

# Corporate Performance Evaluation: Evidence from the Greek Construction Industry

**Ioannis E. Tsolas**

School of Applied Mathematics and Physics  
National Technical University of Athens

**Odysseus G. Manoliadis**

Department of Geotechnolgy and Environmental Engineering  
Technological Education Institute of Western Macedonia

## **Abstract**

*The aim of this paper is to assess the corporate performance in Greek construction industry in terms of profitability. We apply financial ratio analysis in a sample of Greek construction firms listed in Athens Exchange to derive traditional accounting ratios of profitability. Our approach aims to disaggregate Return on Equity (ROE) using the DuPont model. This decomposition facilitates the examination of ROE in terms of a measure of profitability (profit margin), level of assets required to generate sales (asset utilization), and the financing of those assets (equity multiplier). In the light of the results of this paper, most of the top performers in the sample (i.e. the firms with higher ROE ratio values) have total assets turnover values above average, and higher values of equity multiplier.*

**Keywords:** Performance evaluation; financial ratios; DuPont model; construction industry; Greece

## **Introduction**

The construction industry in Greece has been playing a key role in support of national economic development. It is estimated that by the end of 2006 the contribution of the construction industry to GDP will be about 20% (16,1% in 1999; 20.7% in 2004). The industry was characterized by small-sized firms (i.e. contractors) compared to the other European Union countries. In 2002 the industry underwent a substantial change with the merging of firms, revaluation of firms' 'grades' (i.e. Greek contractors are registered in ranking 'classes' in the Registry of Greek Contractors (M.E.EP.) of the Hellenic Ministry for the Environment, Physical Planning and Public Works) and strengthening of the position of listed firms in the Athens Exchange. According to a previous classification there were 759 construction firms registered in five superior classes, while after the change that the industry undergone remained 374 firms. It should be noted that since 2003 and onwards 15 construction firm-groups were created, that are classified in higher classes; among these groups two of them are included in 50 bigger construction firms in the EU (Charalampidou, 2002; 2003).

The aim of this paper is to apply financial ratio analysis using the DuPont model in a sample of Greek construction firms listed in Athens Exchange in order to assess the performance of firms in terms of profitability. We focus our analysis in listed construction firms in Athens Exchange in 2003 in order to shed light in the main drivers of

profitability comparing also the values of relevant financial ratios with the financial benchmarks used internationally. Our results reflect the performance of firms after the substantial change undergone and can be used by practitioners, executives, and researchers together with the results of other studies of the Greek construction industry (see Institute of Construction Economics, <http://www.iok.gr>).

The rest of the paper is organized as follows. The next section discusses the proposed methodology (i.e. the DuPont model). In the following sections the data are presented and the results are discussed. The final section draws the conclusions.

## **Methods**

### **The DuPont Model**

In 1918, F. Donaldson Brown, an employee of DuPont Corporation, recognized a mathematical relationship that existed between two commonly computed ratios, namely profit margin (a profitability measure) and total asset turnover (an efficiency measure in terms of asset utilization), and return on assets (Liesz, 2002). The product of the profit margin and total asset turnover equals return on assets, and this was the original DuPont model, as illustrated in Equation (1):

$$\text{Return on assets (ROA)} = \text{profit margin (PM)} \times \text{total assets turnover (TAT)} \quad (1)$$

where

Return on assets (ROA) = net income / total assets

Profit margin (PM) = net income / sales

Total assets turnover (TAT) = sales / total assets

At this point in time maximizing ROA was a common corporate goal and this model became the dominant form of financial analysis until the 1970s (Blumenthal, 1998; Liesz, 2002).

In the 1970s the above accepted goal became "maximizing the wealth of the firm's owners" and focus shifted from ROA to return on equity (ROE) (Gitman, 1998; Liesz, 2002). Therefore, in addition to profitability and efficiency, the use of firm's "leverage" (i.e. the way in which a firm financed its activities) became a third area of attention for financial managers. The new ratio of interest was the so-called the equity multiplier (i.e. total assets/equity). The modified DuPont model is illustrated in Equation (2):

$$\text{Return on equity (ROE)} = \text{ROA} \times \text{equity multiplier (EM)} \quad (2)$$

where

Return on equity (ROE) = net income / equity

ROA = Return on assets

Equity multiplier (EM) = total assets / equity

The most important, or "bottom line" accounting ratio is the ratio of net income to equity (ROE)" (see also Brigham and Houston, 2001) and the modified DuPont model became a standard in financial management since it was a powerful tool to illustrate the interconnectedness of a firm's income statement and its balance sheet, and to develop

straight-forward strategies for improving the firm's ROE (for the DuPont analysis see also Gibson, 1989; Weston and Brigham, 1993).

More recently, a second modification to the DuPont model was developed which resulted in five different ratios that combine to form ROE (Hawawini and Viallet, 1999; Liesz, 2002). The second modified DuPont model is illustrated in Equation (3).

$$\text{ROE} = \text{operating profit margin} \times \text{capital turnover} \times \text{financial cost ratio} \times \text{financial structure ratio} \times \text{tax effect ratio} \quad (3)$$

where

Operating profit margin = Earnings Before Interest & Taxes (EBIT) / sales

Capital turnover = sales / invested capital

Invested capital = cash + working capital requirement + net fixed assets

Financial cost ratio = Earnings Before Taxes (EBT) / EBIT

Financial structure ratio = invested capital / equity

Tax effect ratio = Earnings After Taxes (EAT) / EBT

This last modified model still maintains the importance of the impact of operating decisions (i.e. profitability and efficiency and financing decisions (leverage) upon ROE such in first modified model, but uses a total of five ratios to uncover what drives ROE and give insight to how to improve this ratio.

In this paper we based on the first modified DuPont model in order to disaggregate Return on Equity (ROE) to profit margin (PM), total assets turnover (TAT) and equity multiplier (EM). This decomposition is interesting and popular because it captures the three main activities of a company - profitability, efficiency in investing and financing. As Nissim and Penman (2001) point out, the ratios identified by the DuPont decomposition are tied together in a structured way that explains how they "sum up" as building blocks of net income. The DuPont decomposition also establishes the tradeoff between PM, TAT and EM. For example, the same ROE can be achieved with low PM and high TAT or with high PM and low TAT.

## Data

The data set selected in the current study is a sample of 18 Greek construction companies from the Greek Exchange's classification. All data corresponds to the financial year ending 31 December 2003 and are obtained from the Greek Exchange's standardized compilation of consolidated financial statements.

Based on the DuPont model presented in the previous section and on data availability ROE ratio encompasses measures of profits before taxes, sales, total assets and equity (for more on the typical measures of traditional financial ratios used in the construction industry see also Edum-Fotwe et al., 1996).

## Results

We apply financial ratio analysis in the sample of 18 Greek construction firms listed in Athens Exchange to assess their financial performance. The descriptive statistics of the results of our approach

(i.e. disaggregation of Return on Equity, ROE) using the DuPont model are presented in Table 1.

**Table 1. Descriptive statistics of the financial ratios used.**

	ROE	PM	TAT	EM
Min	-4.30%	-67.78%	0.03	1.16
Max	43.87%	30.06%	0.96	3.85
Median	9.73%	10.07%	0.51	1.92
Mean	14.71%	9.15%	0.50	2.02
Standard deviation	13.97%	20.82%	0.27	0.59

There are two distinct groupings of Greek construction firms of the sample with respect to the results of the ROE ratio calculation. For half of the firms, the range in values for ROE ratio was between -4.30% and 9.73%; for the other half the range in ratio values was quite dispersed, with a maximum value of 43.87%.

PM is positive for the vast majority of the firms (only one firm has negative value of PM). TAT ranges between 0.03 and 0.96, with an average value of 0.50. EM tends to stay within the range of about 1.2 to 3.9 times, with an average of about 1.9 times.

ROE represents the profitability of funds invested by the owners of the firm. All firms should attempt to make ROE ratio as high as possible but it should be noted that ROE ratio can be high for the wrong reasons however. If for one firm ROE ratio is high because the EM is high, this means that high returns are really coming from overuse of debt which can spell trouble for the that firm (an EM above 3 is thus likely to be a cause for concern).

According to benchmarking standards used internationally (see Maltzman 2005) the ranges that maybe should be targeted by a construction firm, especially for production-oriented builders, are 10-15% for Net Profit (as percentage of sales) and 20-30% for ROE ratio.

Most of the top performers in the sample (i.e. the firms with higher ROE ratio values) have TAT values above average, and higher values of EM.

## **Conclusions**

This paper presents the results of the DuPont model application in a sample of Greek construction firms listed in Athens Exchange in order to assess their financial performance.

The DuPont formula allows one to examine how a firm generates its return on equity. If operating management is strong (i.e. high PM), as well as asset management (i.e. high TAT) and capital structure management (i.e. appropriately low EM), then ROE ratio will be high and the firm can be said to be in strong financial condition.

In the light of the results of this paper, most of the top performers in the sample (i.e. the firms with higher ROE ratio values) have PM and TAT values above average, and higher values of EM. The top performers meet the international standards concerning ROE and PM.

The results of this study are useful to practitioners and executives of the construction industry as they have a means of comparing their own corporate performance with the average of the firms of the sample used here. Average ratios are necessary especially in the cases of TAT and EM to interpret these ratios.

## References

- Blumenthal, R.G., 1998, "Tis the gift to be simple. (Dupont's framework for financial analysis)", CFO Magazine, v14, n1, 1-3, available on line at [http://www5.cfo.com/article.cfm/2990236/1/c\\_3046549](http://www5.cfo.com/article.cfm/2990236/1/c_3046549)
- Brigham, E.F. and J.F. Houston, 2001, "Fundamentals of financial management, Concise Third Edition", Harcourt Publishers.
- Charalampidou, V. 2002, "The club of 15 large-sized contractors", Newspaper 'To Vima', 06/10/2002, p. D22 (in Greek).
- Charalampidou, V. 2003, "A new landscape in public works", Information Bulletin, Technical Chamber of Greece, n 2234 (in Greek).
- Edum-Fotwe, F., Andrew P. and Thorpe, A. 1996, "A review of financial ratio tools for predicting contractor insolvency", *Construction Management and Economics* 14, 189-198.
- Gibson C., 1989, "Financial statement analysis: using financial accounting information.", 4th ed. Boston, MA: PWS-Kent Publishing.
- Gitman, L.J., 2000, "Principles of financial management, 8th Edition", Addison Wesley Publishers.
- Hawawini, G. and C. Viallet, 1999, "Finance for executives", South-Western College Publishing.
- Institute of Construction Economics. "Press release. Financial structure of contractors - Longitudinal and cross-sectional analysis", available on line at <http://www.iok.gr> (in Greek).
- Liesz, T. J. 2002, "Really modified DuPont analysis: Five ways to improve return on equity", available on line at <http://www.sbaer.uca.edu/research/sbida/2002/Papers/19.pdf>
- Maltzman, S., 2005, "Numbers, numbers, numbers. How do yours stack up?", The International Builder's Show, Orlando, FL.
- Nissim, D. and S.H. Penman, 2001, "Ratio analysis and equity valuation: From research to practice." *Review of Accounting Studies* 6: 109-154.
- Weston J. and E. Brigham, 1993, "Essentials of managerial finance. 10th ed.", Fort Worth, TX: Dryden Press.

## About the authors

Dr **Ioannis Tsolas** is a Lecturer in Economics Analysis at the School of Applied Mathematics and Physics of the Athens National Technical University, Greece. His research interests include: Economic Analysis (Microeconomics, Macroeconomics); Business Economics.

**Odysseus Manoliadis** is Professor at the Department of Geotechnology and Environmental Engineering of the Technological Education Institute of Western Macedonia, Greece.