Title of Paper: Analogical Stock-Market valuation of construction and real estate companies

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Abstract

The aim of this work is to obtain explanatory equations for the stock-market value of construction and real estate companies, using the economic-financial information supplied by the same. Equations of fundamental valuation of construction and real estate companies will be calculated by means of combination of factor analysis of principal components and multiple regression, synthesizing the available information in the market and avoiding the frequent problem of multicollinearity. The contribution of this methodology to companies valuation increases on seeing the difficulties and the lack of precision when applying traditional methods. In this way, besides conventional methods, another additional criterion of valuation of companies is used, being useful in stock-market operations, in processes of concentration or for financial administration of these companies.

KEY WORDS: valuation of companies, analogical stock-market valuation, construction and real estate companies, stock market analysis

1. Introduction

The aim of this work is to obtain an explanatory equation to the stock-market value of a company from the construction sector, using economic and financial information supplied by the company. We will use this equation to calculate the analogical stock market value of others companies that are not quoted in the Stock Exchange.

According to the current financial theory the aim that the companies have to pursue is the creation of shareholder value (Rappaport, 1998). This introduces the need of using useful models in the estimation calculus of this value that is also based in economic and financial variables significantly. This need is emphasised by the fact of the non-existence of an organised market of buying and selling entities, except for the companies that listed on the Stock Exchange which stock-market value can be known. Provided that the companies, which share capital, is being dealt in a market with a relative efficiency are a minority part in each business sector. In consequence, we should look for methods to value this kind of companies without share market value so this value could be used as a proxy variable of the market value[1]. There are very varied methodologies, although a unanimously standard as accepted by valuation authors has not yet been reached.

Conventional methods of company valuation are processes, generally complex and submitted to continuous reviews and revisions, which take as a basis the economic-financial information of the entities. These methods can be classify in three main groups, according to the value pursued and the information used:

1. Book value methods. This is based in the wealth value calculated as the difference between the assets and the liabilities The resulting valuation is based on the historic prices of the asset, which does not adequately shows the real situation, and much less the prospects regarding future profitability. In order to correct the first of the inconveniences, other methods have appeared. These try to adjust balances to the real adjusted book value, substantial value, liquidation value, etc, and others try to show the inconstancy of the some balance item, as the methodology of the stochastic balance.

2. Return value methods. They try to obtain the companies value as the current value of the results the company is expected to generate within a given period of time. For calculating the current value of an entity, as in another kind of inversion happens, it's necessary to formulate hypothesis about the parameters from which the current value depends, estimated period of time, capitalization rate, etc. The precision of this hypothesis is diverse and very high the sensibility of the result value in front of changes in these parameters.
   The goodwill presupposes a relationship with accounting methods. Return value is considered a global value as depending on two factors: a tangible one – measured by the substantial value-, and an intangible one –represented by the goodwill. The goodwill would come to explain the foreseeable attainment of different result (bigger or smaller) to those as resulting from what can be considered as normal by a similar company within the same activity sector. However, in a way of valuation methodology can be indifferent to value a company or his goodwill, the problem is stand up.

3. Stock-market value methods. They based in obtained the value from the Stock Exchange capitalization of companies listed on the Stock Exchange. This method would primarily be reserved to companies whose shares have admission to quotation in the Stock Exchange[2]. These models try to formulate the value of the shares of a company regarding the financial-economic information as existing in the market. Empirical research in this area has been carried out, especially in the United States, since the 50's, and it has been aimed at attaining relationships between the price of financial asset and fundamental variables. Such

[1] Obviously the stock market value is not a real market value, about it you can see Caballer (1994) where he present a model of relationship between the market value and the stock market value according to the addition of the called control value.
[2] The application of this methods over entities which quotation in Stock Exchange can be founding Caballer and Moya (1997)

research has presented three main lines: the Hypothesis of Market Efficiency, the CAPM (Capital Asset Pricing Model) and the APT (Arbitrage Pricing Theory).

2. The Stock- Exchange value as the Market value.

For econometric models of share valuation, the variable to explain is the quotation of the share as referred to a given period of time. This quotation multiplied by share's number give us the stock-market value of the company, which can be considered as a good approximation to the company's market value.

However, the stock-market value of a company should not be mistaken for its market value, because a possible purchaser will have to pay, on some occasions and depending of the volume of titles, higher prices than those of the quotation of the shares of the company which he intends to purchase, that is: he will have to pay a premium. The former statement may seem to contradict the intermediate hypothesis of efficient market (the price of the share shows all public information available), but it is not so, for the price market of a share shows its value when the transaction affects small packets. But, when the number of titles conveys the taking of control of a company the resulting price increases, due to the fact that such control has a price. For this reason, the market value (VM) of a company which operating in Stock Exchange can be expressed as the addition of two components, stock-market value (VB), and complementary value of control (VC): VM = VB + VC. However, a cause of practical difficulties to estimate control value, we can assume the hypothesis: the stock-market value is a proxy variable of the market value (Caballer, 1994). This doesn't mean a higher mistake than in a conventional method of companies valuation.

3. Formulation of the general model of stock market value in fundamental analysis

As far as we know, in the econometric models of share valuation, the variable to explain is the quotation of the share as referred to a given period of time. The product between the number of shares and the quotation of them give us the stock-market value. This is an approximation of the company's market value. Explanatory variables can be chosen by two different procedures:

a) From models theoretically formulated already. Some of these variables can be, the profit, cash flow, foreign financing expenses, leverage, dividend expectations, etc.

b) From an exhaustive relation of variables which may influence the stock-market value. In such a complex market as the Stock Exchange, to limit already formulated theoretical models can be a prior restriction. It is because, it's better working out of exhaustive relation

of variables affecting, a priori, the stock-market value of the share. This relation should include not only those variables affecting the own company, but also those referring to information about stock-market in general.

Provided that the variables in the first group would be considered at the same period of time, the economic and social situation that affect over the quotation of each one of the shares is the same and it has not operative interest to introduce any variable belong to the second group.

The initial general model (1) would be formulated as follows:

$$VB = b_o + b_1V_1 + b_2V_2 + ... + b_nV_n + e \qquad (1)$$

where: VB is the average stock-market value corresponding to the last three month,

b_i are regression coefficients

V_i are explanatory variables

i= 1, 2, 3, ……, n

e is the error or aleatory perturbation (residue).

From this time forward, we will be considered that the information about the explanatory variables is valid for verifying the behaviour of the market during the following period to its publication until new information about these variables. So, the stock-market value is calculated as average of the last three months of the year, using definitive data in this economic exercise and it will be valid during the next economic exercise, although the entities, which listed on Stock Exchange, present provisional accounting information each trimester and semester. The reduction of the validity period could give information to take decisions for to invest in Stock Exchange, but it is not operative for the companies valuation. It is more logical to define the entity value in superior or equal periods of time to the accounting or economic period.

3.1 Selecting of explanatory variables: the problem of multicollinearity.

Interdependence among explanatory variables makes it difficult to empirically determine the contribution of these regarding the variation noted on the dependent variable. The problem, then, arises on selecting interdependent variables for multiple regression analysis.

This indicates that some ratios provide redundant information and therefore their calculating could be avoided, apart from the fact that for the restricted sought model, highly correlated variables should not be included, in spite of presenting high correlation with the variable to explain, the stock-market value. Otherwise valuation models based on multiple regression with high level of multicollinearity may contain meaningless coefficients. In these

cases the probability of getting some useful inference of the model is practically non-existent. For all this, the use of regression analysis regarding stock-market valuation should take into account the problem of the selecting of independent variables under two conditions: a) To increase determination coefficient and b) To reduce correlation among explanatory variables.

To choose variables for the regression analysis, eliminating the multicollinearity problem, is based on factor analysis of principal components. This procedure is useful for studies with enormous amount of information, difficult to manage and analyse, and which is frequently in part redundant, for there are interdependence relationships among some variables, which causes the information supplied by one of them to be repeated in part by that provided by the others. Using this technique, we try to synthesize information to the maximum, with the approach the minimum lost of explanation power referring to the whole variance of the dates. It's frequent that some few variables explain a high percentage of variance, so the reduction the amount dimension obtained is important. With the factor analysis we group the variables in factors and we can explain them, as are lineal combinations of the variables. Each variable is assigned to the factor with which it is more correlated. Factors are usually submitted to a process called rotation process. Rotated factors are lineal combinations of the original and therefore of the starting variables. This rotation is carried out to simplify, seeking the suitable situation in which each variable appears in only one factor[3].

The next step consists to obtain a simplified equation. In the regression model only one variable per factor[4] should be included. As variables in each factor tend to be very correlated among them, this procedure systematically reduces the probability of highly correlated variables being included in the final model.

The application of this methodology allow an equation (or several equations) optimum for calculating the stock-market value; it has the next characteristics:

1. It has a sufficiently low number of explanatory variables to be operative.
2. All of the variables are significant, with a correct economic sense a cause of their sign.
3. Without significant correlation between them (without multicollinearity).
4. A determination coefficient sufficiently high to be useful for the valuation.

[3] The present study will use the varimax technique, as it is the most recommended ortogonal rotation method for applications (Cuadras, 1991).

[4] There are different alternatives for the selection of these variables. Some authors, (Darling and Tamura, 1970), recommend choosing among variables of similar weight in the factor those which may present greater simple correlation respect to the dependent variable. This is usually the best technique to get a high determination coefficient. However, there are other solutions for the problem of selection when several alternatives are possible, for instance: the variable whose measurement supposes a lesser cost may be selected.

4. Data base and variables

In this work it has been established are cross-section to determine an explanatory equation of stock-market value for a company in the construction sector and it can be used for others companies in the same sector, which doesn't quotation in the Stock Exchange now. The general model starts from the hypothesis, admitted by the main theories of fundamental analysis, which sets out the possible influence of the variables considered on the entity value. The variable requiring explanation is the stock-market value (VB), in millions of pesetas, of a company as resulting from the product between the number of shares issued and the average quotation during the last three moths of the year to which the financial-economic information corresponds: 1998.

In order to present study we will consider the construction sector composed of next groups of business activity:

1. Manufacturer's companies of cement.
2. Construction and property companies.
3. Building material companies.
4. Companies manufacturers others elements for the construction.

Exist some differences between them, but we have formed only a group with them. That is so, because the number of them that listed in the Spanish Stock Exchange is scarce, consequently it is difficult to obtain information about a sufficient number of companies for each one of these groups. With the purpose to use of information presents in the stock market.

We can enumerate some general characteristics about this group of entities that goes to belong to our study sector:

1) The fixed asset material acquires a fundamental role in the patrimony structure of entity and consequently, in the company's value. For example, in the case of the manufacturers companies of cement, we can talk about the plant (equipment); in the case of construction and property companies, we can talk about builder investment.

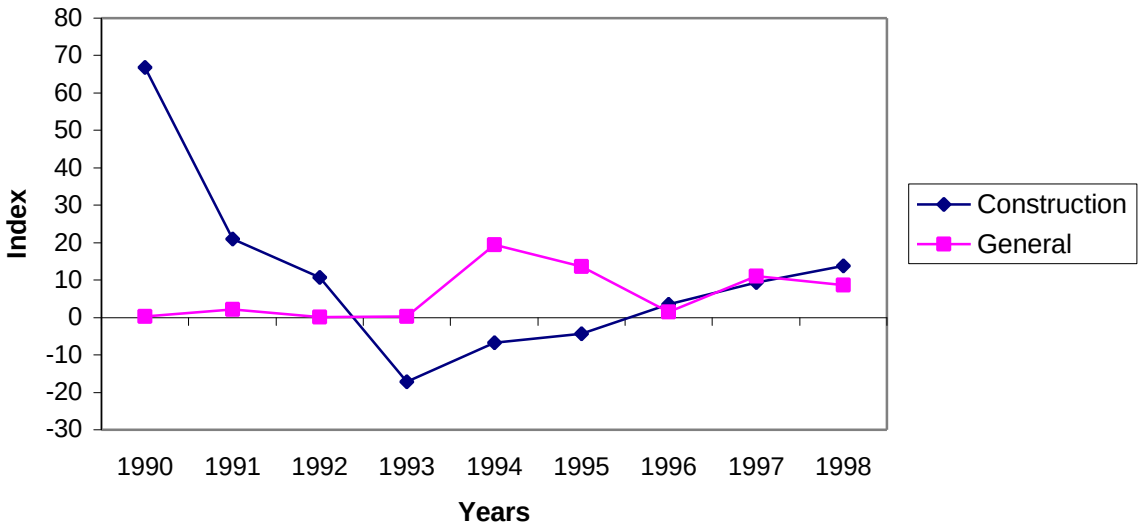
2) The sector is less limited than others as banking sector or Energy sector, if you considered the internal operations of the company. However, its activity depends on town-planning political and public expense.

3) Around the big companies exist a lot of medium and small companies that subcontract, compete and complement the building activity of the biggest entities. All of them constitute a network with a multiplayer effect in the rest of economy.

The evolution of the economic results got for the companies of this sector in the last decade in relation to the general growth-rate of entities in the economy, you can see it in the next figure 1.

In this figure we can watch the industry crisis early in the nineties and how it grows up since 1993 even overcoming the general rate at the end of the decade, date where we locate the research study object.

FIGURE 1
INDEX DEVELOPMENT



Source: Central de Balances del Banco de España

The explanatory variables corresponding to data of 1998 it shows in the table 1 and pick up several aspects of the public information: big magnitudes and results, balance structure, liabilities, rentability, costs and productivity. The data source comes from the information provided by the CNMV (National Commission of Stock Market), also the data base SABE.

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TABLE 1
EXPLANATORY VARIABLES 1998

A: Asset side	S (%): Asset side / Liabilities
IN: Net fixed assets	AU (%): Net worth / Permanent Resources
RP: Stockholders equity	C1 (%):Net worth / Net Fixed assets
ELP: Medium and Long term liability	RA (%): Depreciation rate
ECP: Short term liability	C2 (%):Permanent Resources / Fixed assets
BB: Gross profit	FP: Sales / Nº employee
BN: Net profit	VAA (%): Value added / Assets side

CFN: Net Cash-flow	RF (%): Financial profitability
GF: Financial expenses	RE (%): Economic profitability
E: Nº employee	GFE (%): Financial expenses / Liabilities
GP: Employee expenses	GPV (%): Employee expenses / Value added
VA: Value added	BNCF (%): Net Profit / Net Cash-Flow
DA: Provide depreciation	VAP: Value added / Nº employee
IEA: Fixed Assets before exercise	BNP: Net Profit / Nº employee
EA (%): Net Fixed Asset / Asset side	VAF (%): Value added / Sales
EE (%): Medium and Long term liab. / Short term liabilities	FA (%): Sales / Asset side
RPA (%):Net worth / Asset side	

The 24 companies, which listed in the Spanish Stock Market in 1998, are shown in table 2. They belong to the sectors describe before.

TABLE 2
LIST OF COMPANIES

ACCIONA	INMOBILIARIA URBIS SA
ACERINOX	INMOBILIARIA ZABALBURU SA
ACS ACTIVIDADES DE CONSTRUCCION Y SERVICIOS SA	METROVACESA SA
ALDEASA SA	N. CORREA
BAMI SA INMOBILIARIA DE CONSTRUCCIONES Y TERRENOS	OBRASCON HUARTE LAIN S.A.
CEMENTOS PORTLAND SA	PORTLAND VALDERRIVAS SA
FCC (Fomento de Construcciones y Contratas)	PRIMA INMOBILIARIA SA
GLOBAL STEEL WIRE SA	SAINT GOBAIN (CRISTALERIA ESPAÑOLA)
GRUPO DRAGADOS SA	UNILAND
INBESOS	URALITA SA
INMOBILIARIA FILO	VALLEHERMOSO SA
INMOBILIARIA SOTOGRANDE	ZARDOYA OTIS

The application of the principal components analysis to the construction companies database is shown in table 3. We have followed the Kaiser criterion. It consists of choosing some components with own value upper than unit, that is, they have greater explanatory capacity than only one variable as an average. We have typified. We select 7 components, being the accumulated percentage of explained variance 90.39%. It is shown in table 3.

TABLE 3
PRINCIPAL COMPONENTS ANALYSIS

Factors	Eigenvalue	P. Variance (%)	Cum. P (%)
1	12,891	36,830	36,830
2	5,546	15,846	52,676
3	3,872	11,063	63,739
4	3,499	9,997	73,736
5	2,605	7,443	81,179
6	1,613	4,609	85,787
7	1,611	4,604	90,391

Once the number of factors has been determined, table 4 shows varimax rotation of the factor matrix, to facilitate the interpretation of intercorrelated factors and to get better assigning of the variables. Each variable is assigned to only one factor, which with it has greater correlation, as represented by its load and weight within the factor, as is shown in table 5.

TABLE 4
THE VARIABLES WEIGHT IN THE VARIMAX ROTATED FACTOR MATRIX

	Componente						
	1	2	3	4	5	6	7
A	,969				-,162		,114
VA	,941	,166	-,113				,187
BB	,938	,256					-,106
GP	,910	,139	-,118		-,126		,288
Inmov Ejerc Anterior	,909	-,121		-,223		-,129	-,180
IN	,908	-,103		-,226		-,191	-,174
E	,905	,114	-,102		-,126		,260
CFN	,902	,240				-,247	-,166
F	,900	,140	-,179		-,129		,297
GF	,898		-,125	-,108	-,187	,105	,239
RP	,891			-,123	,112		-,131
BN	,888	,343					-,192
ECP	,849		-,166		-,246		,327
DA	,841	,128	-,112			-,421	
ELP	,808	-,238	,166	-,169	-,296	,213	-,245
RF		,938			-,104	,130	-,136
VAA	,150	,905	-,161				
FA	,210	,798	-,345			,110	,198
RE	-,133	,655	-,122	-,198	,203	,251	-,402
FP	-,266	-,634	,335	,196	,101	,366	-,187
RA		,618	-,138	,206	-,247	-,332	,110
GFE	-,151	-,508	-,195	-,383	,227	-,157	,353
BNP	-,130	-,277	,905			,216	
EE	-,138	-,228	,900				
VAP	-,217	-,438	,816			,161	
VAF		,236	,783	-,294		-,266	-,195
CI	-,233	-,118		,916	,114		
C2	-,218	-,180		,913			
RAI		,435	-,172	,797	-,139	,127	,195
EA		-,276	,423	-,638		-,396	-,280
S	-,161	-,185			,872		
RPA	-,339	-,106			,860	,113	-,202
AU		,542	-,227	,119	,716		,215
BNCF	-,221	,174	,187	,449	,147	,727	
GPV	,484	,493	-,378		-,174	-,111	,528

TABLE 5
ASSIGNATION OF VARIABLES

Factor 1: A, VA, BB, GP, IEA, IN, E, CFN, F, GF, RP, BN, ECP, DA, ELP
Factor 2: RF, VAA, FA, RE, (-)FP, RA
Factor 3: EE, BNP, VAP, VAF
Factor 4: C1, C2, RAI, (-)EA
Factor 5: RPA, S, AU
Factor 6: BNCF
Factor 7: GFE

As you can verify there are groups of variables very correlated between them, which is the reason for grouping them in the corresponding factors. Although these factors are not directly observable variables, they are an economic-financial sense due to the weightiest variables into. So the factor number 1 represents the big magnitudes of the balance and the income statement, this is the size of the company. In the same way, the factor 2 would be related with the profit, the factor 3 with the productivity, the fourth with the financial coverage, the 5 with the solvency, the 6 with the economic results and the redemption policy and the seventh with the financial expenses over their liabilities.

When each variable is assigned to only one factor we make the multiple regression model. The dependent variable is the stock-market value and the independents variables are chosen following a procedure mixing the multiple regression method stepwise with the criterion to choose only one variable per factor (with the weightiest in the factor). After that, we have made a logarithmic transformation in order to correct the range effect. The results are shown in table 6.

TABLE 6
REGRESSION MODEL

Dependent variable: LOG (VB)				
Parameter	Estimate	Standard Error	t - statistic	p - value
CONSTANT	-3,721	1,093	-3,405	0,003
LOG (A)	1,124	0,079	14,297	0,000
RF	3,868E-02	0,008	4,718	0,000
RPA	1,974E-02	0,006	3,314	0,004
BNCF	1,005E-02	0,004	2,287	0,034
R-squared = 92,5 percent R-squared (adjusted for d.f.) = 91,0 percent				
Analysis of variance: F-Ratio = 58,841 P-Value = 0,000				

The output shows the results of fitting a multiple linear regression model to describe the relationship between dependent variable, LOG (VB), and 4 independent variables (notice that the maxium number of independent variables give us the number of the factors, in this case 7). The equation of the fitted model is (2):

$$LOG(VB) = -3,721 + 1,124\ LOG(A) + 0,03868\ RF + 0,01974\ RPA + 0,01005\ BNCF \qquad (2)$$

Since the P-value in the analysis of variance is less than 0,01, there is a statistically significant relationship between the variables at the 99% confidence level. The R-Squared (adjusted for d.f.) statistic indicates that the model as fitted explains 91,0% of the variability in LOG(VB). The highest P-value on the independent variables is 0,034, belonging to BNCF, since the P-value is less than 0,05, all terms are statistically signifcants at the 95% confidence level.

The resulting equation express that the stock-market value of the Construction sector depending on: one variable represents the size and the balance of the company (assets side). Another variable represents the rentability (financial profitability, or the profitability for the shareholder-owner of the capital). The third variable indicates the influence of the financial structure in the company value (owner resources over total assets). The last significant variable connect the dependent variable with the depreciation effects over the results (net profit variable over the cash-flow of the factor). Provided that the positive sign of the variables coefficients, we can interpret the model in the next way: The companies of the construction sector which add to their net worth, the rentability that give to their owners, the their financial structure has been restructure and them have done less provide to the depreciation, this companies increase their stock-market value.

5. Comparison between the real stock market value and the estimate value

By means of the equation (2) and using the values of the coefficients to the real data for each entity in construction sector which listed in Stock Exchange, we have calculate the estimates stock-market values for them. It is shown in table 7, where we can watch the real stock market value (VB) and the relative error so much per one.

TABLE 7
ANALOGICAL STOCK MARKET VALUATION MODEL AND THEIR RELATIONSHIP WITH THE REAL STOCK MARKET
(Million of pesetas)

	NAME	VB	A	RPA	RF	BNCF	VBe	Relative Error
1	**ACCIONA**	529.517	417.799	23,70	15,78	55,54	258.625,44	0,51
2	**ACERINOX**	181.227	234.276	63,38	6,22	41,11	176.556,66	0,03
3	**ACS ACTIVIDADES DE CONSTRUCCION Y SERVICIOS SA**	222.107	398.633	20,37	14,19	67,92	244.576,36	-0,10
4	**ALDEASA SA**	109.007	40.881	65,15	31,47	86,44	107.618,19	0,01
5	**BAMI SA INMOBILIARIA DE CONSTRUCCIONES Y TERRENOS**	15.147	14.081	45,92	8,94	95,54	10.183,00	0,33
6	**CEMENTOS PORTLAND SA**	158.258	135.655	55,76	17,43	56,28	147.696,27	0,07
7	**FCC (Fomento de Construcciones y Contratas)**	477.766	684.304	21,13	17,74	48,69	430.996,14	0,10
8	**GLOBAL STEEL WIRE SA**	10.622	92.796	31,11	4,20	29,43	27.121,98	-1,55
9	**GRUPO DRAGADOS SA**	262.201	518.146	25,57	11,08	58,03	292.190,21	-0,11
10	**INBESOS**	3.727	8.940	45,87	4,90	71,28	4.092,50	-0,10

11	INMOBILIARIA FILO	9.268	35.660	21,62	0,09	0,65	4.901,60	0,47
12	INMOBILIARIA SOTOGRANDE	14.338	13.209	69,46	3,32	76,83	10.057,53	0,30
13	INMOBILIARIA URBIS SA	82.481	134.005	31,32	7,56	97,63	93.024,74	-0,13
14	INMOBILIARIA ZABALBURU SA	41.921	42.376	87,50	2,30	77,50	51.499,74	-0,23
15	METROVACESA SA	196.135	172.121	45,51	8,12	71,36	127.960,73	0,35
16	N. CORREA	9.005	7.066	49,75	34,03	85,55	12.075,52	-0,34
17	OBRASCON HUARTE LAIN S.A.	66.233	148.005	20,01	21,04	75,16	111.790,31	-0,69
18	PORTLAND VALDERRIVAS SA	117.656	161.038	36,95	22,74	54,85	149.530,76	-0,27
19	PRIMA INMOBILIARIA SA	36.339	75.642	48,01	4,57	78,89	50.163,24	-0,38
20	SAINT GOBAIN (CRISTALERIA ESPAÑOLA)	114.413	225.709	43,02	10,85	37,86	131.116,90	-0,15
21	UNILAND	43.222	66.072	37,17	21,63	65,27	58.694,10	-0,36
22	URALITA SA	74.710	139.978	33,15	15,35	45,27	80.880,30	-0,08
23	VALLEHERMOSO SA	226.764	198.490	48,35	6,99	83,00	170.927,27	0,25
24	ZARDOYA OTIS	259.426	62.412	31,53	49,1	84,19	172.363,37	0,34

FIGURE 2
OBTAINED VALUES IN FRONT OF THE REAL STOCK MARKET VALUE

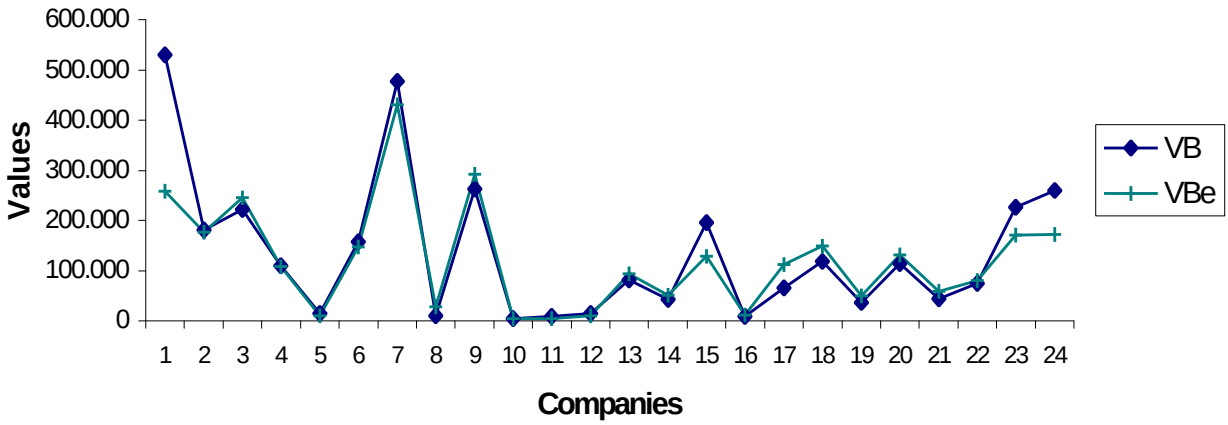
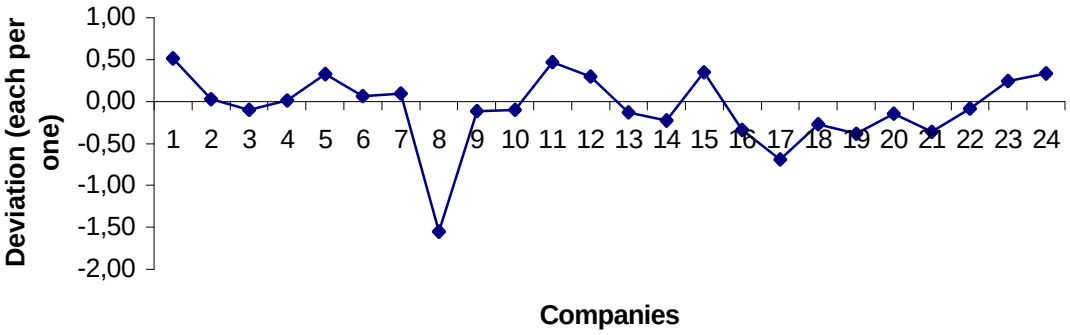


FIGURE 3
RELATIVE ERRORS SO MUCH PER ONE



6. Application of the Analogical Stock-Market Valuation model

With the purpose of applying the valuation model used to the entities in the construction sector listed on stock exchange to a sample of the same sector not listed, it must be verified the possible existence of significant differences from the statistic point of view, among variables from the two groups. The methodology focuses on the techniques of variance analysis (ANOVA), which is useful to evaluate significantly different behaviour due to the effect of qualitative variable on another called response variable. For that, we define a variable called Dummy. This variable has the value 1 if it is quoted and 0 in the other case.

TABLE 8
ANALYSIS OF VARIANCE

Variable	F-Ratio	P-Value
RF	0,54	0,4650
RPA	3,34	0,0719
BNCF	2,09	0,1529

To this three variables the P-value of the F-test is greater than to 0,05, there is not a statistically significant difference between the mean of each variable from one level of Dummy variable to another at the 95% confidence level. So the formulated model would be valid for the valuation of the companies samples, which is not quoted.

6.1. Identification of anomalous points

Finally, and before of the application of the valuation model in the companies of the construction section which are not quoted in stock exchange[7], it is necessary to detect the anomalous behaviour in the explanatory variables. For that we use the Box-and-Whisker Plot graphical to create and display a plot that is a graphical summary of the presence of outliers in the data. The central box covers the middle 50 percent of the data; the sides of the box are the lower and upper quartiles, and the vertical line drawn through the box is the median. Horizontal lines, known as whiskers, extend from each end of the box. The left (or lower) whisker is drawn from the lower quartile to the smallest point within 1.5 interquartile ranges from the lower quartile. The other whisker is drawn from the upper quartile to the largest point within 1.5 interquartile ranges from the upper quartile. Individual points are plotted as values that fall beyond the whiskers, but within 3 interquartile ranges (suspect outliers).

[7] It made up of 45 entities with the similar size to these companies are quoteted and goted from data base SABE

FIGURE 4
BOX-AND-WHISKER PLOT (RF)

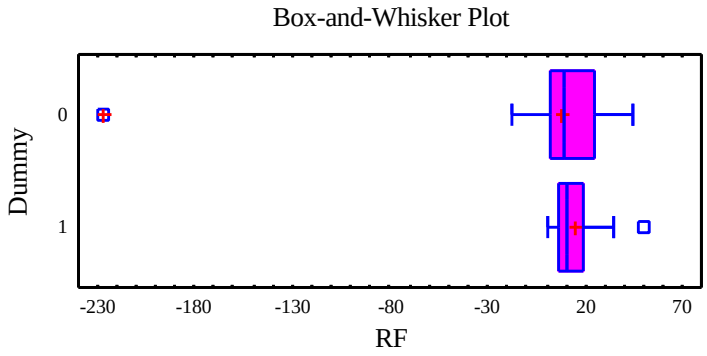


FIGURE 5
BOX-AND-WHISKER PLOT (BNCF)

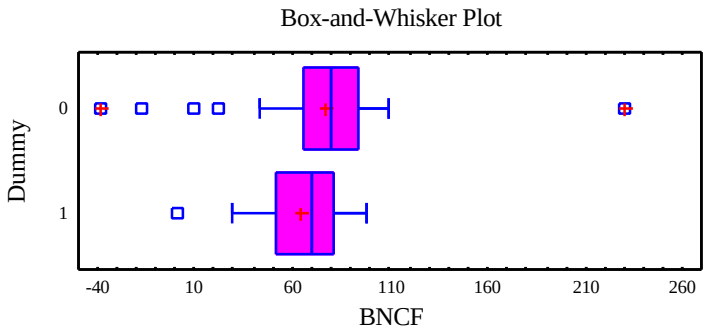
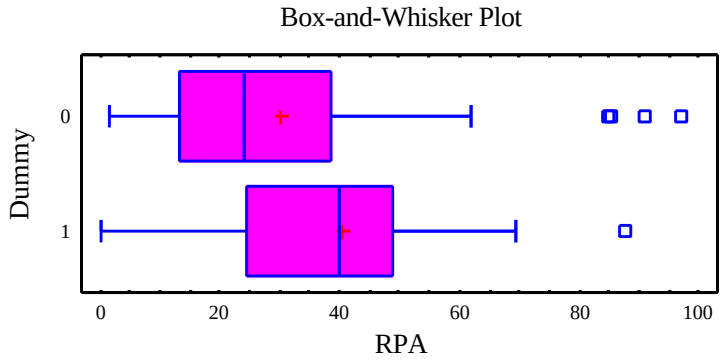


FIGURE 6
BOX-AND-WHISKER PLOT (RPA)



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According with the Box and Whisker Plot watched we made the table 9. In this table for each explanation ratio variable we point out the entities, which are individual points for this variable (in italics if it is quoted) and the same with those that are suspect outliers. When the entities were individual point, the result value it is taken with certain reservations, while in case of suspect outliers won't apply the valuation model.

TABLE 9
PARTICULAR CASES OF COMPANIES

Variable	Individual point	Suspect outliers
RF	*Zardoya Otis (49,10%)*	Triángulo Plaza de Cataluña (-226,59%)
RPA	Prominmo (96,99%) Cimarsol (90,93%) *Inmobiliaria Zabalburu (87,50%)* Gesinar (85,32%) Inversiones Hemisferio (84,61%)	
BNCF	*Inmobiliaria Filo (0,65)* Gestió d'Infraestructures (21,88) Infoinvest (9,99) Inversiones Hemisferio (-16,78)	Rodamco Inversiones (230,07) Anfi del Mar (-38,24)

Lastly, in the table 9 it is show the analogical stock market valuation (VAB) of the sample companies in the construction sector.

TABLE 10
ANALOGICAL STOCK MARKET VALUATION
(COMPANIES ARE NOT LISTED ON STOCK EXCHANGE)

	Nombre	A	RF	RPA	BNCF	VAB
1	**NECSO ENTRECANALES CUBIERTAS S.A**	311349	11,50	19,65	55,77	93390
2	**CINTRA CONCESIONES DE INFRAESTRUCCTURAS**	227223	2,46	14,33	57,49	60041
3	**CONSTRUCCTORA SAN JOSE SA.**	74273	24,23	9,77	91,63	22001
4	**ABENGOA SA**	163826	11,56	18,74	44,41	39760
5	**GESTIO D'INFRAESTRUCCTURES (*)**	116822	0,92	4,07	21,88	16227
6	**SACYR SA**	81189	38,45	36,77	92,64	41861
7	**ISOLUX WAT SA**	26016	22,27	21,49	76,47	7323
8	**CONSTRUCCIONES REYAL SA**	58823	9,68	12,89	75,03	15237
9	**PROM. Y CONSTRUC. PYC PRYCONSA SA**	53801	17,10	33,82	98,71	26435
10	**SIEMENS SA**	162680	13,41	19,75	67,80	50907
11	**GRUPO DE EMPRESAS PRA SA**	86970	28,33	9,72	93,73	26809
12	**CONSTRUCCIONES Y OBRAS PUBLICAS Y CIVILES**	22207	8,02	14,55	76,48	5345
13	**CORSAN EMPRESA CONSTRUCTORA SA**	24295	18,79	18,56	73,33	6200
14	**CORVIAM SA**	22663	32,73	26,01	88,44	7733
15	**COPISA CONSTRUCTORA PIRENAICA SA**	20693	24,14	7,32	82,76	4560
16	**CINTRA APARCAMIENTOS**	29437	8,66	37,68	54,63	9301
17	**CONSTRUCC. SANCHEZ DOMINGUEZ SANDO SA**	21735	30,86	14,08	79,55	5331
18	**INSTALACIONES ABENGOA INABENSA SA**	21758	24,25	11,18	73,44	4741
19	**LUIS BATALLA SA**	20159	9,31	34,15	78,83	7228
20	**EDIFICACIONES CALPE**	27429	26,78	20,59	90,82	8820
21	**ELECNOR SA**	47546	12,41	24,93	65,49	13823
22	**PROMINMO SA (*)**	33045	3,26	96,99	55,96	34607
23	**HANSA URBANA SA**	29999	3,28	38,90	51,47	9427
24	**INMOBILIARIA ESPACIO SA**	343976	28,93	13,44	66,32	102751
25	**GESINAR SL (*)**	95286	8,04	85,32	90,42	127788
26	**RODAMCO INVERSIONES SL (**)**	85501	-6,65	24,94	230,07	---
27	**GRUPO DE INVERSIONES NOGA SA**	75050	14,16	49,55	95,46	50736
28	**TAMISA SL**	67505	7,35	27,34	77,17	24175
29	**INFOINVEST SA (*)**	60494	0,25	61,01	9,99	21147
30	**FADESA INMBOLIARIA SA**	54324	44,27	4,31	92,98	14089
31	**CIMARSOL SL (*)**	49733	-2,22	90,93	100,00	75690
32	**RIOJANA DE FINCAS SA**	43661	43,15	6,54	88,96	11060
33	**APEX 2000 SA**	42991	8,31	61,95	94,12	34180
34	**COGEIN SA**	40258	1,07	25,29	87,48	14403
35	**LEISURE & CAMING CORPORATION SL**	34785	-17,44	9,63	109,80	11227
36	**HERMANOS REVILLA SA**	30798	8,90	45,62	76,68	14285
37	**YALQUI SA**	29637	7,14	26,96	76,33	9432
38	**HIJOS DE FCO. LOPEZ SANCHEZ SA**	27010	43,08	56,18	99,88	19170
39	**TORRE SERRANO SA**	24606	3,97	29,39	42,86	5735
40	**NOZAR SA**	24530	11,55	13,01	93,87	6906
41	**INSTITUTO VALENCIANO DE VIVIENDA SA**	23287	-16,69	38,67	104,25	12000
42	**ONDARRETA SA**	22443	0,03	56,23	100,00	15600
43	**INVERSIONES HEMISFERIO SL (*)**	22078	-0,05	84,61	-16,78	8293
44	**CONST. SANCHEZ DOMINGUEZ SANDO SA**	21735	30,86	14,08	79,55	5331
45	**TRIANGULO PLAZA DE CATALUÑA SL (**)**	21656	-226,59	1,66	104,22	---
46	**ANFI DEL MAR SA (**)**	21435	-1,24	24,28	-38,24	---
47	**VIAS Y CONSTRUCCIONES SA**	35104	18,30	19,86	82,63	10564

Conclusion

The purpose of the present study has been obtaining of an explanatory model for the stock-market value of a construction company in Spain, using the economic-financial and public information on hand in the financials markets. The got model has been application to a sample of companies in the same sector which not listed on the Stock Exchange. This methodology is called Analogical Stock-Market valuation.

By means of the principal components regression, we have calculated the fundamental equation for the valuation of companies of the Construction sector listed on the Stock Exchange, that synthesize the information on the market. Coefficients have the expected sign and have economic sense, thus avoiding the problem derived from multicolinearity.

The resulting equation express that the stock-market value of the construction sector depending on: one variable represents the size and the balance of the company (assets side). Another variable represents the rentability (financial profitability, or the profitability for the shareholder-owner of the capital). The third variable indicates the influence of the financial structure in the company value (owner resources over total assets). The last significant variable connect the dependent variable with the depreciation effects over the results (net profit variable over the cash-flow). Provided that the positive sign of the variables coefficients, we can interpret the model in the next way: The companies of the construction sector which increase their patrimonio, the rentability that give to their owners, the their financial structure has been restructure and them have done less provide to the depreciation, this companies increase their stock-market value.

Using a test of the variance homogeneity, we check the non-existence significant differences in the performance of the explanatory variables between the companies that listed on the Stock Exchange and those who not do it. The result has allow to apply the model to the last ones and to obtain their analogical stock-market value.

The contribution of this methodology to company valuation increases on seeing the difficulties and lack of precision when applying traditional methods. The existence of restrictive hypotheses as drifting away from reality, as well as the inevitable errors caused by the need to predict on the parameters (results, discount rate, growth, etc.) in traditional valuations are a good example of it. However, it should be remembered that the equation as resulting from the use of this econometric model is of temporal and local validity. It marks not only coefficient values but the very structure of the model too. Therefore, it is necessary to formulate, using the proposed methodology, a new explanatory equation for each moment of time and Stock Exchange.

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