The Links Between the Companies' Market Price Quality and That of its Management and Business Quality: A System Panel Data Approach

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Abstract

This work uses a simultaneous equation system approach to analyse the relationship between the management and business quality of companies and their market price quality. Using panel data we found that both the management and the business quality of companies positively influence the market price quality of the studied American companies. Additionally, variables like the actual position of the company price quality compared to the industry average, being on the top or the bottom, or the beta value of a company, also influence the market price quality of the respective company. It is shown that the system equation approach is the most appropriate to explain the linkages between price, business, and management quality providing consistent estimates. Also, using ratings to express the three core variables in the system is the most adequate way to define the quality characteristics in terms of price, management, and business performance of the companies considered in this study.

Keywords: Management and Business Quality, Market Price Quality, Simultaneous Equations Approach, Panel Data, Synthetic Price Multiple, Company Ratings

JEL: M16, M21, C33

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Introduction

The relationship between the companies' prices and their business and management quality has been object of scrutiny for a long time in the literature. Sometimes, the market seems to follow a modest speculative pattern which almost tells the investor that there is no real relationship between them. Some authors claim that the market can go up, down or sideways and that no one can actually predict its variations.

More specifically, there is a claim that the prices are a simple reflection of speculative attacks that may put a stock on rising or a falling trend. Others think that markets behave better in the sense that the companies' stocks follow a pattern showing a relationship with their fundamental values and their business and management quality. This kind of behaviour is the basis for the rational investor theory. Investment experts had always favoured companies that presented strong fundamentals expressing a sound, strong, and capable organism making them a good ground of medium-long term investment.

This relationship is analysed in this study. We intend to find whether it is true that the better the business and management quality, the better price quality of a company.

For this, we use privately held company ratings for the price, business, and management quality of the companies. We also use a set of other variables that can help to explain the price quality of a company as well as the business and management performance.

The relationship between the business and management quality has not been explored extensively in the existing literature and this study aims at contributing to this field. To our knowledge there is no research linking the companies' business and management quality to the price quality by using a simultaneous equation approach to capture the reciprocal relations. On the other hand no other study uses a rating classification approach to analyse the same interrelations.

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By using a simultaneous equations approach, we found evidence that both the management and the business quality ratings of the studied companies positively affect the price quality rating. Also, being on the top (market trend term) negatively affects the price rating of a company. This is in line with the theoretical framework employed in this study explained by the fact that by being on a top, it is much easier for the price to fall. In this case, there is a high probability to verify a negative trend in the price. The absolute deviation from the average beta[1] of the whole market does also present its relevance when computing the price quality rating.

The rest of the study is structured as follows: second section provides a brief literature review, third section explains the study objectives, fourth section presents the applied methodology explaining the variables the data and the structural model to estimate, fifth section discusses the results, and the last section concludes.

Literature Review

The variations in companies' stock prices may be related to several factors, internal or external. These factors have the power to change the investors' expectations and therefore influence the companies' prices. This subject has been vastly studied in the last decades by several authors, among them (Athanassakos, 2007; Baber, Chen, & Kang, 2006; Filbeck, Gorman, Greenlee, & Speh, 2005; Iqbal & Hamid, 2000; Mclntosh, Rogers, Sirmans, & Liang, 1994).

One of the most influential factors that can shape the investors perception of a company and therefore the associated stock prices is the available information regarding the company. Within the available information, earnings information is most of the time considered the most relevant information when it comes to measure its impact on the stock prices. Investors react to the companies' earnings disclosures and these reactions can be influenced by the type of disclosures companies do. Managers are responsible for choosing which information to disclose and sometimes they do not promote transparency. Earnings management is a very common practice where managers bend the information according to the needs of the companies, or their own needs in order to influence the companies' stakeholders. When this behaviour occurs, one may think that managers are, in fact, doing what they think is good for themselves and the company. But, this is not always the case. Investors can most of the times detect this kind of behaviour, and their response is somehow different from what it was expected (Baber *et al*., 2006; Dechow, 2003; Kwag & Stephens, 2010; Weber, 2006).

It is common for managers to incur in opportunistic behaviour which enables them to shape the disclosed information in such a way that they are able to retrieve benefits from disclosing. This behaviour is mainly seen when managers have to disclose information (Boubakri, Boyer, & Ghalleb, 2008; Miller, 2009).

One very common practice of influencing by disclosing is the introduction of non-GAAP[2] indicators on the released documents. These indicators are included to improve or worsen the company's image depending on the interests of the manager (Bradshaw & Sloan, 2002; Choi, Lin, Walker, & Young, 2007; Miller, 2009). One other, and even more common way of bending the stakeholders perception of the company is to change the disclosing timings (Chen & Mohan, 1994; Doyle & Magilke, 2009; Lougee & Marquardt, 2004).Here the most common example is the Friday effect, where the worst and more complex news are released on Fridays or after the closing of the market. Nevertheless, investors and other information users are learning to identify situations where the non-GAAP disclosing is done in order to hide company related issues or when managers disclose information in certain periods where the market is less aware for the disclosure. In this case, the released information is expected to have a smaller impact (Dellavigna & Pollet, 2009).

Information disclosing is not the only area where managers can influence the companies' prices. The day-to-day activity of the company is also in the hands of managers. Their choices can make or break the future of a company. Managers tend to use different management techniques in order to influence the environment surrounding the company, and therefore, to be successful. These techniques can be well or not so well chosen, and well or not so well implemented. The decisions

1 The beta of a stock is a risk measure arising from being exposed to the whole market. When a company has a beta value less than 1 it is considered to be a less volatile investment or an investment with a weak market correlation. The opposite happens when beta is greater than one. In our case beta suffered some transformations which are explained in the data section.

2 Generally Accepted Accounting Principles.

regarding the operational effectiveness of companies are one main example of management decisions (Cesnovar, 2006). Consequently, all these circumstances will have reflections on the company results and therefore on their stock prices.

Behaving strategically is one fundamental aspect of modern management, and strategy is present in all sides of the multilateral entity that is the company. As previously stated, the management quality and how the management decisions are taken can also directly influence the business side of the company. Cesnovar (2006) also studied this subject and found that companies which value their management practices and use strategic management tend to have better business outcomes.

Within this context, there exits literature that links the various kinds of quality oriented management with the long-run stock price performance. This relationship is fairly easy to understand (Filbeck *et al*., 2005; Hendricks & Singhal, 2001). The higher the quality of the management the higher the performance of the stock price is. Hendricks and Singhal (2006) focus on the total quality management and Filbeck *et al*. (2001), focus on the supply chain direct quality management.

In fact, the supply chain direct quality management is seen as a management type which produces high value increase for the company. It can be defined as the strategic coordination of the traditional functionalities and tactics of a business within the supply chain. The aim of this type of management is to improve the long-term performance of the company and the supply chain simultaneously.

On the same subject (Filbeck, Gorman, & Preece, 1997)) have found that investments on companies which have been well managed have a higher probability in achieving better results. Also, investors who have a well-diversified portfolio and capitalize it in successful companies are more exposed to higher returns.

Furthermore, there are more examples that link the management quality to the stock prices. As an example the VBM (Value-Based Management) aims directly at creating shareholder value through the usage of specific analytical tools and procedures. The long-term stock performance is the variable to maximize (Athanassakos, 2007), and this behaviour seems to have become a pattern in modern societies. Athanassakos (2007) studied the Canadian management performance and focused on discovering the trend in usage of the VBM. He found that this type of management has been gaining importance due to new and more finance-educated executives. But more, he states that there are different variations of VBM that allow for a better fit to each company.

Study Objectives

The present work focuses on the company's internal factors that are able to explain its stock price quality. Therefore by taking advantage of private published ratings, we intend to verify whether there is a relationship between the price quality rating of a company and the business and management quality ratings.

For this, we have used ratings which are published by a private investment analysis company[3]. By standardising the quality of the company regarding specific analysed areas, we end up with a scale that can range from 0 to 100. Each of the ratings is based on a set of variables which, in our case, are directly related to the price, management or business referred to a specific evaluated company. More information on the data will be given below.

Normally, and as we have seen in the literature review, researchers try to link the quality of the business or the different types of management strategies to the market price of a company individually.

Although there are interesting studies on effects of management and business performance on the market value of the company, there is no study that focuses on both effects at the same time.

Also, no study uses privately held ratings allowing to globally defining business quality and management quality as measurable and comparable sets of values. By using this type of data, we were able to quantify the quality of a company in terms of its business, management and market price.

To measure the above relationship, we employ a more comprehensive econometric approach that takes into account the reciprocal interrelations between management and business quality, and price quality of the companies. To study these relationships we estimate a simultaneous equation system with the use of panel data.

3 SADIF Investment Analytics.For a detail information see at: http://www.sadifanalytics.com

We intend to verify whether the relationship between the business, management, and market price of the companies is in fact statistically relevant.

Methodology

Definition of Variables and Expected Effects

In order to measure effects of Management Quality Rating (MQR) and Business Quality Rating (BQR) on Price Quality Rating (PQR), we have collected daily data from 01/01/2010 to 01/01/2014 for a set of 985U.S listed companies constructing an unbalanced panel.

The dataset includes not only the studied ratings but also its construction components as well as a set of control variables that could help to explain the relation between the PQR and other two ratings.

Table 1 presents the variables that are comprised in the dataset as well as its description, range, and expected effect.

As stated before, we expect the MQR and BQR (proxies for management quality and business quality),to have a positive impact on the PQR.

The same happens for the earnings representatives, both earnings per share and earnings per employee. Higher

Table 1: Variables Description

Name	*Description*	*Range*	*Expected effect*
Beta	Corresponds to the absolute deviation of the standardisation of the Thompson Reuters published Beta, which is the slope of the 60 month regression line of the percentage price change of the stock relative to the percentage price change of the relevant local index	Numerical	Unknown.
Sales	Sales elasticity, which is a composed variable and its calculation method, is explained in the annex.	Numerical	Positive.
Revenue	Three year Revenue growth Rate.	Numerical (%)	Positive.
Earnings per share	Earnings per share excluding extraordinary growth (Latest Fiscal Year).	Numerical (%)	Positive.
Operating Income	Five year average of Operating Income percentage margin.	Numerical (%)	Positive.
Return on Assets	Return on Assets (using total assets latest twelve months).	Numerical	Positive.
BQR	Business Quality Rating.	0-100	Positive.
MQR	Management Quality Rating.	0-100	Positive.
PQR	Price Quality Rating.	0-100	Positive in the BQR and MQR regressions (from the Simultaneous Equation System)
Earnings/Employee	Standardised Earnings per employee.	Numerical	Positive.
PQRratio	PQR/ Average of the SMK (Same as PQR, calculated through fundamentals) index for all the companies that belong to the same industry and country with the analysed company. Gives the relative position of the company, in terms of price rating, when compared to the industry average for the studied country.	Numerical (%)	Positive.
TopBottom	Binary variable that captures the effects of a Top or a Bottom in the analysed company's country. Being in the top means that the market has reached its higher value and has a large probability of falling down. Being in the Bottom, means that the market reached its lowest value and there are large opportunities for investors due to high possibilities of upwards trends.	Binary variable where 0 stands for Bottom and 1 for Top.	Negative.

Source: The data used to build all the variables was retrieved from Reuters Knowledge.

earnings are generally appreciated by analysts and investors, and they tend to kindly portray the management abilities within a company. Therefore they may affect positively the MQR and consequently the PQR.

The expected effect coming from the TopBot variable may be explained by the fact that when a company is in a TOP, there is a higher probability for the stock price to suffer a downfall. Therefore, the price quality of the company is negatively affected meaning that there is a high probability for a loss to occur.

In terms of revenue, a company that presents a positive trend on the revenue growth shows that the business is healthy and therefore the investors may be more confident investing in a growing company. The impact on the price quality is, in this case expected to be positive, due to an indirect effect on the business quality of the company.

With regards to the PQR ratio, this variable actually gives us the relative position of the company's price relative to other companies on the same industry (for the same country). So, if a company has a better relative position than its competitors this should definitely positively influence its price quality, increasing the difference between the observed company and other competitors in the same industry.

The logic behind the expected sign of return on assets is almost the same. Companies that achieve higher returns from their assets are believed to be more capable of achieving higher valuations, through a better management. Investors and analysts are attracted by higher return on assets (ROA from now on) companies. Therefore, it is expected that this variable has a positive influence on the MQR and consequently on the PQR.

Regarding the operating income, higher income firms are also more attractive to investors and to other market players. Companies able to generate a higher income show better business abilities than its competitors and therefore it is expected that a higher operating income can positively influence the BQR and therefore the PQR variable.

Finally, sales elasticity is also expected to have a positive impact on business quality of the company and therefore on the PQR. This variable allows us to have a good picture of the relative position of the company's revenue when compared to the industry's revenue, both trend and gross value.

Considerations and Descriptive Statistics

We have to clarify that after building the dataset, all the non-numeric variables had to be coded. The coding process was made to the data and the reference identifier of the company (also known as ticker) for an easier recognition by the statistical software.

Table 2 shows the most relevant statistics on the variables used in the empirical analysis. As it is shown we have a very large sample enhancing a total of 793416 observations for each variable but after applying the logarithm transformation to several variables for the required estimation approach, we are left with 465768 valid observations for the regressions. This large sample guarantees the robustness of the regression results.

Analysing the variables individually, we observe that the Price Quality Rating (PQR) ranges between 13.80194 and 99.36925 with an average value of 54.311 and a standard deviation of 14.94634, which makes it the most volatile among the three ratings. It presents the highest variance when compared to the other ratings of around 223.39 and its skewness and kurtosis have the value of 0.2223188 and 1.893428 showing a positive bias and a leptokurtic shape, respectively.

The Business Quality Rating (BQR) varies between a minimum value of 0.001 and a maximum value of 100 being the widest of the three ratings with a mean value of 50.837 and a standard deviation of 14.61 close to PQR. In terms of variance it shows a value of 213.5183 and the values of skewness and kurtosis are 0.237059 and 2.767332, respectively.

The Management Quality Rating (MQR) ranges between a minimum value of 2.040015 and a maximum of 93.01868, the latter being the lowest when compared to the other ratings. Its mean value of 59.323 is the highest among the other ratings but it is the less volatile with a standard deviation of 11.25478.It presents the lowest variation of the three ratings 126.67 and it is the only rating showing a negative skewness -0.5743536. In terms of kurtosis the value is the highest for the three ratings 4.823931.

The same interpretation follows for the rest of the variables with some specific cases to note. For instance, the mean value of the dummy variable TopBot equivalent to 0.0565, shows that the sample involves more observations on bottom than on top. The Sales elasticity presents an ample

Table 2: Descriptive Statistics

Variable	*Observations*	*Mean*	*Std. Deviation*	*Min*	*Max*	*Variance*	*Skewness*	*Kurtosis*
Sales Elasticity	793416	1.421	2536.085	-1183328	1071792	6431730	-65.79966	199891.3
Three year Revenue Growth Rate	793416	7.1849	15.85254	-59.34	319.58	251.3032	5.615005	84.64137
Earnings Per Share	793416	136.57	2952.19	-11701.2	154390.8	8715426	46.7656	2405.545
Operating Income % Margin, 5 Year average	793416	12.323	36.63232	-1542.72	99.76	1341.927	-30.59675	1201.027
Return on Assets	793416	5.9882	8.446194	-139.75	3392.32	71.33819	80.14156	32598.54
BQR	793416	50.837	14.61227	0.001	100	213.5183	0.237059	2.767332
MQR	793416	59.323	11.25478	2.040015	93.01868	126.67	-0.5743536	4.823931
PQR	793416	54.311	14.94635	13.80194	99.36925	223.3934	0.2223188	1.893428
Standardised Earnings per Employee	793416	50.813	4.05757	6.0544	100	16.46388	3.523505	34.95796
TOPBOT	793416	0.0565	0.230955	0	1	0.0533402	3.84026	15.7476
Beta	793416	14.593	8.955759	0	50	80.20561	0.1145281	1.846297
PRQratio	793416	1.1246	0.2617271	0.292274	2.293567	0.068501	0.380154	2.618881

Source: Data retrieved from Reuters Knowledge and processed by Stata 2013.

range and its mean value 1.421 indicates a slight inclination of the dataset towards companies with a positive sales elasticity while its standard deviation 2536.085 reflects a high degree of volatility between companies. With what concerns the remaining of the variables we conclude that on average the observed in our sample companies show a positive revenue 3 year growth (7.1849), that most of the companies present a positive value regarding their 5 year operating income margins, on average the companies present a positive return on assets ratio, and a positive earnings per share ratio.

Model Specification

Our task is to estimate the variables PQR, BQR and MQR simultaneously since we assume that there are bilateral relationships between them. The most efficient way to deal with it is to consider a Simultaneous Equation System involving these three core variables. The three equation simultaneous system can be described as follows:

$$InPQR_{i,t} = \beta_0 + \beta_1 Beta_{i,t} + \beta_2 InBQR_{i,t} + \beta_3 InMQR_{i,t} + \beta_4 InPQRratio_{i,t} + \beta_5 TOPBT_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$InBQR_{i,t} = \alpha_0 + \alpha_1 InPQR_{i,t} + \alpha_2 SalesElasticity_{i,t} + \alpha 3 RevenueGrowthRate_{i,t} + \alpha_4 In(OperatingIncome Margin)_{i,t} + v_{i,t} \quad (2)$$

$$InMQR_{i,t} = \gamma_1 InPQR_{i,t} + \gamma_2 In(ROA)_{i,t} + \gamma_3 In(EarningsparEmployee)_{i,t} + \gamma_4 In(EarningsPerShare)_{i,t} + z_{i,t} \quad (3)$$

where beyond the three ratings;

- $SalesElasticity_{i,t}$ – corresponds to sales elasticity;
- $RevenueGrowthRate_{i,t}$–stands for the three year revenue growth rate;
- $OperatingIncomeMargin_{it}$- is the five year average of operating income percentage margin;
- $ROA_{i,t}$ corresponds to return on assets (using total assets for the latest 12months);
- $EarningsPerEmployee_{it}$ - is the standardised earnings per employee;
- $EarningsPerSharei,_t$ represents the earnings per share excluding extraordinary growth measured for the latest fiscal year;
- e_{it}, v_{it} and z_{it} are the error terms of the equations assuming that they satisfy the classical hypotheses of zero conditional mean, homoskedasticity and no autocorrelation;

The main reason why we have built the equation system is to deal with simultaneity. So looking at the system we have three endogenous variables, meaning that these variables are determined within the system itself. All the other variables are considered exogenous to the system and their values are pre-determined outside of the relations.

When using a simultaneous equations system, we have

to account for the identification problem (whether there are enough instrumental variables). Before applying any estimation method, we need to confirm that the equations are identified, in order to find unique values for the structural coefficients. Two methods are used to identify the equations of the system, the order condition and the rank condition. According to these rules the equations of the system are over identified, therefore the system can be estimated by 3sls, the most efficient method to obtain unbiased and consistent estimators. This method controls for the problem of the endogeneity of regressors by using instrumental variables and takes into account the cross-error correlation between equations (Greene, 2003; Wooldridge, 2002).

The GMM three-stage least squares is a GMM estimator using a specific weighting approach to define the 3SLS estimators. With $\breve{u}_i = y_i - X_i\breve{\beta}$ being the residuals we can define the $G \times G$ matrix as $\widehat{\Omega} = N^{-1}\sum_{i=1}^{N}\breve{u}_j\breve{u}_i'$. The 2sls error matrix is given by

$$\widehat{W} = \left(N^{-1}\sum_{i=1}^{N} Z_i'\widehat{\Omega}Z_i\right)^{-1} = \left[Z'\left(I_N \otimes \widehat{\Omega}\right)Z/N\right]^{-1}$$

, where I_N is the $N \times N$ identity matrix and Z the matrix of instruments. The GMM estimator is defined as $\hat{\beta} = \left[X'Z\{Z'(I_N \otimes \widehat{\Omega})Z\}^{-1}Z'X\right]^{-1} X'Z\{Z'(I_N \otimes \widehat{\Omega})Z\}^{-1}Z'X$ with β being consistent and asymptotically normal under the classical assumptions (Wooldridge, 2002).

Empirical Results and Discussion

Table 3 reports the results obtained by implementing the 3sls estimation approach to the three equation system explained above and using panel data.

Generally speaking the obtained estimation results are satisfactory. The goodness of fit is reasonable in all equations (73%, 55% and 83% respectively) showing that all explanatory variables explain fairly well the total variation of the dependent variables. All population coefficients are statistically significant at the highest 1% level in the three equations and most importantly all estimated coefficients carry their expected signs being in line with economic theory. The most important result is that the business and management quality, both positively influence the quality of the companies' market price, and this latter influences significantly the former, suggesting a reverse causality. Therefore, our results confirm our initial hypotheses and that the simultaneous equation system is the most adequate approach to explain the links between the three core variables.

Interpreting the individual impacts of the explanatory variables (assuming that everything else is constant) we conclude the following, with respect to the first equation of the system:

An increase of one unit on the the absolute deviation of the standardisation of the Reuters calculated Beta, may lead to a decrease of 0.02356% on the price quality rating of the companies. We did not expect a specific effect coming from the variation of this variable. In fact our evidence shows that the impact of this variable affects negatively the price quality rating of the company, and this is consistent with the higher level of volatility involved when the value of Beta increases.

An increase of one percent on the business quality rating is responsible for 0.1733822% increase on the price quality rating. As expected a higher business quality affects positively the quality of price of the respective company and this is in line with other findings in the relevant literature.

Our evidence also shows that a one percentage increase in the management quality rating is responsible for 0.3860616% increase in the price quality rating, as expected. Companies with a higher quality management are also expected to influence favourably its market price and this is therefore reflected in price quality rating.

If the PQR ratio (relative position of the company, in terms of price rating, to the overall industry average for the considered country, in this case the USA)increases 1% it is predicted that the price quality rating increases by 0.826245%, and this is in line with what was expected initially. A company that has a positive position relatively to other companies may be seen as a benchmark in the market. This influences the investor's perception that the company possesses a higher overall quality, affecting therefore its price quality too.

Being in a TOP may lead to a decrease of 2.98529% on price quality rating relatively to the companies situated in the bottom. This result can be justified by the fact that when a company reaches a top position the probability of its price to decline increases. The opposite happens when a company is at a low position, creating expectations that its price most probably will increase in the future.

These results are considered satisfactory; they confirm

our initial hypotheses and the theory in which our structural model is based on. Individually business rating, management rating, PQR ratio, and TopBot variables all present their expected impacts. The Betadiff variable is also shown to be significant to the studied model.

Interpreting the individual impacts of the explanatory variables (assuming that everything else is constant) we conclude the following, with respect to the second equation of the system:

Our evidence shows that an increase of one percent on price quality rating may lead to an increase of 0.1500582% on the business quality rating confirming therefore the reciprocal relation between these two variables. A higher price quality rating reflects the overall quality of a company and therefore its business activities and credibility.

It is also estimated that one unit increase on the sales elasticity may lead to an increase of 0.0000129% on the business quality rating as expected. Generally speaking, higher growth revenue of a company relatively to the industrial sector in which it operates shows a better business performance relative to others and this will affect positively its the business quality rating. However the marginal impact of this variable is not very considerable.

An increase of one percentage point on the three year revenue growth rate provokes an increase of 1.44635% on the business quality rating, confirming therefore the hypothesis that continuous revenues positively affect the image and prestige of business activities of the relevant companies.

Analogously, an increase of one percent on the 5 year average operating income margin may lead to an increase of 0.0645909% on business quality rating. This is an expected result since this variable reflects the profitability of companies affecting positively its business activity.

With respect to the third equation of the system we conclude the following:

Table 3: 3sls Regression results of the simultaneous equation system, panel data

Equation		*Obs*	*Parms*	*RMSE*	*R-sq*	*chi2*	*P-value*	
	logPQR	465768	5	0.1401251	0.7309	0.000000128	0.00	
	logBQR	465768	4	0.1963497	0.5516	566812.14	0.00	
	logMQR	465768	4	0.0563481	0.8355	0.000000237	0.00	
Individual Equations Estimation Outputs								
			Coef.	Std. Err.	z	P>|z|	[95% C. Interval]	
logPQR		Beta	-0.0002356***	0.0000221	-10.65	0.00	-0.000279	-0.0001923
		logMQR	0.3860616***	0.0019499	197.99	0.00	0.3822397	0.3898834
		logBQR	0.1733822***	0.0010503	165.08	0.00	0.1713237	0.1754408
		logPQRratio	0.826245***	0.0010421	792.85	0.00	0.8242025	0.8282875
		Topbop	-0.0298529***	0.0007984	-37.39	0.00	-0.0314178	-0.028288
		Constant	1.619383***	0.0073967	218.93	0.00	1.604886	1.63388
logBQR		logPQR	0.1500582***	0.0014232	105.44	0.00	0.1472688	0.1528476
		Sales Elasticity	1.29E-06***	0.00000001.14	11.35	0.00	0.000000107	0.000000151
		Revenue Growth Rate	0.0144635***	0.0000239	606.23	0.00	0.0144168	0.0145103
		log Operating Income Margin	0.0645909***	0.0003885	166.28	0.00	0.0638295	0.0653523
		Constant	3.044943***	0.0053117	573.25	0.00	3.034533	3.055354
logMQR		logPQR	0.0890316***	0.0004474	199.01	0.00	0.0881548	0.0899085
		logROA	0.1100342***	0.0001096	1004.29	0.00	0.1098194	0.1102489
		log Earnings per Employee	0.730149***	0.0013273	550.09	0.00	0.7275474	0.7327505
		log Earnings per Share	0.0084535***	0.0000517	163.48	0.00	0.0083522	0.0085549
		Constant	0.6838641***	0.0053258	128.4	0.00	0.6734257	0.6943026

Note: *** indicates statistical significance of the population coefficient at the 1% level. The used exogenous instruments are the Beta, logPQRratio, Topbop, Sales Elasticity, Revenue Growth Rate, log Operating Income Margin,logROA, log Earnings per Employee and log Earnings per Share.

An increase of one percent on the price quality rating may lead to an increase of 0.0890316% on the management quality rating endorsing a reciprocal relation between the two variables. As in the BQR coefficient analysis, a higher price quality rating can also influence management quality of a company depicting the influence on the general quality of the observed companies.

It is also shown that an increase of one percent on the asset returns is responsible for an increase of 0.1100342% on the management quality rating, and this result is in line with the theory presented in the previous section. Higher asset returns is a sign of more efficient managements and better business performance improving therefore the quality rating of management.

Analogously, an increase of one percent on the standardised earnings per employee is responsible for an increase of 0.730149% on the management quality rating. Higher earnings, as expected, influence positively the management strategy of companies, and as stated in the data section, higher earnings are a good proxy for a better management orientation.

Finally, our evidence shows that an increase of one percent on the earnings per share may lead to an increase of 0.0084535% on management quality rating. Although we already had a measure of earnings, this measure is more appealing for market players because it shows the relative position of the company's earnings to the number of shares available at the given moment. Therefore, this ratio can be improved by means of increasing the earnings or diminishing the number of shares in the market. As stated before, investors and analysts are attracted by companies with higher earnings per share ratios confirmed by its positive impact on management quality in this regression.

Conclusions

The relationship between a company's management, business quality, and its market price has always been subject to a great amount of scrutiny by academics and professionals. This topic has been gaining even more attraction in recent years due to changes in regulation regarding the disclosing process, as well as due to other recent developments related to the financial crisis effects. These are the basic motivations to study the influence of the business and management quality on the companies' price quality in the market, and explain the linkages between them.

Recognising the reciprocal relationship between these three variables we employed a simultaneous equation system approach that takes into account the endogeneity problem of regressors devolving consistent estimators. To our knowledge this estimation methodology has not been used yet in the empirical literature on this topic considering panel data.

Confirming our initial assumptions, we found that both management quality and business quality positively influence the price quality of a company. Additionally, being in a top position negatively influences price quality of a company, and this is in line with theory assessing that being in a TOP increases the probability of a decline in the company's price. The actual position of the company related to the industry average is also a significant factor that positively influences the price quality of a company.

The other two relations of the system also brought the expected results. Clearly the price quality rating has a positive impact on the management quality rating and business quality rating confirming again the strong linkages between the three core variables in the system.

In particular, and in line with theory, higher composed sales elasticity as well as higher revenue growth rate and operating income margin influence positively the overall business quality rating of a company. On the other hand, higher returns on assets, earnings per employee and earnings per share have a positive influence on the management quality rating of a given company, as it is shown in the third equation of the estimated system.

Generally our results provide robust evidence that solid and well-performed companies, both in terms of business and management quality are more likely to have higher price quality ratings in the US markets where they operate. But most importantly these three quality dimensions are strongly interrelated to each other as it shown by the system approach employed in this study. An additional contribution is that using a ratings based data approach is more adequate in the sense that it normalizes the dataset and allows for a more reliable analysis on the quality performance of a company.

Annex

For each firm we first start by gathering the total revenue (for the latest 12 months) as well as the three year revenue growth rates.

Then for each stock, we calculate the following:

3 Year Revenue Growth = e^{In}(Total Revenue) – 3*In

$$= \left(\frac{\text{Three Year Revenue Growth Rate}}{100} + 1 \right)$$

After this step, we have to compute the industry 3 Year Revenue Growth and the Industry Total Revenue, which are the sum of the individual stock data obtained in the previous steps for each industry.

Then for each industry we calculate:

Industry Sales 3Y Growth

$$= \left(\left(\frac{\text{Industry Total Revenue}}{\text{Industry 3Year Revenue Growth}} \right)^{\frac{1}{3}} - 1 \right) * 100$$

The last step is to apply the following condition:

If Industry Sales 3Y Growth < then 0 we have:

$$\text{Sales Elasticity} = \frac{\text{Revenue Growth Rate}}{-\text{Industry Sales 3Year Growth}}$$

Otherwise we have:

$$\text{Sales Elasticity} = \frac{\text{Revenue Growth Rate}}{\text{Industry Sales 3Year Growth}}$$

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