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A Retroactive Impact Analysis of Changes in Social Benefits: The Case of Venezuela

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ABSTRACT

For organizations facing changes in a social benefit system that mandates employer contributions, a major problem facing decision-makers is forecasting the impact of those changes for companies in different sectors of the economy. Such is the case in Venezuela at the time of this study. When a company employs a relatively large number of employees, accurately determining the impact of the maximum it can be quite laborious and complicated. The processing of information on an individualized basis can be nearly impossible when facing time constraints, making the development of a model imperative. In this research study, we tackle the issues raised above by identifying key variables. The impact is then explained using a reduced multivariable statistical model. This study has used a proprietary data set to model a methodology for measuring the rigor of these regulatory changes. Three key explanatory variables – the number of employees; the cumulative warranty; the monthly average full salary – are analyzed to determine the impact on those companies. Among these, the most important variable and in terms of statistical significance is the amount of accumulated warranty at five percent, followed by the salary and lastly the number of employees in the company.

Keywords: Impact analysis, Social benefit, Venezuela.
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1.0 INTRODUCTION

Many pension and social benefit systems, both in the public and private sector, are facing challenges in meeting future obligations. At the state level in the U.S., according to a research study conducted by State Budget Solutions, state public pension plans were underfunded by $4.7 trillion, up from $4.1 trillion in 2013. The aggregate funded status dipped three percentage points to 36 percent, which amounts to an unfunded liability of $15,000 per American (Luppino-Esposito, 2014). The major reasons

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for underfunding are a combination of an overly optimistic discount rate and the lack of political discipline to make necessary annual contributions to pension funds.

In the United Kingdom, UK companies are paying less towards meeting their pension shortfalls than at any point since 2009. FTSE 350 companies paid £7 billion towards their defined benefit pension deficits in 2014, 20 percent less than the previous year and an astounding 40 percent below the amount each year between 2009 and 2012, according to a study by consultants Barnett Waddingham. Again, an interest rate rise might help by diminishing projected liabilities (Evans, 2015).

Pension plan reforms have been especially prolific in Latin America. More than a third of the governments who have implemented some form of market-oriented pension reform have been conducted in Latin America. In an analysis of pension reform in Argentina and Brazil, Brooks (2007) posits that financial globalization has created a double bind for the capital-scarce governments in that region of the world by fostering long-term incentives to privatize pension systems while heightening the risk of punishment in the short term.

A study by Diz and Query (2004) examined the characteristics of the Venezuelan social security system. As with many other countries, Venezuela is expected to experience a financial shortfall in its projected retirement and social health-care future liabilities. This paper provides suggestions for reform of the social security system in Venezuela by integrating many of the same concepts found in other restructurings. Their analysis concluded that, given the political and economic instability of the region, a major overhaul of the existing system is not politically feasible. An incremental approach with minimal disruption is more attainable given the current circumstances.

Since that paper was published a decade ago, economic and political instability has increased dramatically. However, there have been some changes to the pension system in that country. The most recent modifications of the pension laws were enacted in May of 2013, with passage and implementation of the Labor Law for Workers. In addition to shorter working hours and longer maternity leave (the third longest in the world), all workers are now entitled to retirement pensions, including full-time mothers and the self-employed. In increasingly socialist countries such as Venezuela, changing pension obligations can create unforeseen challenges for companies.

In this study we develop a model to forecast the impact of changes in social benefit systems. The ability to model a scenario-type analysis will provide valuable planning tools for organizations to respond to changes in laws and regulations impacting the pension obligations to their workforce.

The next section provides support and motivation for the study, followed by the objective of the study. In section four we develop a mathematical model to assist companies as they assess the impact of regulatory changes. The subsequent section provides a description of the data set utilized in the study along with the data model, followed by descriptive statistics and an analysis of research results.

2.0 RESEARCH MOTIVATION AND JUSTIFICATION

For organizations facing changes in a social benefit system that mandates employer contributions, a major problem facing decision-makers is forecasting the impact of those changes for companies in different sectors of the economy. Such is the case in Venezuela at the time of this study.

When a company employs a relatively large number of employees, accurately determining the impact of the maximum it can be quite laborious and complicated. The processing of information on an individualized basis can be nearly impossible when facing time constraints, making the development of a model imperative. A properly constructed model that uses a relatively small group of variables to estimate potential future obligations can prove to be a valuable tool in the decision-making process. In this research study, we tackle the issues raised above by identifying key variables. The impact is then explained using a reduced multivariable statistical model.

3.0 OBJECTIVE

The main purpose of this investigation is to develop a generalized regression model that explains the performance of the social benefits in relation to other variables of a demographic and financial nature. Using this information, we expect to provide a reasonable estimation of the cost impact for companies given specific data.

By adjusting the model, we can discover which variables contribute more to the differential in terms of cost, as well as those that are relatively insignificant. The fundamental idea is to find a type of correlation:

$$\underbrace{f(x) = \sum a_j}_{\text{Representing the maximum theoretical liability difference}} \underbrace{x_j + e_j}_{\text{Deterministic Component}} \underbrace{e \sim N(o,\sigma^2)}_{\text{Stochastic Component}} \quad \text{With}$$

Given the dependent and predictive or explanatory variables, we analyze different models, ranging from linear to logarithmic. Several connecting functions or links will be used to find different models, then, the model that has the lower level of residual lag will be chosen and the most basic structure with possible variables that explain the high variability of chosen data.

4.0 MATHEMATICAL MODEL TO COMPUTE THE SOCIAL BENEFITS

In this section, we describe the development of the mathematical model that will be used to project social benefits under various scenarios. Basically, the calculation of benefit is derived as follows:

x : The current age of the employee

y :Age of employee at entry to the company

G_x : Social benefits warranty at age X

T_x: Rate of profit gains in social benefits at age x (the rate varies with the years of service of the employee in the company).

R_x: Retroactive Social Benefits

Δ_x: Difference between Retroactive Social Benefits and Warranty (maximum theoretical liability difference)

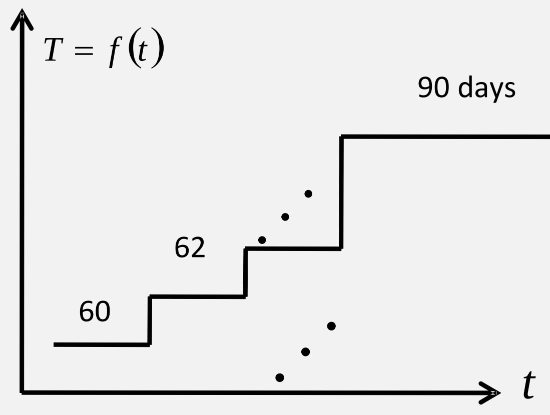
SI_x: Employee integral salary at age X. This salary is the basic monthly salary plus bonuses and other payments covered by the Labor Law. The applicable rates of social benefits are determined as follows:

Rate	Time[3]	Accumulation[4]
60	1	60
62	2	60+62
.	.	
.	.	
90	15	$60+62+\cdots 90$

[3] At the end of each time, t will earn a number of days of salary given by t.

[4] Rates are accumulated with new salary in each future year, In other words, in the first year; 60 days of salary are paid at the end of the first year. In the second year, there will be an accumulative amount of the prior year plus 62 days to the new salary, and thus successively in the following years.

Evolution Rate



To calculate the warranty to a specific year *t* is given by:

$$G_t = G_{t-1} + (T_t)(SI_t)$$

The above expression defines an equation of cumulative differences, where the warranty (collateral) *t* is the accumulation that was in (*t-1*) plus the new rate for the new integral salary earned in *t*.

In = 1 it is fulfilled:

$G_1 : G_0 + T_1 SI_1$ Where $G_0 = 0$

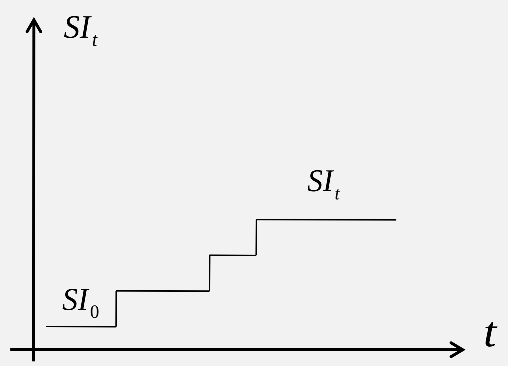
$G_2 : G_1 + T_2 SI_2$ Where $T_1 = 60$ days

$G_3 : T_1 SI_1 + T_2 SI_2$ Where $SI_1 = 60$ First year salary

.
.
.

$$G_t : \sum_{j=1}^{t} T_j SI_j$$

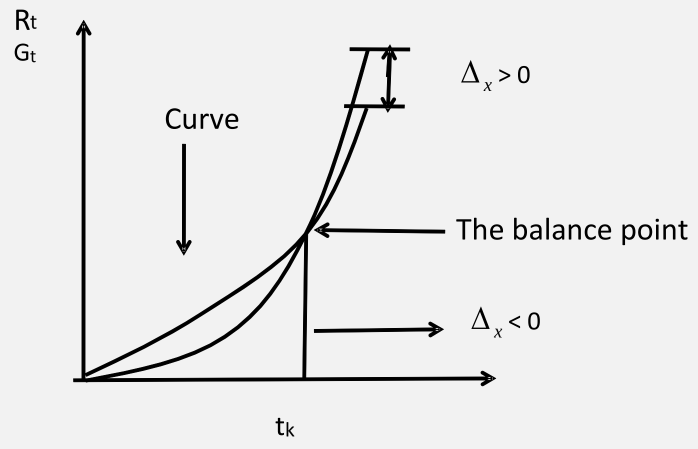
Evaluation of Salary



The above expression can be understood as the average of a weighted salary due to the result of the rates T_j that have been earned over the time. The retroactivity is determined as $R_t = (SI_t)(t)$, i.e., its calculation is directly proportional to the current integral salaries or salary and to the service of time accumulated up to that year.

When both social benefits formulations are compared, the following is obtained:

Social Benefits



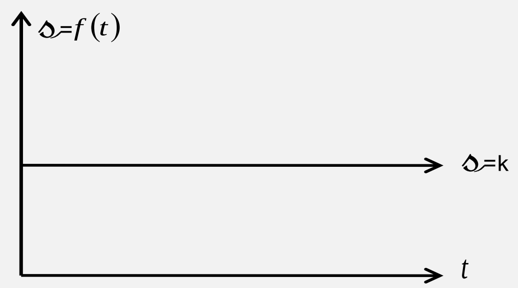
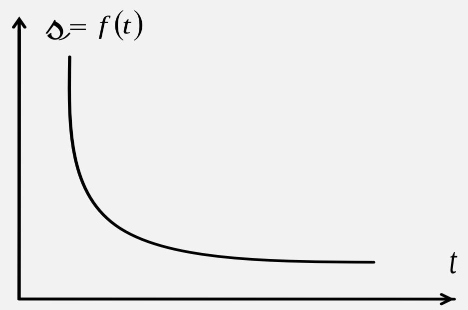
There is an interval $t > t_k$, where the retroactivity exceeds the warranty, clearly, in $t = t_k$ applies that $G_t = R_t$ 5, that is, a breaking point between both social benefits. As always, the evolution of salaries exhibits a geometric and / or exponential growth as follows:

$$SI_t = SI_{t-1}(1+s)$$

The solution of the differences to the above equation is:

$$SI_t = SI_0\,(1+s)$$

The rate of the increased salary can be constant in all ranges of valuation. As demonstrated by the following, the two patterns shown graphically illustrate the above mentioned equations.

Constant Rate	Variable Rate
	

The level of inflation observed in Venezuela in the last five years has been among the highest in the world, ranging from 63 percent to 115 percent – according to government sources. Therefore, it is advantageous to start the distance of the assessment with salary rates relatively high and then decrease them to a lower threshold in a period of approximately 10-12 years. This assumes a scenario of gradual improvement of the economy, resulting in a threshold of a lower and relatively stable salary rate for the remainder of time in the future. The differential of social benefits is given by:

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5 The guarantee G is given by the Labor Law that the company records year after year and normally this is held in a Trust Banking fund. By contrast, the difference of the payable social benefits and the actuarial liability generally is kept at the reserve account of the books.

$$D_t = R_t - G_t = \Delta_t$$

$$PSP_t = MAX(R_t, G_t) = \begin{cases} R_t Si \ \ R_t > G_t \\ G \cdot Si \ \ G \cdot > R \cdot \end{cases}$$

PSP_t : Social benefits payable at time **t**

D_t : Theoretical maximum liability differential in **t**

Obviously, the differential D_t [6] can be positive or negative depending on what type of provision dominates the other, in this sense it can also be expressed as follows:

$$D_t = MAX(R_t, G_t) - G_t$$

And if there is no additional impact; therefore, we would be interested in those cases of employees where the $\Delta_t > 0$ that is to say $R_t > G_t$

5.0 DESCRIPTION OF DATA

To empirically test the model, we use data from 100 multinational companies. The companies that comprise the data sample are from a proprietary source that provides actuarial valuations for them as clients. The uniqueness and quality of this data is one of the strengths of the study, as these companies are typically audited by the top accounting firms in the world.

A variety of industrial and service sectors are represented in the sample, which will be informative as we determine their impact from a financial point of view. For a list of the sectors included in this sample, see Appendix V.

6.0 DATA MODEL

The data collected was consolidated as follows:

$$\begin{array}{lcllll} \text{Variables} & \longrightarrow & x_{11} & x_{12} & \cdots & x_n \\ & & \vdots & \multicolumn{3}{c}{Matrix \ \ of \ \ Data} \\ \text{Data} & \longrightarrow & x_{n1} & \cdots & \cdots & x_m \end{array}$$

Variables Description	Nomenclature	Units
a) ID: Identification of the company	ID	Identification
b) #; Number of employees	Employees	Number
c) Composed by sex	% M, % F	%
d) Average Seniority	Service	Years
e) Average age	Age	Years
f) Average integral salary	SI	Bolívares
g) Accumulated guarantee amount	G	Bolívares
h) Benefits payable amount	PSP	Bolívares
i) Allocation of the total payable amount	PSP = R + 61	Bolívares
i1) By Retroactivity	R	Bolívares
i2) By Warranty	G1	Bolívares
j) Integral social benefits or theoretical maximum liability difference	DIF = PSP- G	Bolívares

[6] The new social benefits system requires the calculation of the retroactivity and compares the result with the guarantee, thus, giving employee the maximum amount between these two amounts.

7.0 RESEARCH RESULT ANALYSIS

The companies comprising the sample represent twelve different sectors. Of these sectors, three had one company each and four had double-digit numbers of companies represented, with a high of 34 companies from one sector.

The 100 companies observed from different industrial sectors are reported as follows

Sector	# Companies by sector
1	4
2	13
3	3
4	34
5	11
6	7
7	1
8	5
9	7
10	1
11	1
12	13

(For a description of each sector, see Appendix V)

8.0 DESCRIPTIVE STATISTIC

The following data emerge from the descriptive statistic in a consolidated level:

Demographic Data

By sectors				
Sector	**Average Service**	**Average Salary**	**# Employees**	**Average Age**
1	8,32	25.572,89	3.681	37,83
2	8,61	30.826,28	6.922	39,80
3	10,23	22.066,65	754	38,81
4	6,60	31.806,36	18.913	37,93
5	7,19	22.470,33	9.008	36,97
6	8,34	26.871,50	4.221	37,57
7	8,81	20.141,38	430	38,06
8	5,83	27.124,07	1.104	35,93
9	6,32	28.658,28	5.119	34,30
10	9,78	18.405,65	96	38,76
11	6,64	23.622,81	2.831	34,77
12	7,59	28.742,48	4.189	37,11

9.0 MULTIVARIATE LINEAR REGRESSION MODEL

When the differential variable (dependent variable) is correlated with the integral salary, the number of employees and the accumulated warranty under a multivariate lineal model, the following is shown:

$$D_t = a_0 + a_1 SI_t + a_2 G_t + a_3 E + e \qquad e \sim N(0, \sigma^2)$$

Multiple Regressions - DIF

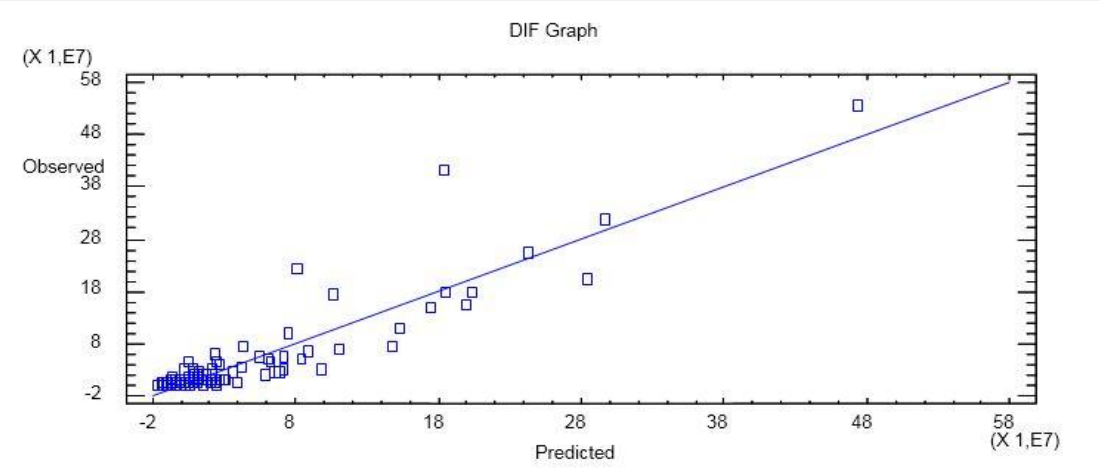
- Dependent variable: DIF
- Independent variables: Employees - G - Salary

Parameter	Estimate	Standard Error	Statistical T	P Value
CONSTANT	-2,78825E7	9,65982E6	2,88644	0,0048
Employees	-14342,0	6604,02	-2,1717	0,0324
G	0,598009	0,0469475	12,7378	0,0000
Salary	807,245	308,945	2,61291	0,0105

Variance Analysis

Source	Sum of Square	Gl	Mean Square	Ratio - F	Value P
Sample	6,01263E17	3	2,00421E17	145,01	0,0000
Residual	1,29915E17	94	1,38208E15		
Total (Corr.)	7,31178E17	97			

- R-square = 82.2321%
- R-square (adjusted for g.l.) = 81.665%
- Standard error of the study = 3.71763E7
- Mean absolute error = 2.13953E7
- Statistical Durbin-Watson = 1.83343 (P=0.2021)
- Autocorrelation of lagged residuals 1 = 0.0803712



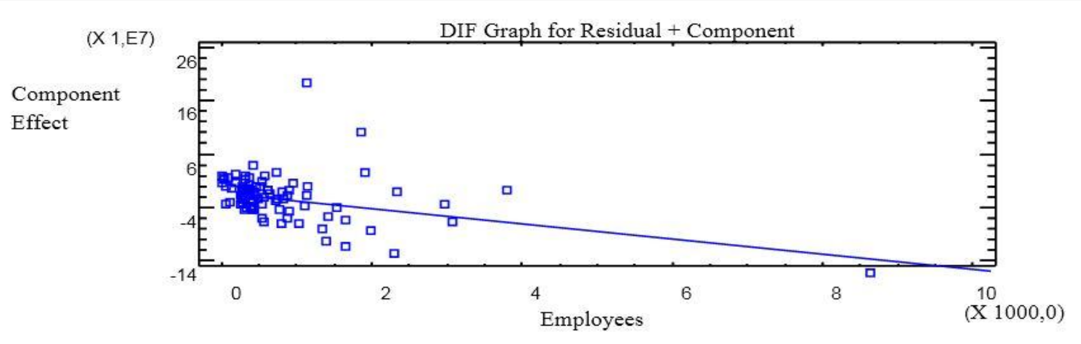
The outputs show the results of adjusting a multivariate lineal regression model to describe the correlation between DIF and three independents variables. The equation of the adjusted model is:

DIF = -2.78825E7 – 14342.0*Employees + 0.598009*G + 807.245*Salary

Since the P-value in the ANOVA table is less than 0.05, there is a statistical significant relationship among the variables with a confidence level of 95.0%.

The statistical Square R indicates that the model (well) adjusted explains 82.2321% of variability in DIF. The adjusted statistical Square R, which is more appropriate to compare on models with different numbers of independent variables, is 81.665%. The standard error of the estimate shows that the standard deviation of the residuals is 3.71763E7. This value can be used to construct limits for new observations. The mean absolute error (MAE) of 2.13953E7 is the residual average value. The Durbin-Watson (DW) examines the residual to determine if there is any significant correlation between values, based on the order in which they are present in the data file. Since the P-value is greater than 0.05, there is no indication of a serial correlation in the residuals with a confidence level of 95.0%.

To determine if this model can be simplified, note that the highest Value P among the independent variables is 0.0324 and corresponds to the employees. Since the P-value is less than 0.05, that value is statistical significant with a confidence level of 95.0%. Consequently, we do not want to eliminate any variables in the model.



Confidence intervals of 95.0% for the estimation of the coefficients

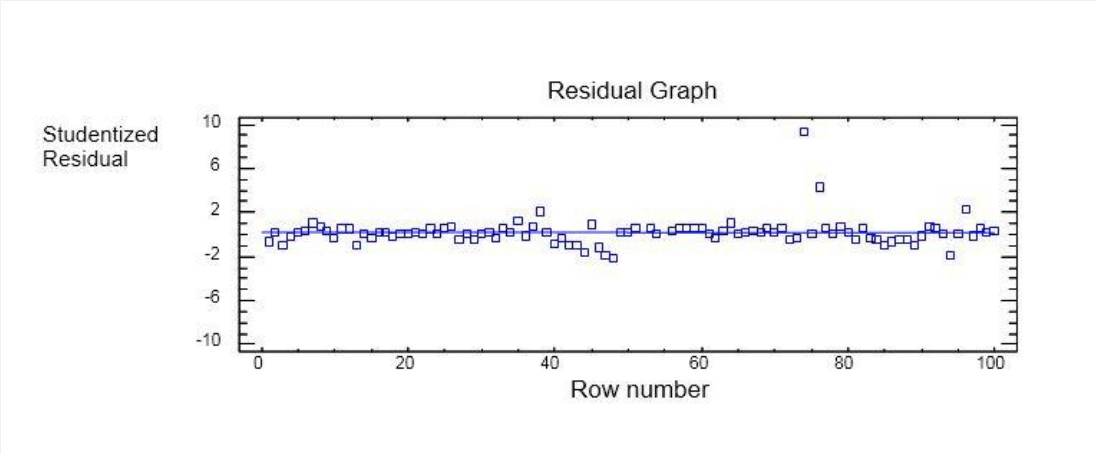
		Standard	Statistical	
Parameter	Estimate	Error	Lower Limit	Upper Limit
CONSTANT	-2,78825E7	9,65982E6	-4,70623E7	-8,70265E6
Employees	-14342,0	6604,02	-27454,4	-1229,5
G	0,598009	0,0469475	0,504793	0,691224
Salary	807,245	308,945	193,826	1420,66

This table shows confidence intervals of 95.0% for the coefficients in the model. The confidence intervals show how accurately can be estimated the coefficients given, the amount of available data and the level of current noise.

Atypical Residuals

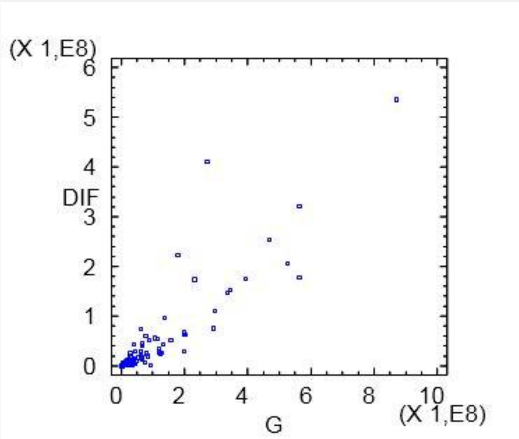
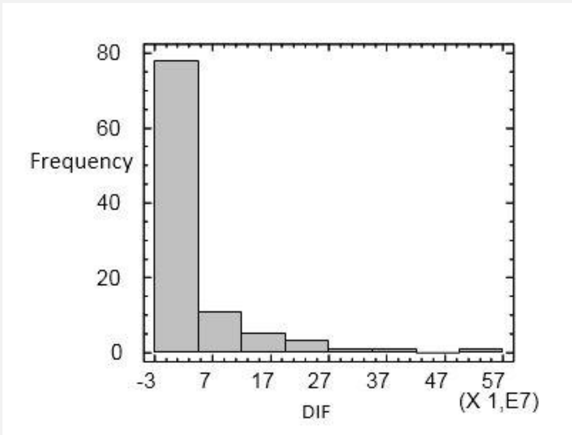
		Y		Studentized
Row	Y	Predicted	Residual	Residual
47	1,7636E8	2,03282E8	-2,69214E7	-2,06
48	2,05109E8	2,84636E8	-7,95269E7	-2,35
74	4,10454E8	1,8367E8	2,26784E8	9,08
76	2,22293E8	8,10794E7	1,41213E8	4,17
94	7,45925E7	1,48823E8	-7,42307E7	-2,07
96	5,34074E8	4,74345E8	5,97289E7	2,04

The table of atypical residuals lists all the observations that have studentized residuals higher than 2, in absolute value. The studentized residual measures how many standard deviations are deviated for each value observed by the adjusted model DIF, by using all data except that observation. In this case, there are 6 studentized residuals; three are higher than 2.2 and 3 greater than 3. It is convenient to examine carefully the observations with residual greater than 3 to see if they are deviant values that should be eliminated from the model and treated separately.



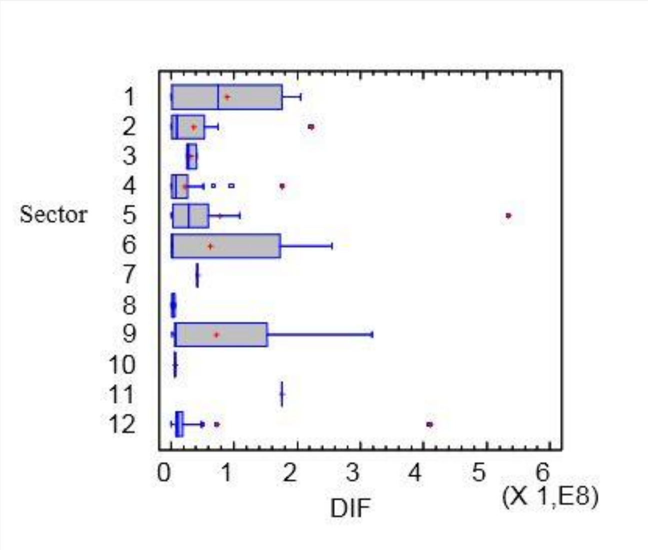
With respect to the last analysis, we find that it was found that the most important atypical residuals are from sectors 1, 6, and 9. There are two residuals higher than 3 standard deviations, so they can be eliminated.

The next two graphs are especially illustrative to our study. They are associated with the social benefits or theoretical maximum liability differential and a scatter plot of differential versus the warranty.

DIF Graph vs G	Histogram of Differentials
	

The graphs clearly indicate a higher density of small differentials, which is connected with the demographic values observed in the sample, and similarly in the chart. In the same way, on the graph of the scattered plots, it is observed that most of the points are concentrated in lower levels of warranty and oriented on the bisector plane (DIF,G) with some atypical points that were mentioned before. The maximum differences in terms of variability were observed in three sectors: sector 1, sector 6, Sector 9.

Box and Whiskers Plot



These three areas or sectors correspond to:
Sector 1 Agricultural Industry
Sector 6 Automotive Industries
Sector 9 Food Industries

10.0 RESEARCH FINDINGS

This study attempts to develop a multivariate linear regression model for the purpose of executing a retroactive impact analysis of social benefits, using a sample of 100 Venezuelan companies in various industries. A relatively good linear statistical model was found to make the estimations of the new social benefit system of some Venezuelan companies. This was based on three key variables and subsequent analyses that explain this impact in those companies. These variables are:

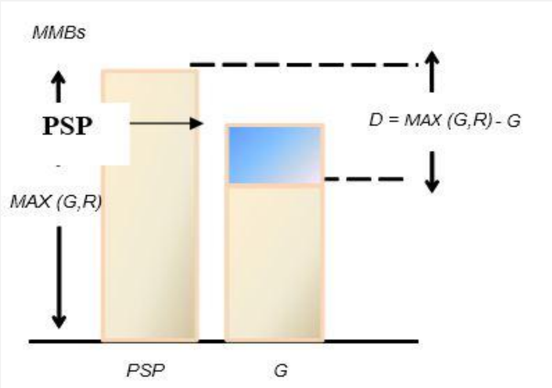
a) The number of employees
b) The cumulative warranty
c) The monthly average full salary

Among these, the most important variable and in terms of statistical significance is the amount of accumulated warranty at 5 percent, followed by the salary and lastly the number of employees in the company.

Setting aside the fixed term of the model (a_0 = -278825E7), the variable that most contributes to impact as marginal factor is the number of employees, with a negative sign after the salary. Least contributive among these three variables is the warranty. The number of employees was expected to have a positive sign, i.e., the greater the number of employees the greater is the magnitude of differential or (theoretical maximum liability differential), however this is not necessarily true; because it is possible that a group of employees in a company do not necessarily reach retroactivity. Only a subset of them where it is verified that $R_t > G_t$, and this depends highly on accumulated service.

Regarding the descriptive statistical analysis for the consolidated sector, the following was observed:

A consolidated level



PSP: 13.767.28
G: 9.426.35
D: 4.340.92

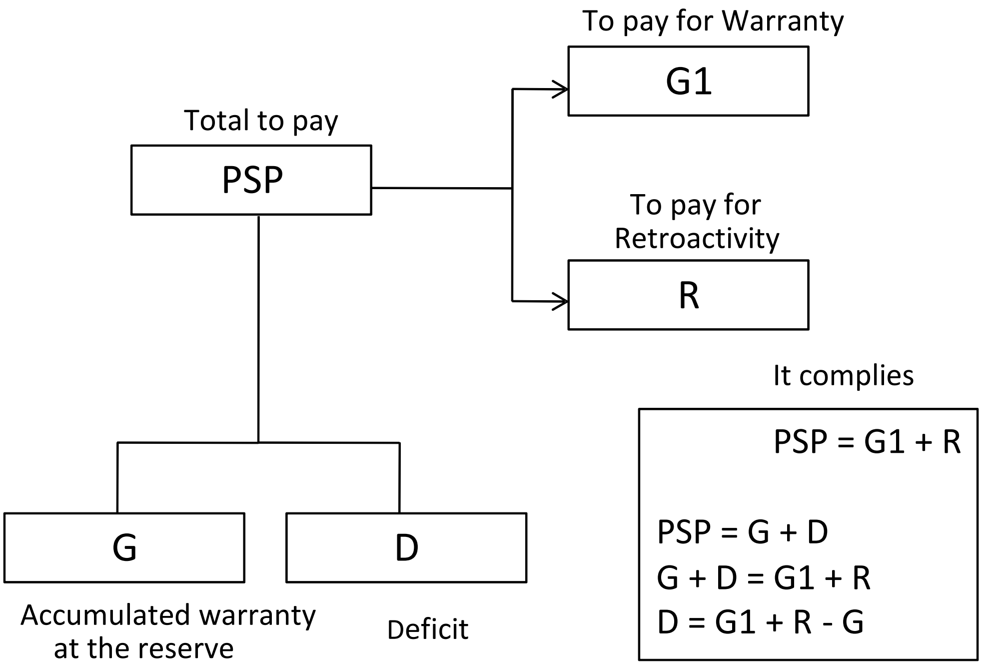
The total differential observed in the sample is in the order of 4.340.92 MMBs. When it is expressed as a percentage of the warranty, it is more like 46.04 percent. In theory this would be the additional obligation[7] not recognized to cover 100 percent of the total social benefits.

As for how the social benefits are distributed to pay PSP in retroactivity and warranty, the following is obtained:

PSP = 13.767.28

a) R = 10.982.99 (79.77%)
b) G1 = 2.784.29

The above can be described as follows:



[7] In practice, actuarial studies are conducted to determine the PBO or liabilities actuarial differential. Because the company is considered a going concern entity, it should not be necessary to cover this total differential in theory and depending on the assumptions and actuarial hypothesis.

11.0 CONCLUSION

This study has used a proprietary data set to model a methodology for measuring the rigor of pension regulatory changes. Often the regulatory changes sought by the ruling political class are implemented with little regard of their impact on private organizations. For example, shortly after sweeping health care reform was passed as the law of the land in the United States in 2009, a number of major corporations set aside millions in reserves to reflect the added expenditures expected from the Affordable Care Act. Correspondingly, it is imperative for corporations to plan for regulatory changes in order to compete and survive. Regulation is becoming a driver of strategy. History has illustrated repeatedly that periods of significant regulatory changes are frequently followed by periods of new products, increased merger and acquisition activity, and other changes impacting industry dynamics. Overall, our findings substantiate beliefs that the environment in which industries operate under a government-mandated pension system is a strategically important factor. Furthermore, our analysis demonstrates that some version of a scenario analysis analyzing possible future events by considering alternative possible outcomes is warranted and recommended by organizations operating within such a situation. While this analysis focused on pension plan-related changes, an exciting area for further study beyond pension plan changes would be to extend this area and develop a tool to measure the impact of other social changes such as health care reform.

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APPENDIX I

Demographic sample data

ID	Sector	Interest	Employees	Salary	Age	Service
1,00	1,00	24,00	1.522,00	27.049,01	43,58	12,88
2,00	1,00	25,00		33.502,51	37,65	9,30
3,00	1,00	24,00		23.288,97	37,33	6,59
4,00	1,00	25,00	37,00	18.451,08	32,74	4,52
5,00	2,00	24,00	27,00	21.716,25	39,86	4,34
6,00	2,00	20,00	102,00	57.277,62	40,83	5,86
7,00	2,00	24,00	375,00	22.675,40	37,17	8,32
8,00	2,00	22,00	8,00	22.604,27	48,01	6,80
9,00	2,00	24,00	148,00	30.821,22	42,84	15,09
10,00	2,00	24,00	79,00	52.193,72	39,96	8,23
11,00	2,00	24,00	32,00	28.451,47	42,59	14,19
12,00	2,00	24,00	23,00	23.117,96	41,98	13,16
13,00	2,00	24,00	518,00	46.365,16	36,03	6,61
14,00	2,00	25,00	1.610,00	31.438,25	36,16	7,49
15,00	2,00	25,00	1.412,00	19.752,44	40,53	9,09
16,00	2,00	24,00	1.178,00	14.980,48	36,28	3,64
17,00	2,00	28,00	1.410,00	26.972,56	35,10	9,07
18,00	3,00	22,00	69,00	19.816,85	39,89	10,56
19,00	3,00	24,00	372,00	25.255,74	38,09	9,77
20,00	3,00	22,00	313,00	21.127,37	38,45	10,37
21,00	4,00	24,00	59,00	38.538,04	33,02	5,78
22,00	4,00	19,00	149,00	34.230,85	63,78	9,09
23,00	4,00	25,00	590,00	27.681,23	35,99	6,16
24,00	4,00	25,00	373,00	26.856,29	40,01	9,83
25,00	4,00	24,00	1.150,00	11.182,42	34,92	5,65
26,00	4,00	24,00	804,00	10.400,75	36,46	6,01
27,00	4,00	24,00	186,00	23.902,60	36,66	6,24
28,00	4,00	24,00	21,00	36.190,38	35,35	5,93
29,00	4,00	25,00	35,00	39.091,48	37,16	3,21
30,00	4,00	25,00	62,00	36.200,52	32,72	6,01
31,00	4,00	31,00	55,00	53.712,43	37,53	5,00
32,00	4,00	24,00	152,00	26.516,86	36,76	4,93
33,00	4,00	24,00	195,00	22.514,74	40,82	9,10
34,00	4,00	24,00	155,00	39.244,97	39,50	7,66
35,00	4,00	24,00	272,00	3.700,13	38,00	9,18
36,00	4,00	25,00	479,00	23.247,80	36,90	7,62
37,00	4,00	23,00	286,00	49.285,12	40,13	6,78
38,00	4,00	18,00	649,00	26.203,81	40,20	11,54
39,00	4,00	31,00	780,00	37.729,23	39,02	9,06
40,00	4,00	24,00	544,00	36.742,36	39,83	7,26
41,00	4,00	27,00	1.147,00	28.447,14	36,08	5,17
42,00	4,00	25,00	8.388,00	16.515,31	29,53	3,76
43,00	4,00	24,00	18,00	32.901,31	36,99	9,28
44,00	4,00	31,00	37,00	38.918,69	34,76	4,14
45,00	4,00	24,00	45,00	52.839,92	35,49	4,75
46,00	4,00	24,00	54,00	37.110,94	38,03	4,56
47,00	4,00	24,00	250,00	26.499,74	37,00	6,14
48,00	4,00	25,00	657,00	37.524,20	38,29	9,65
49,00	4,00	24,00	174,00	33.821,35	37,18	5,76
50,00	4,00	24,00	160,00	34.602,45	38,34	6,70

APPENDIX II

Distributions of Liabilities by Sector

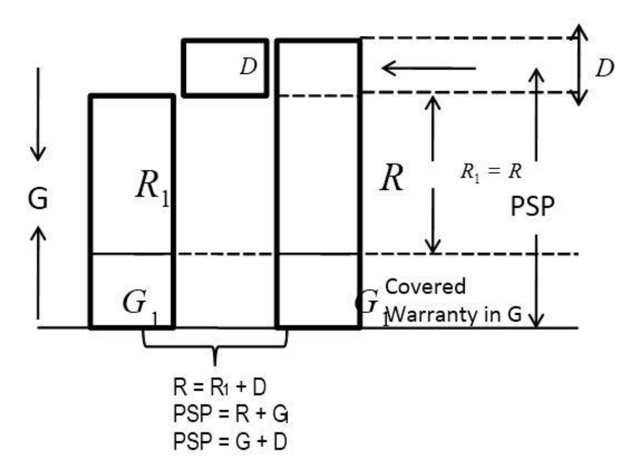
ID	Sector	G	PSP	G1	R	DIF	PBO
1,00	1,00	337.559.680,90	484.244.151,35	84.675.389,22	399.568.762,14	146.684.470,45	50.630.124,85
2,00	1,00	526.802.205,75	731.911.000,30	199.771.159,27	532.139.841,03	205.108.794,55	195.257.075,20
3,00	1,00	7.122.537,64	11.317.324,22	811.305,31	10.506.018,91	4.194.786,58	3.352.260,36
4,00	1,00	4.235.750,79	4.405.320,66	3.227.031,63	1.178.289,03	169.569,87	293.435,67
5,00	2,00	5.686.617,26	5.686.617,26	5.686.617,26	-	-	34.079,63
6,00	2,00	36.741.149,17	38.417.447,69	25.233.008,69	13.184.439,00	1.676.298,52	10.239.943,54
7,00	2,00	54.852.423,13	71.114.148,12	19.314.257,24	51.799.890,88	16.261.724,99	11.154.362,89
8,00	2,00	2.305.541,52	3.177.494,54	209.546,52	2.967.948,02	871.953,02	832.187,36
9,00	2,00	29.248.251,19	53.563.282,22	537.285,92	53.025.996,30	24.315.031,03	18.434.400,29
10,00	2,00	30.928.398,68	40.512.660,76	7.745.993,96	32.766.666,81	9.584.262,08	7.335.288,95
11,00	2,00	8.292.948,66	11.568.181,28	1.143.202,99	10.424.978,29	3.275.232,62	1.282.243.716,00
12,00	2,00	6.039.870,16	7.434.274,04	1.764.211,32	5.670.062,72	1.394.403,88	1.116.821,89
13,00	2,00	116.183.374,82	169.396.659,20	14.473.846,69	154.922.812,51	53.213.284,38	20.742.152,42
14,00	2,00	178.382.268,61	400.675.143,94	15.580.078,48	385.095.065,46	222.292.875,33	112.896.734,41
15,00	2,00	202.762.443,36	265.443.483,31	62.563.172,15	202.880.311,16	62.681.039,95	57.981.474,62
16,00	2,00	94.579.315,66	96.157.809,18	83.405.880,27	12.751.928,91	1.578.493,52	1.544.980,19
17,00	2,00	292.896.082,37	367.488.578,66	109.679.203,01	257.809.375,65	74.592.496,29	48.321.047,42
18,00	3,00	131.230.914,59	156.329.314,76	65.189.110,84	91.140.203,92	25.098.400,17	20.464.145,65
19,00	3,00	67.281.978,70	108.251.235,46	8.532.182,59	99.719.052,87	40.969.256,76	45.737.616,50
20,00	3,00	63.025.524,82	92.068.186,07	28.350.207,81	63.717.978,25	29.042.661,25	19.032.837,30
21,00	4,00	14.151.600,28	15.852.035,25	7.471.483,12	8.380.552,13	1.700.434,97	907.502,11
22,00	4,00	40.529.915,97	51.115.560,82	9.377.373,56	41.738.187,26	10.585.644,85	7.293.630,09
23,00	4,00	66.838.133,16	110.060.581,86	15.667.133,50	94.393.448,36	43.222.448,70	7.915.356,54
24,00	4,00	79.784.146,10	103.420.175,53	28.934.971,93	74.485.203,60	23.636.029,43	18.573.371,60
25,00	4,00	68.338.416,54	80.847.707,75	31.718.004,63	49.129.703,12	12.509.291,21	6.548.754,88
26,00	4,00	76.355.062,93	82.729.326,04	45.877.358,50	36.851.967,54	6.374.263,11	5.394.797,73
27,00	4,00	25.687.123,65	30.350.651,28	12.821.069,42	17.529.581,87	4.663.527,63	3.880.798,97
28,00	4,00	4.699.225,07	6.454.931,66	2.058.963,27	4.395.968,39	1.755.706,59	1.485.334,59
29,00	4,00	5.753.159,26	6.010.593,98	4.152.067,20	1.858.526,78	257.434,72	126.106,30
30,00	4,00	14.523.971,26	16.634.093,01	7.885.028,79	8.749.064,22	2.110.121,74	1.196.755,75
31,00	4,00	18.878.543,74	20.005.342,51	11.286.206,61	8.719.135,91	1.126.798,77	870.242,09
32,00	4,00	22.692.382,62	24.350.650,27	14.615.626,34	9.735.023,93	1.658.267,65	1.351.058,40
33,00	4,00	39.264.535,28	52.923.767,17	14.550.334,31	38.373.432,86	13.659.231,89	4.804.467,94
34,00	4,00	43.422.937,75	49.760.525,63	22.309.394,64	27.451.130,99	6.337.587,88	7.081.263,29
35,00	4,00	62.819.074,86	91.632.927,86	17.458.159,14	74.174.768,72	28.813.853,00	233.134.721,34
36,00	4,00	63.456.142,00	83.633.566,15	20.077.722,85	63.555.843,30	20.177.424,15	13.475.950,40
37,00	4,00	85.646.328,19	104.631.994,08	39.284.069,82	65.347.924,26	18.985.665,89	10.961.491,30
38,00	4,00	131.785.780,84	174.382.115,22	41.692.167,23	132.689.947,99	42.596.334,39	21.387.522,36
39,00	4,00	198.841.601,28	266.000.427,51	56.966.088,90	209.034.338,61	67.158.826,23	34.210.171,73
40,00	4,00	125.142.335,48	149.154.034,05	60.136.249,71	89.017.784,34	24.011.698,57	13.995.033,04
41,00	4,00	200.927.006,47	230.148.373,07	131.009.719,18	99.138.653,89	29.221.366,60	7.940.042,79
42,00	4,00	565.430.879,10	741.791.060,07	178.987.312,35	562.803.747,73	176.360.180,98	112.038.529,80
43,00	4,00	30.153.309,39	48.494.756,47	5.028.696,42	43.466.060,05	18.341.447,08	9.260.837,17
44,00	4,00	7.694.368,73	9.160.368,35	4.471.631,99	4.688.736,36	1.465.999,62	1.016.125,21
45,00	4,00	11.858.507,12	15.911.815,60	4.550.129,17	11.361.686,43	4.053.308,48	2.580.724,06
46,00	4,00	9.348.891,96	11.014.733,31	6.370.651,93	4.644.081,38	1.665.841,34	1.533.691,93
47,00	4,00	36.301.210,57	43.708.109,32	17.525.628,00	26.182.481,32	7.406.898,75	4.740.331,68
48,00	4,00	138.708.700,22	234.968.738,85	17.562.706,42	217.406.032,43	96.260.038,64	693.285.800,16
49,00	4,00	38.962.943,40	43.065.733,44	27.583.922,01	15.481.811,43	4.102.790,04	3.408.194,30
50,00	4,00	45.693.455,92	48.369.674,60	30.798.452,90	17.571.221,70	2.676.218,68	2.526.281,62

ID	Sector	G	PSP	G1	R	DIF	PBO
51,00	4,00	119.103.831,41	146.698.673,73	55.246.915,94	91.451.757,79	27.594.842,33	21.011.680,74
52,00	4,00	158.508.624,95	209.485.768,84	56.621.711,32	152.864.057,52	50.977.143,89	54.562.231,66
53,00	4,00	4.047.443,79	4.230.672,60	3.301.744,98	928.927,62	183.228,81	88.356,01
54,00	4,00	2.384.191,64	2.467.963,40	1.479.744,52	988.218,88	83.771,76	114.658,95
55,00	5,00	9.123.184,05	10.887.401,49	4.534.931,77	6.352.469,72	1.764.217,44	1.162.701,37
56,00	5,00	45.379.738,49	74.091.885,40	7.523.554,93	66.568.330,47	28.712.146,91	18.494.321,47
57,00	5,00	9.946.312,25	11.204.675,78	3.898.305,08	7.306.370,70	1.258.363,53	474.622,54
58,00	5,00	40.851.390,24	45.830.070,03	25.171.037,66	20.659.032,37	4.978.679,79	122.950.731,00
59,00	5,00	78.669.442,06	137.511.209,09	4.521.383,76	132.989.825,33	58.841.767,03	23.402.624,21
60,00	5,00	14.604.891,03	18.405.638,83	4.133.220,52	14.272.418,32	3.800.747,81	1.984.128,76
61,00	5,00	32.891.611,60	50.859.429,50	4.768.503,76	46.090.925,74	17.967.817,90	15.340.546,31
62,00	5,00	107.468.722,10	162.866.827,10	6.383.586,61	156.483.240,49	55.398.104,99	39.447.342,06
63,00	5,00	297.412.490,72	407.186.351,85	85.445.929,62	321.740.422,23	109.773.861,13	84.291.908,82
64,00	5,00	118.932.887,63	153.122.248,28	39.685.073,18	113.437.175,10	34.189.360,65	21.129.626,28
65,00	5,00	868.866.551,34	1.402.940.439,00	122.506.860,33	1.280.433.578,67	534.073.887,66	455.316.038,43
66,00	6,00	468.317.739,36	722.821.340,15	57.001.637,29	665.819.702,86	254.503.600,79	96.795.188,65
67,00	6,00	6.281.663,75	8.730.320,30	856.956,99	7.873.363,31	2.448.656,55	933.357,93
68,00	6,00	234.798.522,35	407.880.503,34	18.851.357,14	389.029.146,20	173.081.980,99	143.609.081,14
69,00	6,00	3.799.368,37	5.178.629,06	1.480.028,69	3.698.600,37	1.379.260,69	1.112.708,42
70,00	6,00	11.845.490,47	16.518.958,60	1.716.431,97	14.802.526,63	4.673.468,13	2.540.412,14
71,00	6,00	7.547.275,70	10.053.038,95	3.042.081,04	7.010.957,91	2.505.763,25	8.681.369,14
72,00	6,00	12.325.585,51	14.537.751,76	6.075.217,03	8.462.534,73	2.212.166,25	1.194.690,17
73,00	7,00	38.532.920,39	80.953.211,95	5.698.065,22	75.255.146,73	42.420.291,56	22.044.547,73
74,00	8,00	28.379.355,52	29.300.224,71	23.856.658,38	5.443.566,33	920.869,19	107.124,51
75,00	8,00	17.072.131,84	24.468.729,90	762.701,84	23.706.028,06	7.396.598,06	5.161.909,87
76,00	8,00	7.632.729,76	9.148.099,60	2.154.014,09	6.994.085,50	1.515.369,84	798.391,08
77,00	8,00	20.804.963,67	24.492.139,57	11.741.212,38	12.750.927,19	3.687.175,90	939.839,78
78,00	8,00	35.427.408,15	42.563.376,65	12.381.343,23	30.182.033,42	7.135.968,50	1.937.948,64
79,00	9,00	565.825.651,68	885.030.181,61	132.298.091,41	752.732.090,20	319.204.529,93	160.358.588,26
80,00	9,00	345.386.293,15	497.350.398,37	135.775.317,88	361.575.080,49	151.964.105,23	151.926.076,46
81,00	9,00	11.785.933,41	17.989.402,71	1.720.960,09	16.268.442,62	6.203.469,30	2.995.702,06
82,00	9,00	19.487.613,01	21.048.467,71	15.200.007,17	5.848.460,54	1.560.854,71	176.506.407,91
83,00	9,00	41.789.696,72	50.008.654,51	22.318.493,31	27.690.161,20	8.218.957,79	4.436.258,31
84,00	9,00	49.268.557,53	58.385.935,34	23.075.596,96	35.310.338,38	9.117.377,81	5.993.111,46
85,00	9,00	11.785.933,41	17.989.402,71	1.720.960,09	16.268.442,62	6.203.469,30	2.995.702,06
86,00	10,00	15.737.734,30	22.319.099,82	2.201.049,14	20.118.050,68	6.581.365,52	4.500.371,63
87,00	11,00	392.881.756,69	568.937.232,07	116.390.517,87	452.546.714,20	176.055.475,38	92.301.689,83
88,00	12,00	41.730.694,52	51.593.029,18	9.843.033,28	41.749.995,90	9.862.334,67	5.001.528,12
89,00	12,00	20.585.193,36	33.693.979,37	5.889.769,47	27.804.209,90	13.108.786,01	13.440.722,19
90,00	12,00	87.531.276,08	137.570.864,72	23.345.287,14	114.225.577,58	50.039.588,64	15.984.942,14
91,00	12,00	63.526.993,94	136.919.359,65	5.048.782,62	131.870.577,03	73.392.365,71	44.344.240,98
92,00	12,00	31.544.861,17	50.732.911,90	6.940.448,75	43.792.463,15	19.188.050,72	13.474.112,98
93,00	12,00	27.808.367,54	39.457.458,55	9.895.493,95	29.561.964,60	11.649.091,01	6.377.683,09
94,00	12,00	19.502.620,40	23.057.241,73	10.455.393,17	12.601.848,56	3.554.621,32	2.224.737,74
95,00	12,00	36.078.362,13	45.934.463,02	11.870.598,55	34.063.864,48	9.856.100,89	6.470.478,13
96,00	12,00	271.332.659,79	681.786.907,79	15.046.588,14	666.740.319,66	410.454.248,01	219.813.534,51
97,00	12,00	28.322.536,17	36.258.250,92	15.775.480,58	20.482.770,34	7.935.714,75	5.022.303,27
98,00	12,00	65.919.282,43	82.020.246,66	18.153.731,48	63.866.515,18	16.100.964,23	8.731.081,71
99,00	12,00	3.094.001,82	4.310.151,15	499.103,38	3.811.047,77	1.216.149,32	682.475,71
100,00	12,00	4.629.629,83	4.706.536,89	3.864.991,13	841.545,76	76.907,06	922,56

APPENDIX III

Composition of Liabilities

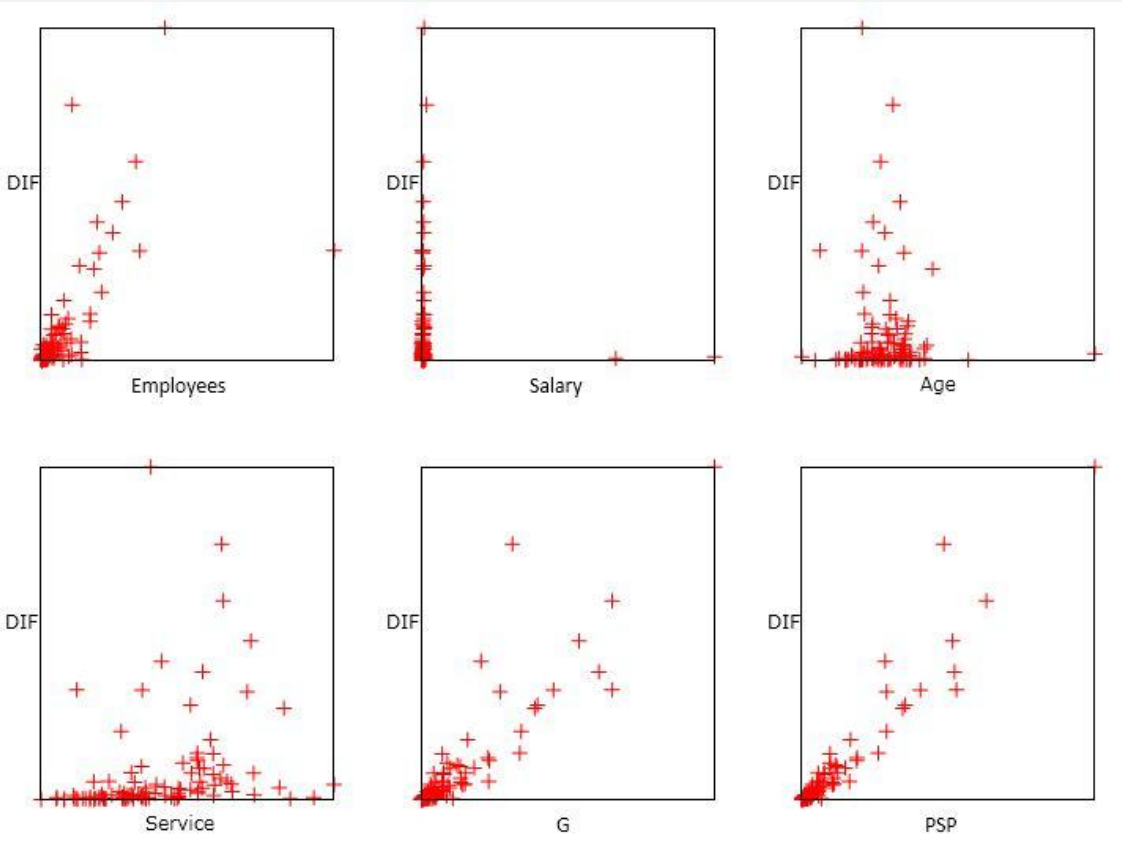
The following relationships are met among retroactivity, warranty and pay social benefits



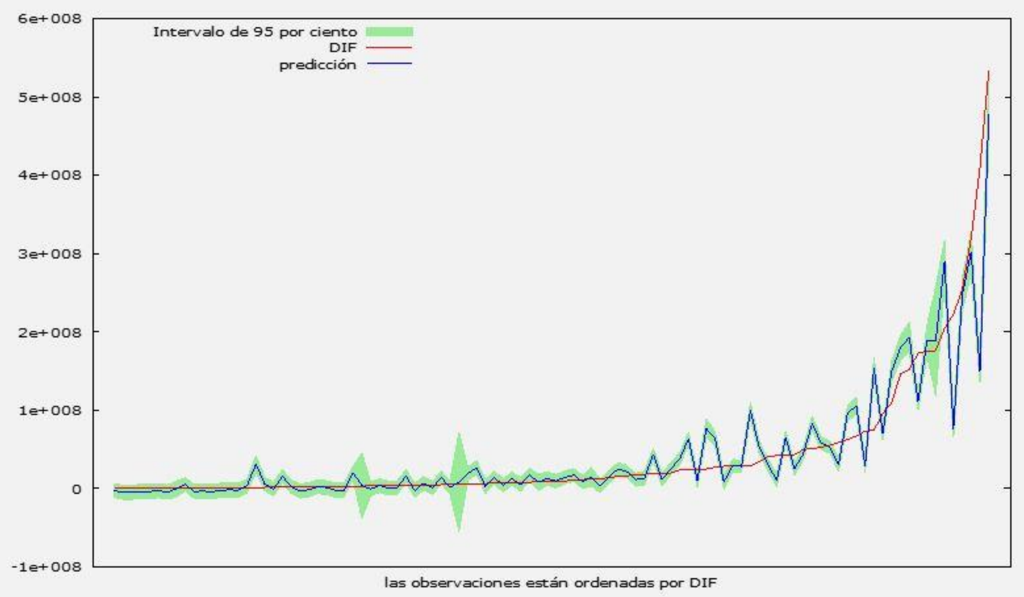
Being:
PSP: Social Benefits to Pay
G: Accumulated warranty at the company
R: Retroactivity
R_1: Retroactivity fraction
D: Differential
G_1: Warranty fraction

APPENDIX IV

Graphics between the major demographic variables and the differential



Interval of Confidence 95% DIF = PSP – G



APPENDIX V

Sector Description

1. Agribusiness (agricultural companies)
2. Energy Products (oil and gas)
3. Capital Goods Companies
4. Pharmaceutical Industries
5. Audiovisual Equipment
6. Automotive Companies
7. Accommodations Companies
8. Technological Companies
9. Food Processing Industries
10. Cargo Freight Services
11. Banking and Financial Institutions
12. Elevator Industries