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Relationship between working capital management and profitability in JSE listed retail sector companies

Abstract

The literature on the relationship between working capital and profitability is inconclusive. Using panel data (2004-2013) from JSE listed retail sector companies, this study found negative relationship between working capital and profitability. Firm profitability and Financial Debt Ratio was also negative. Larger firm size was found to produce a positive and significant effect on the profits. Lastly, the leverage-factor variable showed a positive effect on firm profits but the impact was not statistically significant. The results demonstrate that working management affects profitability and should be an integral part of a firm's financial planning.

Keywords: working capital, cash conversion cycle, firm profitability, panel regression, JSE.
JEL Classification: G3, M14, M19.

Introduction

In the present global environment of aggressive competition, almost all business firms have no other viable option but to cut the cost of operations in order to be competitive and be financially healthy. As a result, efficient working capital management is an integral component of the overall corporate strategy to create shareholders' wealth. The retail industry in South Africa has grown over the past years, supported by an increase in both the supply of retail space and number of shopping centres in the country. According to Statistics South Africa's quarterly labor survey (2012, p. 3), the retail sector grew by an average of 3% for the past 8 years. Empirical studies have shown that most businesses fail, especially in the current economic recession mainly as a result of failure to meet their working capital requirements (Deloof, 2003, p. 574). According to Nazir and Afza (2009, p. 21), working capital management has become one of the most important issues in organizations where many financial managers are struggling to identify basic working capital drivers and appropriate levels of working capital. Working capital is probably one of the most basic but least studied topics in corporate finance. It should involve the analysis of the investments in operating assets and its corresponding financing. Literature has shown that there is some relevant research on the individual components of working capital like receivables, payables and creditors, but little academic effort has been devoted to develop a comprehensive view.

This study seeks to extend findings and explain the relationship between working capital management and profitability for the Johannesburg Stock exchange (JSE) listed companies in the general retail sector.

1. Literature review

1.1. Empirical review. The relationship between working capital management (WCM) and profitability has not lead to any conclusive results. Authors like Deloof (2003), Teruel and Solano (2007), Raheman and Nasr (2007), Lazaridis and Tryfonidis (2006), Weinraub and Visscher (1998), Soenen (1993), Jose et al. (1996), Uyar (2009), Rehman (2010) found negative relationship between WCM and profitability. On the other hand, studies from Ghosh and Maji (2004), Arshad and Gondal (2013) found positive relation between working capital (WC) and profitability. At the same time, these studies have used different proxies for the WC and profitability. The literature below summarizes some of the important studies and the proxies used.

Teruel and Solano (2007, p. 45) studied the effects of WC on profitability of small and medium sized Spanish firms. The results showed that there was a significant negative relationship between an SME's profitability and number of days' accounts receivable and days of inventory. Raheman and Nasr (2007, p. 284) conducted a study to analyze the relationship between WC and profitability in cases of Pakistani firms, and the results show that there is a strong negative relationship between WC and profitability of the firms, and that managers could create positive value for the shareholders by reducing the cash conversion cycle to a possible minimum level. Lazaridis and Tryfonidis (2006, p. 25) investigated the relationship between corporate profitability and working capital using listed companies on the Athens Stock Exchange. They discovered that a statistically significant relationship existed between profitability and the cash conversion cycle. They concluded that businesses can create profits for their companies by correctly handling the cash conversion cycle and keeping each component to an optimum level. Deloof (2003,

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p. 585) found a negative relationship between gross operating income and number of days accounts receivable, inventories and accounts payable of Belgian firms. Weinraub and Visscher (1998, p. 17) discussed the issue of aggressive and conservative working capital management policies by using quarterly data for the period 1984-93 of US firms. The results showed a high and significant negative correlation between industry asset and liability policies. Soenen (1993, p. 55) indicated a negative relationship between the length of the net trade cycle and return on assets. Jose et al. (1996, p. 29) found that a significant negative relationship between the cash conversion cycle and profitability, indicating that more aggressive working capital management is associated with higher profitability. Uyar (2009, p. 40), using ANOVA and correlation analysis, showed that retail/wholesale industry has shorter CCC than manufacturing industries. The study also found significant negative correlation between CCC and profitability as well as between CCC and firm size. Raheman et al. (2010, p. 151), using panel data from Karachi Stock Exchange showed that for overall manufacturing sector, WCM has a significant impact on profitability of the firms and plays a key role in value creation for shareholders as longer CCC and net trade cycle have negative impact on net operating profitability of a firm.

Ghosh and Maji (2004, p. 364) made an empirical study on the relationship between utilization of current assets and operating profitability in the Indian cement and tea industry. The study concluded that the degree of utilization of current assets was positively associated with the operating profitability of all companies under study. The results of their study indicate that there is a significant positive relationship between the cash conversion cycle and traditional liquidity measures of current and quick ratios. The cash conversion cycle is also positively related to the return on assets and the net profit margin but had no linear relationship with the leverage ratios. Arshad and Gondal (2013, p. 388) also did a study in Pakistan on the impact of WCM on profitability in the cement industry. The empirical findings of the study indicate that the current ratio and net current ratio on total ratio have significantly positive effects on firm profitability.

Other scholars have concentrated on the effects of working capital management of retail sector firms. Howorth and Westhead (2003, p. 94) focused on working capital management of small firms in the United Kingdom (UK). They asserted that firms of all sizes, a basic aim of management accounting routines is to control vital areas and to monitor, and hopefully improve performance. Small firms need to particularly control and monitor their working capital. This is because they are generally associated with a higher proportion of current assets relative to large firms, less liquidity, volatile cash flows, and a reliance on short-term debt (Peel and Wilson, 2000, p. 22). A lack of formalization does not necessarily imply that a small firm is poorly controlled. However, Peel and Wilson (2000, p. 23) assert that smaller firms should adopt formal working capital management routines in order to reduce the probability of business closure, as well as to enhance business performance.

Most of the empirical studies support the traditional belief about working capital and profitability that reducing working capital investment would positively affect the profitability of a firm (aggressive policy) by reducing proportion of current assets in total assets. Deloof (2006, p. 570) analyzed a sample of Belgian firms, and Wang (2002, p. 170) analyzed a sample of Japanese and Taiwanese firms, emphasized that the way the working capital management is managed has a significant impact on the profitability of firms and increase in profitability by reducing number of days accounts receivable and reducing inventories. Further studies on impact of WCM on firm profitability have also been conducted in relation to different business cycles. In an empirical study, Einarsson and Marquis (2001, p. 881) found that the degree to which companies rely on bank financing to cover their working capital requirements in the United States (US) is countercyclical; it increases as the state of the economy weakens. Furthermore, Braun and Larrain (2005, p. 1122) found that high working capital requirements are a key determinant of a business' dependence on external financing. Enquivist et al. (2014, p. 38) conducted a study on the impact of WCM on firm profitability in different business cycles on Finnish firms. Their results also show that economic conditions exhibit measurable influences on the working capital-profitability relationship. The low economic state was generally found to have negative effects on corporate profitability.

1.2. Studies on working capital and profitability in South Africa. Not many studies have been done about the relationship between working capital management and profitability in South Africa. However, Ngwenya (2012, p. 1204) did a study on the relationship between working capital management and profitability of companies listed on the Johannesburg Stock Exchange. He used data from financial statements of all companies listed on the JSE from 1998 to 2008. Only companies listed for all 10 years were included and all companies in the insurance and banking sector firms were excluded from their operations were considered to

have not much bearing on working capital management. The cash conversion cycle and its components were used as the main independent variables and gross profit as the dependent variable. The results concluded that there is a statistically significant negative relationship between profitability and the cash conversion cycle.

Smith and Fletcher (2009, p. 15) did a similar study which, however, focused on the factors influencing working capital management in South African industrial companies. Building on previous research, Smith and Fletcher used net liquid balance and working capital requirements as proxies for working capital management. These proxies were tested for influence of industry, turnover, debt ratio, cash flow and return on assets on the measures. The results showed no significant industry effect on working capital management. However, when absolute values were used, the study found that turnover displayed the greatest influence on working capital management.

2. Objectives and research methodology

Given the inconclusive results in literature, this study aimed to establish the relationship between profitability and working capital in the case of South African retail sector companies listed on the JSE.

The study had the following objectives:

1. To study the relationship between working capital[1] and the profitability for selected JSE listed retail sector companies.
2. To assess what effect the financial debt ratio (FDR)[2] has on firm profitability for selected JSE listed retail sector companies.
3. To determine whether the size of the selected companies measured by sales has any relationship on firm profitability.

The study adapted a case study of JSE listed companies in the general retail industry. The data required for this study were extracted from the published annual reports of the companies and, therefore, the nature of the data was secondary. The study covered a period of 10 years from 2004 to 2013. Firm data from 17 companies in the general retail sector listed on the JSE were used. The reason for the chosen JSE listed companies was primarily due to the reliability and availability of financial information. As argued by Lazaridis and Tryfonidis (2006, p. 27), hiding profits in order to avoid corporate tax is a common tactic for non-listed firms in emerging markets which makes them less of a suitable sample for analysis where one can draw inference based on financial data for working capital practices. The cash conversion cycle was used as a comprehensive measure of working capital and its three components, namely, accounts payable, accounts receivable and inventory were the independent variables. The dependent variable used to determine the relationship between working capital management and profitability was the operating profit margin.

Liquidity ratio analysis, mean, variance and standard deviation on profitability and working capital components were used as data analysis tools. The relationship between working capital management and profitability was assessed through statistical analysis such as bivariate and partial correlation coefficients as well as parametric regression analysis as opposed to Kernel regression. The bivariate and partial correlations were used to ascertain the degree of linearity among key variables. The partial correlations, unlike the bivariate counterparts, show net (having taken out the effect of other variables) linear relationship among variables. The correlations only showed the degree of linearity but not the quantitative impact of control variables on the dependent variable and this is where regressions were used.

2.1. Variable transformation. Most variable transformations are monotonic by nature and, therefore, do not distort the fundamental relationships they have with each other. Most of the control variables in this study were not transformed as logarithms as they were within the same scale and this makes it easy to interpret. Without loss of generality, the sales figures were transformed into logarithms to result in a logarithmic variable. Sales are huge figures such that using them in their raw (original) form results in far-fetched interpretations which might not make much sense as they are not in sync scale-wise with the rest of other variables. The other advantage of using variables in logarithms is that the regression coefficients of log-log models are automatically interpreted as elasticities.

2.2. Functional form of the model. The empirical framework adopted in the study was that suggested by Deloof (2003) and, subsequently, by Padachi (2006) as mentioned in the paper by Raheman et al. (2010, p. 154). The model took the form that is known as an unobserved effects model shown below and is a version of the model as modified by Raheman et al. (2010, p. 154).

$$OPM_{it} = \beta_0 + \beta_1 CCC_{it} + \beta_3 \ln S_{it} + \beta_4 FDR_{it} + \\ + \lambda_i + u_{it}.$$

[1] Working capital shall be proxied by the cash conversion cycle (CCC) since CCC is derived from the components that make up working capital. These components are inventory conversion period, receivables conversion period and payables conversion period.

[2] FDR is a debt to assets ratio and is an important determinant of profitability as high indebtedness may negatively affect the firm's ability to generate profits and is also linked to the management of working capital.

The subscripts show that the variable is taken at time t for an observation i and this is the standard form of writing a panel regression model**.**

2.3. Definition and rational for the regression variables. CCC: this variable is used as a control variable to ascertain the extent to which profitability can be affected by the period it would take to realize receipts out of investments made in an attempt to increase sales. It is a liquidity risk measure. FDR: It is prudent to know how much of the external funding, in relation to total assets, would affect profitability. The dependent variable, OPM, is chosen as a regress and since it is the target variable whose factors are those discussed already as control variables.

Lnsales = log of sales (sales being the firm's annual turnover, used to measure the size of the firm).

The term λ_i is representing the unobserved firm-specific characteristics and the term u_{it} stands for the random term.

The analysis proceeded by way of Panel Data regression. The coefficients of the control variables act as impact parameters explaining the extent to which the relevant control variable impacts on the firm's profitability variable.

STATA Version 12 was used for analysis.

3. Data analysis and interpretations

3.1. Partial correlations between dependent and independent variables. From the available literature and the empirical evidence, the study adopted a *prior i* expectations of the correlations between operating profit margin (OPM) and the independent variables and these are shown below:

$r_{OPM\ lnsales}$ (ALL others constant) > 0,

$r_{OPM\ liverage\_factor}$ (ALL others constant) > 0,

$r_{OPM\ FDR}$ (ALL others constant) < 0,

$r_{OPM\ CCC}$ (ALL others constant) < 0.

Key: where $r_{OPM\ X}$ (ALL others constant) means partial correlation between OPM and the independent variable X holding the effect of all the other independent variables constant.

3.1.1. Interpretations of the partial correlations between OPM and independent variables. The results are shown in Appendix.

1. OPM and log of sales (lnsales): a positive correlation between log of sales (log of turnover) and operating profit margin with the partial correlation coefficient of 0.4960 was established. The relationship was found statistically significant. From this relationship one could expect profitability to increase as size of firm increases in the long run. This finding is in line with the study by Smith and Fletcher (2009) and other similar studies.
2. OPM and leverage factor: negative correlation value of -0.0182 between OPM and leverage factor was observed. However, due to high probability value of about 0.8153, the association between these two variables is not significant.
3. OPM and FDR: the profit margin shows that it is negatively correlated (-0.585) with the financial debt ratio (FDR). A situation where the debt-asset ratio is high means the debts a firm holds are more than the assets it has and this erodes both investor and customer confidence and ultimately affects profit negatively. The probability value of 0.000 (< 5% limit) means the correlation is significant. While the econometric results show a negative impact of financial debt ratio on profitability, some other empirical studies show a different picture.
4. OPM and CCC (i.e., OPM and working capital): the cash conversion cycle (CCC) is a proxy for working capital. This is inspired by the components that are used to compute CCC and constitute working capital. The greater the cash conversion cycle, the smaller will be the profit levels posted by the firms. The correlation between OPM and CCC (-0.225) was found statistically significant. This finding is in line with the studies like Deloof (2003) and others who found the relationship between working capital and profitability negative.

To verify the correlation results, the scatter plots between the operating profit margin and the independent variables were drawn. Various scatter plots of profitability with other control variables are shown in Figure 1 (see Appendix).

The scatter plots corroborate the correlations among the variables. Through the scatter plots profitability was found to be positively related to log of sales (panel A). There was a negative relationship between profitability and cash conversion cycle (panel B) as well as between profitability and financial debt ratio (FDR) (panel D). The plot of profitability and leverage_ratio was negative.

3.2. Descriptive statistics. The descriptive statistics is shown in Table 2A, Appendix and reflects the suitability of data to deliver credible analysis.

3.2.1. Jarque-Bera tests of normality. The variable CCC and OPM were found to be non-normally distributed. FDR & log of sales were found to be normally distributed. Since these were panel data, non-normality in variables is an inherent characteristic and was considered not a problem in analysis (refer to Appendix).

3.2.2. Panel unit root tests. All the unit root test statistics (Table 3A, Appendix) showed that as panel results were stationary for variable OPM. This is important for regression purposes. Similar tests were carried on the other variables, namely, the log of sales, FDR, leverage_factor and cash conversion cycle (CCC). They were all found to be stationary in their levels.

3.2.3. Model specific test. The objective was to establish a suitable model that suits the data given in order to get more credible and robust regression results that address objectives of this study. The competing models were random effects model and fixed effects model. The Hausman specification test (see Table 4A, Appendix) showed the fixed-effects model to be the better model ahead of the random-effects model.

The Hausman specification test shows that there was a significant difference in the coefficients of the fixed effects model and the random effects model. The proposition was that there are no firm-specific factors that affect profitability (that is, difference in coefficients is not systematic). Going by the probability value of less than five percent (5%) the study rejected the null hypothesis that the differences in the coefficients are not systematic and, therefore, the model to be estimated is the fixed effects model that captures firm specific effects on profitability.

3.2.4. Fixed effects regression results. Fixed effects regression results are shown in Appendix, Table 5A.

The Hausman specification test favored the estimation of the fixed effects model ahead of the random effects model. This means that there were significant differences in the structure of the firms even though they were in the same industry. Besides the commonly identified factors of profitability such as FDR, sales and CCC, there are other factors that are specific to the firms in the industry which affect profitability. These factors are not of random nature across the industry. Of importance to the estimated model is not really the quantitative impact of the exogenous variables but its directional impact to the dependent variable, which is the operating profit margin (OPM). Based on the Hausman specification test, this study found that the profitability of firms was affected by specific factors unique to each firm despite being in the same industry. The industry studied was largely retail by nature but they deal in differentiated products and so are not homogenous. Non-homogeneity of products means firms have some power over the prices they charge and therefore different profit levels across the firms in the industry. One would have been inclined to suggest that a random effects model would fit the data better but, then, reality on the ground is that being in the same industry does not mean exactly facing the same cost and market factors.

4. Delimitations of the study

The study concentrated on one type of industry using 17 firms for a period of ten years from 2004 to 2013. There were twenty nine (29) firms in total in the industry but only seventeen (17) firms had complete observations while the rest had too many missing observations. This means that data from eleven (11) firms could not be used in the analysis. Having more firms increases variability and, hence, sharpens the regression results and other data analysis. The study could have been more interesting if different types of industries were studied as well.

Conclusion

The primary goal of working capital management in a firm is to manage short-term funds required for day-to-day business activities of a firm. The company requires effective working capital management policy for a smooth uninterrupted production and sale activity.

The Fixed Effect Regression analysis of this study showed that a longer cash conversion cycle (CCC) has a negative impact on firm profitability. Similarly, a higher financial debt ratio (FDR) reduces firm profitability. The CCC is a powerful performance measure for assessing how well a company is managing its working capital. The results of this study imply that working capital managers of retail sector companies listed on the JSE can improve the profitability of their firms by shortening the CCC. CCC can be shortened by reducing the inventory conversion period through processing and selling goods more quickly, by reducing the receivable collection period or by delaying payments to suppliers.

The study results are largely mirror findings from other countries and indicate that effective management of firms' total working capital as well as its individual components have a significant impact on corporate profitability levels.

Leverage in this study was also found to be negatively associated with profitability which implies that increase in debt financing adversely affects the performance of the firm measured by profitability. Regarding the size and profitability, an increase in size (measured by log of sales) leads to an increase in the profitability of the firm. Sales growth showed a positive association with profit since growth as an indicator of a firm's business opportunities is a very important factor which allows a firm to enjoy more profits.

Overall, the results indicate that investing in working capital processes and incorporating working capital efficiency into everyday routines is essential for corporate profitability. As a result, firms should include working capital management in their financial planning processes and this can generate income and, at the same time, create employment. National economic policy aimed at boosting cash flows of firms may increase business ability to finance working capital internally, especially during economic downturns.

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References

1. Arshad, Z. and Gondal, M.Y. (2013). Impact of working capital management on profitability: A case of the Pakistan cement industry, *Interdisciplinary Journal of Contemporary Research in Business*, 5 (2), pp. 384-389.
2. Braun, M. and Larrain, B. (2005). Finance and the business cycle: international inter-industry evidence, *Journal of Finance*, 60 (3), pp. 1097-1198.
3. Deloof, M. (2003). Does working capital management affect profitability of Belgian firms? *Journal of Business Finance & Accounting*, 30 (3), pp. 573-87.
4. Einarsson, T. and Marquis, M.H. (2001). Bank intermediation over the business cycle, *Journal of Money Credit Banking*, 33 (4), pp. 876-899.
5. Enqvist, J., Graham, and Nikkinen, J. (2014). The impact of working capital management on firm profitability in different business cycles: Evidence from Finland, *Journal of Research in International Business and Finance*, 32, pp. 36-49.
6. Ghosh, S. and Maji, S. (2004). Working capital management efficiency: A study on the Indian cement industry, *The Management Accountant*, 39 (5), pp. 363-372.
7. Hofmann, E., and Kotzab, H. (2010). A Supply Chain-Oriented Approach of Working capital Management, *Journal of Business Logistics*, 31 (2), pp. 305-330.
8. Howorth, C. and Westhead, P. (2003). The focus on working capital management on UK small firms, *Management Accounting Research*, 14 (2), pp. 94-111.
9. Jose, M.L., Lancaster, C. and Stevens, J.L. (1996). Corporate returns and cash conversion cycles, *Journal of Economics Finance*, 20 (1), pp. 33-46.
10. Lazaridis, I. and Tryfonidis, D. (2006). Relationship between working capital management and profitability of listed companies in the Athens stock exchange, *Journal of Financial Management and Analysis*, 19 (1), pp. 26-35.
11. Nazir, S.M. and Afza, T. (2009). Impact of aggressive working capital management policy on firms profitability, *The IUP Journal of Applied Finance*, 15 (8), pp. 19-30.
12. Ngwenya, S. (2012). Relationship between working capital management and profitability of companies listed on the Johannesburg Stock Exchange, *Journal of Modern Accounting and Auditing*, 8 (8), pp. 1204-1213.
13. Padachi, K. (2006). Trends in working capital management and its impact on firms' performance: An analysis of Mauritian small manufacturing firms, *International Review of Business Research Papers*, 2 (2), pp. 45-58.
14. Peel, M.J., Wilson, N. and Howorth, C.A. (2000). Late payment and credit management in the small firm sector: some empirical evidence, *International Small Business Journal*, 18 (2), pp. 17-37.
15. Pirttila, M., Viskari, S. and Karri, T. (2010). Working Capital in the Value Chain: Cycle Times of Pulp and Paper Industry. Proceedings of 19th Annual IPSERA Conference, May 16-19, 2010, Lappeenranta, pp. 365-377.
16. Raheman, A. and Nasr, M. (2007). Working Capital Management And Profitability – Case Of Pakistani Firms. *International Review of Business Research Papers*, 3 (1), pp. 279-300.
17. Raheman, A., Afza, T., Qayyum, A. and Bodla, M.A. (2010). Working capital management and corporate performance of manufacturing sector in Pakistan, *International Research Journal of Finance and Economics*, 47, pp. 1-13.
18. Smith, M.B. & Fletcher, L. (2009). Factors influencing working capital management in South Africa, *Management Dynamics*, 18 (3), pp. 15-24.
19. Soenen, L.A. (1993). Cash conversion cycle and corporate profitability, *Journal of Cash Managemen*t, 13, pp. 53-57.
20. Statistics South Africa (2012). *Quarterly Labour Force Survey*, Quarter 1, Pretoria.
21. Teruel, P.J.G. and Solano, P.M. (2007). Effects of Working Capital Management on SME Profitability, *International Journal of Managerial Finance*, 3 (2), pp. 164-177.
22. Uyar, A. (2009). The relationship of cash conversion cycle with firm size and profitability, *Finance Practice and Education*, 8 (2), pp. 37-45.
23. Wang, Y.J. (2002). Liquidity management, operating performance and corporate value: evidence from Japan and Taiwan, *Journal of Multinational Financial Management*, 12 (2), pp. 159-169.
24. Weinraub, H.J. and Visscher, S. (1998). Industry practice relating to aggressive conservative working capital policies, *Journal of Financial and Strategic Decision*, 11 (2), pp. 11-18.

Appendix

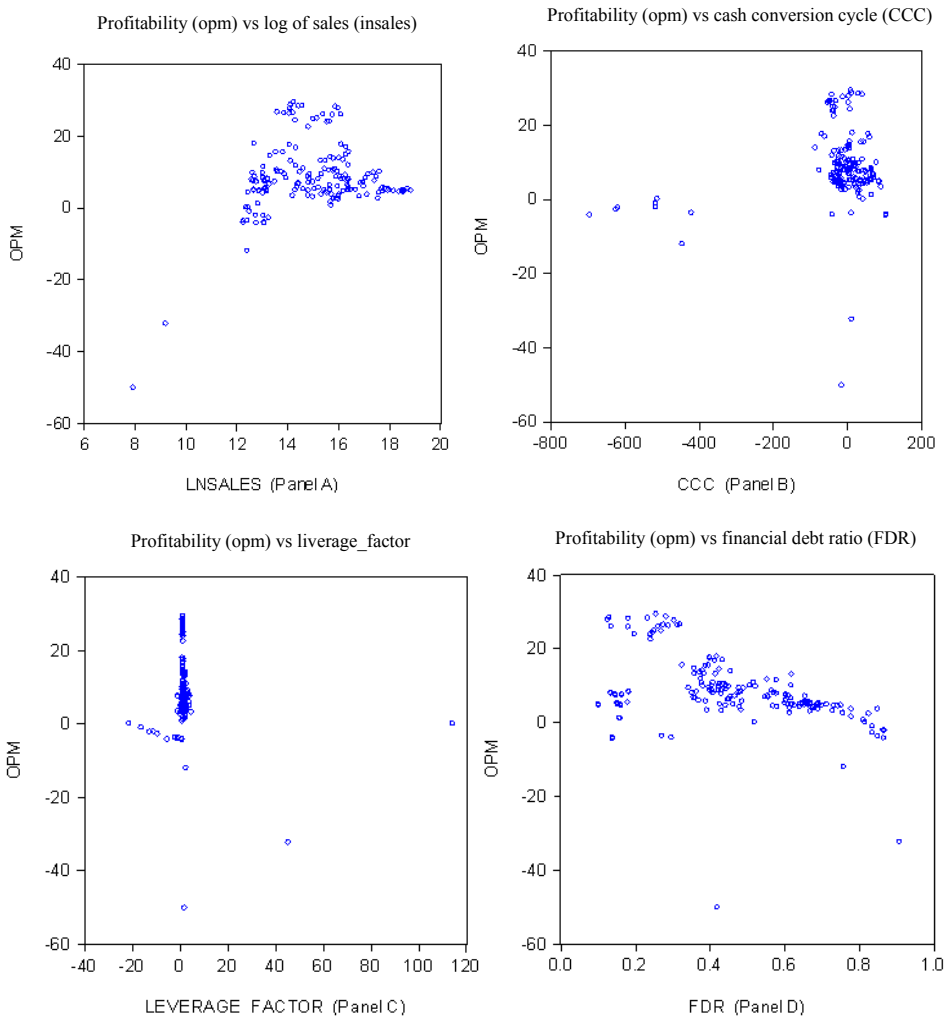

Fig. 1. Operating profit margin scatter plots

Table 1A. Partial & semi-partial correlations of OPM with control variables

Variable	Partial corr.	Semi-partial corr.	Partial corr.^2	Semi-partial corr. ^2	Significance value
Insales	0.4960	0.4406	0.2460	0.1941	0.0000
Leverage_~r	-0.0182	-0.0141	0.0003	0.0002	0.8153
FDR	-0.5854	-0.5569	0.3427	0.3101	0.0000
CCC	-0.2245	-0.1777	0.0504	0.0316	0.0035

Table 2A. Descriptive statistics

	CCC	OPM	FDR	LNSALES	TDCFR
Mean	-20.75775	8.379906	0.464702	14.95163	4.953958
Median	0.857264	7.209187	0.441794	15.00168	2.606726
Maximum	104.0801	29.45431	0.907941	18.84859	49.62368
Minimum	-696.1382	-50.08977	0.099827	7.932003	-37.99234
Std. dev.	124.1876	9.589063	0.204499	1.864674	8.809564
Skewness	-3.793393	-1.148426	0.085577	-0.208463	2.313331
Kurtosis	17.79332	12.04439	2.178841	3.342802	16.28983
Jarque-Bera	1957.846	616.7914	4.983806	2.063662	1402.681
Probability	0.000000	0.000000	0.082752	0.356354	0.000000
Sum	-3528.817	1424.584	78.99940	2541.778	842.1729
Sum sq. dev.	2606414.	15539.57	7.067577	587.6143	13115.82
Observations	170	170	170	170	170

Table 3A. Panel unit root testing results

Panel unit root test: summary				
Series: OPM				
Date: 04/18/14 time: 15:44				
Sample: 2004 2013				
Exogenous variables: Individual effects				
User-specified lags: 1				
Newey-West automatic band width selection and Bartlett kernel				
Balanced observations for each test				
Method	Statistic	Prob.**	Cross-sections	Obs
Null: unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-11.8029	0.0000	17	136
Null: unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-2.03763	0.0208	17	136
ADF-Fisher Chi-square	52.3452	0.0230	17	136
PP-Fisher Chi-square	38.2478	0.2826	17	153
** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.				
Panel unit root test: summary				
Series: LNSALES				
Date: 04/18/14 time: 15:51				
Sample: 2004 2013				
Exogenous variables: Individual effects				
User-specified lags: 1				
Newey-West automatic bandwidth selection and Bartlett kernel				
Balanced observations for each test				
Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-6.11750	0.0000	17	136
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-3.06727	0.0011	17	136
ADF-Fisher Chi-square	67.2946	0.0006	17	136
PP-Fisher Chi-square	86.8273	0.0000	17	153
** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.				
Panel unit root test: summary				
Series: CCC				
Date: 04/18/14 time: 15:52				
Sample: 2004 2013				
Exogenous variables: Individual effects				
User-specified lags: 1				
Newey-West automatic bandwidth selection and Bartlett kernel				
Balanced observations for each test				
Method	Statistic	Prob.**	Cross-sections	Obs
Null: unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-2.30407	0.0106	17	136
Null: unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	0.46702	0.6798	17	136
ADF - Fisher Chi-square	33.5864	0.4878	17	136
PP - Fisher Chi-square	56.6601	0.0087	17	153
** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.				
Panel unit root test: summary				
Series: FDR				
Date: 04/18/14 time: 15:55				
Sample: 2004 2013				
Exogenous variables: Individual effects				
User-specified lags: 1				
Newey-West automatic bandwidth selection and Bartlett kernel				
Balanced observations for each test				

Table 3A (cont.). Panel unit root testing results

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-9.53403	0.0000	17	136
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-0.75052	0.2265	17	136
ADF-Fisher Chi-square	53.2139	0.0191	17	136
PP-Fisher Chi-square	36.5966	0.3491	17	153
** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.				
Panel unit root test: summary				
Series:TDCFR				
Date: 04/18/14 time: 15:56				
Sample: 2004 2013				
Exogenous variables: Individual effects				
User-specified lags: 1				
Newey-West automatic bandwidth selection and Bartlett kernel				
Balanced observations for each test				
Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-3.70706	0.0001	17	136
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-0.47290	0.3181	17	136
ADF - Fisher Chi-square	39.5494	0.2359	17	136
PP - Fisher Chi-square	34.0119	0.4672	17	153
** Probabilities for Fisher tests are computed using an asymptotic-square distribution. All other tests assume asymptotic normality. Chi				

Table 4A. Hausman specification tests results

. hausman fixed ., sigmamore				
	Coefficients			
	(b) fixed	(B) .	(b-B) Difference1	sqrt (diag(V_b-V_B)) S.E.
CCC	-.0160767	-.0230613	.0069846	0.0039875
fdr	-13.63939	-23.58156	9.942171	3.096999
lnsales	6.920217	4.936587	1.98363	.441715
Leverage_f~r	.0226581	.0118836	.0107745	.0043317

Notes: b = consistent under Ho and Ha; obtained from xtreq. B = inconsistent under Ha, efficient under Ho; obtained from xtreq. Test: Ho: difference in coefficients is not systematic. chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 24.65. Prob > chi2 = 0.0001.

Table 5A. Fixed effect model results

Fixed effects (within) regression				Number of obs = 170		
Group variable: firm_id				Number of groups = 17		
R-sr:	within = 0.4488			Obs	per group: min = 10	
	between = 0.0832				avg = 10.0	
	overall = 0.1199				max = 10	
corr(u_i, Xb) = -0.7364				F(4, 149) = 30.34 Prob > F = 0.0000		
opm	Coef.	Std. err.	t	P > |t|	[95% conf. interval]	
CCC	-.0160767	.0078418	-2.05	0.042	-.0315722	-.0005812
FDR	-13.63939	5.524729	-2.47	0.015	-24.55633	-2.722455
lnsales	6.920217	.6693615	10.34	0.000	5.59755	8.242884
leverage_factor	.0226581	.0368556	0.61	0.540	--.050169	.0954853
_cons	-89.12395	10.48759	-8.50	0.000	-109.8476	-68.40034
sigma_u	12.076146					
sigma_e	4.4842952					
rho	.87881984 (fraction of variance due to u_i)					
F test that u_i = 0:	F(16, 149) = 19.41			Prob > F = 0.0000		
. estimates store fixed						