evren. 2017. Liquidity adjusted value at risk: Integrating the uncertainty in depth and tightness. *Eurasian Journal of Business and Management*, 5(1), pp. 55-69. https://doi.org/10.15604/ejbm.2017.05.01.006

Li, L., Bi, S., Sun, Y., 2016. Risk assessment method for aeroengine multiple failure risk using Monte Carlo simulation. *Multidiscipline Modeling in Materials and Structures*, 12(2), pp. 384-396. https://doi.org/10.1108/MMMS-06-2015-0028

Loizou, P. and French, N., 2012. Risk and uncertainty in development: A critical evaluation of using the Monte Carlo simulation method as a decision tool in real estate development projects. *Journal of Property Investment & Finance*, 30(2), pp. 198-210. https://doi.org/10.1108/14635781211206922

Martinovic, D. Veselinovic, L., and Arnaout-Berilo, A., 2017. The effects of entrepreneurial activity and preference for avoiding uncertainty on national economic growth. *Eurasian Journal of Business and Management*, 5(2), pp. 11-20. https://doi.org/10.15604/ejbm.2017.05.02.002

Meins, E. and Sager, D., 2015. Sustainability and risk: Combining Monte Carlo simulation and DCF for Swiss residential buildings. *Journal of European Real Estate Research*, 8(1), pp. 66-84. https://doi.org/10.1108/JERER-05-2014-0019

Okmen, O. and Oztas, A., 2015. Scenario based evaluation of a cost risk model through sensitivity analysis. *Engineering, Construction and Architectural Management*, 22(4), pp. 403-423. https://doi.org/10.1108/ECAM-09-2014-0121

Olson, D. L. and Wu, D., 2011. Risk management models for supply chain: A scenario analysis of outsourcing to China. *Supply Chain Management: An International Journal*, 16(6), pp. 401-408. https://doi.org/10.1108/13598541111171110

Shi, K., Guo, Q., and Jeffers, A., 2013. Stochastic analysis of structures in fire by Monte Carlo Simulation. *Journal of Structural Fire Engineering*, 4(1), pp. 37-46. https://doi.org/10.1260/2040-2317.4.1.37

Smith, M. and Dikolli, S., 1995. Customer profitability analysis: An activity-based costing approach. *Managerial Auditing Journal*, 10(7), pp. 3-7. https://doi.org/10.1108/02686909510090276

van Raaij, E. M., 2005. The strategic value of customer profitability analysis. *Marketing Intelligence & Planning*, 23(4), pp. 372-381. https://doi.org/10.1108/02634500510603474

Yang, Y. H., Haddad, K., and Chow, C. W., 2001. Capacity planning using Monte Carlo simulation: An illustrative application of commonly available PC software. *Managerial Finance*, 27(5), pp. 33-54. https://doi.org/10.1108/03074350110767187

Ziyun Yang, 2017. Customer concentration, relationship, and debt contracting. *Journal of Applied Accounting Research,* 18(2), pp. 185-207. https://doi.org/10.1108/JAAR-04-2016-0041