# Fractal modeling in the international financial leverage

RAMOS-ESCAMILLA, Maria`, GOMEZ Anne``, SANCHEZ, Carlos``, TABOADA, Armando``

*`Instituto Tecnologico de Pachuca*
*``Universidad Tecnologica de Mexico*

Recibido 20 de Mayo, 2015; Aceptado 30 de Septiembre, 2015

**Abstract**

In this articule we shows the financial situation of the Mexican company "Grupo Herdez" wich specializes in food is a leader in it, markets which it is focused and their participation in the Mexican Stock Exchange. The development of prediction methods for Marketing and Fractal applied to determine the investment risk.

Obtaining information from the Mexican Stock Exchange; and analyzing their stability, history, investment and determine if the company generates a leverage or financing. Using economic modeling, we managed to analyze the economic situation of the "Grupo Herdez" and their stability in the stock market.

**Finances, Fractal, Economics, Leverage, Financing Mexican Stock Exchange, Grupo Herdez, Inflation, Finito, Modeling**

**Citación:** RAMOS-ESCAMILLA, Maria, GOMEZ, Anne, SANCHEZ, Carlos, TABOADA, Armando. Fractal modeling in the international financial leverage. Revista de Planeación y Control Microfiinanciero 2015, 1-2: 104-109

† Investigador contribuyendo como primer autor.

## Introduction

We realize a study to announce the feasibility and the performance that some investor could have to this company about what are the risks or benefits in Group Herdez. With the following models we will represent the reliability of the group in the stock exchange area and to guarantee a good decision. We considered data from the Mexican Stock Exchange, the National Institute of Statistics and Geography and Banco de Mexico to implement the variables within two mathematical financial models, (Leverage & Financing). To better understand what we are talking about, we share an example. The number of customers of a beach restaurant varies based on the season, the weather, the adquistivo power of customers at that time, the same restaurant service, etc. So, we do not really know what will be the exact number of clients, but we can have an approximate. The same happens with companies, the market is evolving, vary the exchange rates, inflation, purchasing power, innovations, and many factors which could change from one day to another, but based on historical data can generate certain number to give us a vision of the environment of the company.

About how risky it can be to apply for funding at this moment for the company HERDEZ of Mexico.The apalacamiento is which will give us an approximate view that there is much risk, to take firm decisions.

Grupo Herdez is a leading processed food sector and in the segment of frozen yogurt company in Mexico and one of the leaders in the category of Mexican food in the United States. The Company is engaged in a wide range of categories, including organic foods.

The stock market of April matrix was determined using the method of financing and leverage respectively. For this exercise we will apply different models based on the formula of leverage and financing. To make the financing operation should have the detail of the following items, the lagrangian model allows us to reduce a very large number of small.

Finito set:

$$\text{All that is } \log = \lim = 0.618 = \frac{\mathrm{d}}{\mathrm{d}1} = 0.5 = \frac{\partial}{\partial 1} = .75$$

The Model of Koch:

$$\log = \frac{1}{2}\ln = \frac{3}{4}\frac{3}{4} = 0.75 \text{ Antilog} = \frac{1}{2}\frac{\partial}{\partial \mathrm{i}} + \frac{3}{4}\frac{\partial}{\partial \mathrm{ii}}$$

These three models should have the same variables applied differently but in the end the three will give us an approximate number of risks. We will take actual data of the company HERDEZ of Mexico, which is listed on the Mexican Stock Exchange, the leverage variable has as basis the following the formula

$$\mathrm{A} = \left[\frac{\log[\mathrm{TCf} + \mathrm{TCft}]}{\ln[\mathrm{Tcx}]}\right]^{\frac{\mathrm{TC}-\pi}{\frac{1}{2}}}$$

Where:
A = Leverage
TCf = Fixed exchange rate
TCf = type fluctuane change
TCx = flexible exchange rate
TC = Exchange
$\pi$ = Inflation
1/2 = Brownian

ISSN-2444-5037

Applying values to the original formula, one of the key features of the multifractals remains little known. Using the author's recent work, introduced for the first time in this chapter, the exposition can be unusually brief and mathematically elementary, yet covering all the key features of multifractality. It is restricted to very special but powerful cases: i) the Bernoulli binomial measure, which is classical but presented in a little-known fash- ion, and ii) a new two-valued "canonical" measure.

$$A = \left[\frac{\log[TCf + TCft]}{\ln[Tcx]}\right]^{\frac{TC-\pi}{\frac{1}{2}}} = \left[\frac{\log[17.55 + 20.31]}{\ln[14.79]}\right]^{\frac{17.55-2.76}{0.5}} = \left[\frac{\log[37.86]}{\ln[14.79]}\right]^{\frac{14.79}{0.5}} = \left[\frac{1.578}{2.693}\right]^{\frac{14.79}{0.5}} = (1.36)$$

We keep this result and today we do the exercise with the multifractal model advanced extends scale invariance to allow for dependence. Readily controllable parameters generate tails that are as heavy as desired and can be made to follow a power-law with an exponent in the range $1 < \alpha < \infty$. Remembering what this model tells us, the formula would be the next:

$$FA = \left[\frac{\log[Antilog(TCf + TCft)]}{\ln[Tcx]}\right]^{\frac{TC-\pi}{\frac{1}{2}}}$$

Apply the same values to the formula:

$$A = \left[\frac{\log[\log(\log((17.55+20.31))]}{\ln[14.79]}\right]^{\frac{17.55-2.76}{0.5}} = \left[\frac{\log[\log(\log((37.86))]}{\ln[14.79]}\right]^{\frac{17.55-2.76}{0.5}} = \left[\frac{\log[\log(1.57)]}{2.69}\right]^{\frac{14.79}{0.5}} = \left[\frac{\log[0.19]}{2.69}\right]^{\frac{14.79}{0.5}} = \left[\frac{-0.70}{2.69}\right]^{\frac{14.79}{0.5}} = (-2.254)$$

Recalling all along, search for a model was inspired by a finding rooted in economics outside of finance. Indeed, the distribution of personal incomes the following formula is obtained based on the model Lagrangian.

$$A = \left[\frac{\lim[\partial(TCf + TCft)]}{\frac{d}{dI}[Tcx]}\right]^{\frac{TC-\pi}{\frac{1}{2}}}$$

Apply the same values to the formula of this principle has provided the basis of models or scenarios that can be called good because they satisfy all the following properties: i) they closely model reality,ii)they are exceptionally parsimonious, being based on very few very general a priori assumptions, and iii) they are creative in the following sense: extensive and correct predictions arise as consequences of a few assumptions; when those assumptions are changed the consequences also change. By contrast, all too many financial models start with Brownian motion, then build upon it by including in the input every one of the properties that one wishes to see present in the output.

$$A = \left[\frac{0.618[0.75(17.55 + 20.31)]}{0.5[14.79]}\right]^{\frac{17.55-2.76}{0.5}} = \left[\frac{0.618[0.75(37.86)]}{7.395}\right]^{\frac{14.79}{0.5}} = \left[\frac{0.618[28.395)]}{7.395}\right]^{\frac{14.79}{0.5}} = \left[\frac{17.54811}{7.395}\right]^{\frac{14.79}{0.5}} = 1.26$$

Finally, we have the model of Koch, leaving the following formula based on the case of multifractal functions, two additional considerations should be heeded. The so-called multifractal formalism (to be described below) is extremely important. But it does not by itself specify a random function closely enough to allow analysis to be followed by synthesis:

$$A = \left[\frac{\frac{1}{2}[\frac{1}{2}(\frac{d}{dI}) + \frac{3}{4}(\frac{d}{dII})(TCf + TCft)]}{\frac{3}{4}[Tcx]}\right]^{\frac{TC-\pi}{\frac{\partial}{\partial I}}}$$

Apply the same values to the formula:

$$A = \left[\frac{0.25[(0.25(0.5)) + ((0.75(1))(17.55 + 20.31))]}{0.75[14.79]}\right]^{\frac{17.55-2.76}{0.25}}$$

$$= \left[\frac{0.25[(0.125) + ((0.75)(37.86))]}{11.0925}\right]^{\frac{14.79}{0.5}}$$

$$A = \left[\frac{0.25[0.125 + 28.395]}{11.0925}\right]^{\frac{14.79}{0.5}}$$

$$= \left[\frac{0.25[28.52]}{11.0925}\right]^{\frac{14.79}{0.5}}$$

$$= \left[\frac{7.13}{11.0925}\right]^{\frac{14.79}{0.5}}$$

$$= 0.00000210$$

The funding base formula variable is as follows one begins with two statistically independent random functions F (TCf) and TCf (t), where TCf (t ) is non-decreasing. Then one creates the "compound" function F [TCf (t)] = ϕ(t ). Choosing F (TCf) and θ (t ) to be scale-invariant insures that TCf (t ) will be scale-invariant as well. A limitation of compounding as defined thus far is that it demands independence of F and TCf, therefore restricts the scope of the compound function

$$F = \left[\frac{A\ TCf}{A\ TCx}\right] \frac{\frac{Di}{Di-} + \varepsilon^2}{(\ln\theta)^{\frac{1}{2}}}$$

Where:
F = Financing
A = Leverage
TCf = Fixed exchange rate
TCx = flexible exchange rate
Di = direct currency
Di- = indirect currency
θ = Infinite
ε = Infinite
1/2 = Brownian

Using the values:

$$F = \frac{90}{180} = 0.5$$

$$A = \frac{45}{180} = 0.25$$

Exchange rate of the Bank of Mexico $TCf = 17.33$, whereTCx = TCf - Annual Inflation Subyancente with TCf and Annual Inflation $TCx = 17.33 - 2.76 = 14.57$ by $Di- = 17.33, \theta = -1$ and $\varepsilon = 8.4$, applying values to the original formula.

$$F = \left[\frac{(0.25)(17.33)}{(0.25)(14.57)}\right] \frac{\frac{0.05}{17.33} + 8.61^2}{(\ln -1)^{\frac{1}{2}}}$$

$$= \left[\frac{4.33}{3.64}\right] \frac{\frac{0.05}{17.33} + 8.61^2}{1^{0.5}}$$

$$= \left[\frac{4.33}{3.64}\right] \frac{\frac{0.05}{17.33} + 74.13}{1}$$

$$= \left[\frac{4.33}{3.64}\right] \frac{74.13}{1} = 88.182$$

We keep this result and today we do the exercise with the Lagrangian model, remembering what this model tells us, the formula would be the NEXT:

$$F = \left[\frac{\log A\ (\ln Tcf)}{\frac{A}{TCx}}\right]^{\frac{\frac{Di}{Di-} + \varepsilon^2}{(\ln\theta)^{\frac{1}{2}}}}$$

Apply the same values to the formula:

$$F=\left[\frac{(\log 0.25)(\ln 17.33)}{\frac{0.25}{14.57}}\right]^{\frac{\frac{0.05}{17.33}+8.61^2}{(\ln -1)^{\frac{1}{2}}}}=$$

$$\left[\frac{(-0.60)(2.58)}{0.017}\right]^{\frac{\frac{0.05}{17.33}+74.13}{1^{.0.5}}}=\left[\frac{-1.548}{0.017}\right]^{\frac{\frac{0.05}{17.33}+74.13}{1}}= -1.756$$

By recalling the theory Lemma of ito with the following formula is obtained based on the model Lagrangian

$$F=\left[\frac{(\lim A)\ (\frac{d}{d1}\,TCf)}{\frac{A}{TCx}}\right]^{\frac{\frac{Di}{Di-}+\varepsilon^2}{(\frac{d}{d1}-1)^{\frac{1}{2}}}}$$

Apply the same values to the formula:

$$F=\left[\frac{((0.618)\,0.25)((0.5)\,17.33)}{\frac{0.25}{14.57}}\right]^{\frac{\frac{0.05}{17.33}+8.61^2}{((0.5)-1)^{\frac{1}{2}}}}=$$

$$\left[\frac{(0.1545)(8.665)}{0.017}\right]^{\frac{\frac{0.05}{17.33}+74.13}{|0.7071|}}=$$

$$\left[\frac{1.338}{0.017}\right]^{\frac{\frac{0.05}{17.33}+74.13}{0.7071}}=5.733$$

Finally we have the model of Koch, leaving the following formula based on the model Lagrangian

$$F=\left[\frac{(\frac{1}{2}A)\ (\frac{3}{4}\,TCf)}{\frac{A}{TCx}}\right]^{\frac{\frac{Di}{Di-}+\varepsilon^2}{(\frac{3}{4}-1)^{\frac{\partial}{\partial 1}}}}$$

Apply the same values to the formula:

$$F=\left[\frac{((0.25)(\,0.25))\ ((0.75)(17.33))}{\frac{0.25}{14.57}}\right]^{\frac{\frac{0.05}{17.33}+8.61^2}{((0.75)(-1))^{0.25}}}$$

$$=\left[\frac{(0.0625)\ (12.9975)}{0.017}\right]^{\frac{\frac{0.05}{17.33}+74.13}{0.9306}}$$

$$F=\left[\frac{(0.0625)\ (12.9975)}{0.017}\right]^{\frac{\frac{0.05}{17.33}+74.13}{0.9306}}$$

$$=\left[\frac{0.8123}{0.017}\right]^{\frac{\frac{0.05}{17.33}+74.13}{0.9306}}=5.648$$

The result shows a negative leverage, thus comparing other companies, Grupo Herdez, does not require extra capital or another company to generate profit, as is well positioned in the Mexican stock exchange.

## Conclusions

As we can see in the results, leverage turns out to be negative, therefore, it was concluded that this company is not required to have leverage, as the result of funding was higher than expected, so we can see that account with sufficient capital generated profits.

It is important to construct the financial models of the required variables to generate a complete report of the company to which it is planning to invest capital, it should consider taking the actual data from reliable sources, keep them updated and in that way get a better result. As we said at the beginning of the article, if we generate with mathematical models the finances have a better result to be checked, so you do not invest in a company that will not leave any profit.

The companies that are leveraged must have control of movements of money both flow that enters and leaves, it is important to recognize that you can not throw money blindly into a business only to invest, we must learn what we leave more profit than losses.

**References**

González-del Foyo, M. E., & García-Escalona, E. C. (2016). EL ANÁLISIS APALANCAMIENTO OPERATIVO Y SU RELACIÓN CON EL RIESGO OPERATIVO EN LAS EMPRESAS CUBANAS. Anuario Facultad de Ciencias Económicas y Empresariales, 2, 12-21.

Echeverría, R. A., Garza, J. M., García, G., León, N., Alanís, E. C. G., & Garza, J. R. S. ESTRUCTURA ÓPTIMA DE CAPITAL: ANÁLISIS DE LA TEORÍA DEL TRADE-OFF ENTRE PATRIMONIO Y DEUDA PARA MINIMIZAR EL COSTO DE CAPITAL (CPPC) Y MAXIMIZAR EL VALOR DE LA EMPRESA (MARKETCAP).

de Deane, C. A., Corengia, Á., de Fanelli, A. G., & Carranza, M. P. (2016). La investigación en las universidades privadas de la Argentina. Cambios tras las políticas de aseguramiento de la calidad y financiamiento competitivo. REICE. Revista Iberoamericana sobre Calidad, Eficacia y Cambio en Educación, 12(3).

Arnaudo, M. F., Lago, F., Moscoso, N., Báscolo, E., & Yavich, N. (2016). concentración y desigualdades en el financiamiento de las obras sociales posdesregulación: un análisis comparativo de los años 2004 y 2011. Salud Colectiva, 12(1), 125-137.

Escamilla, M. R., & Torrado, F. M. (2012). Tecnología fractal aplicada a los precios del consumidor racional. Investigación: cultura, ciencia y tecnología, (8), 32-37.
RAMOS ESCAMILLA, M. D. J. (2013). DINAMICA ECONOMICO FINANCIERA ACTUAL (Doctoral dissertation).

Escamilla, M. R., Vargas, M. J. S., & García, M. M. (2013). ITERACIÓN FRACTAL DE COMPUTO IFS EN LOS MERCADOS FINANCIEROS. Rect@, (4), 223.

Miranda Torrado, F., & Ramos Escamilla, M. (2015). Regiones factibles y óptimas del Iso-Beneficio del Consumidor (Artículos y Miscelánea).