Determinants of Working Capital Requirement: Evidence from Non-Financial Firms Listed on the Vietnam Exchange

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ABSTRACT

The purpose of this study is to examine whether non-financial firms listed on the VietNam Exchange exhibit a target working capital requirement (WCR). The study also investigates the determinants of WCR and the speed with which firms can adjust toward their target WCR. Based on a sample of 314 non-financial firms listed on the VietNam Exchange during 2010–2015, Using the Generalized Method of Moments estimation, the study found that firms pursue target levels of WCR. However, the adjustment process is relatively slow with an adjustment coefficient of 0.4573. In addition, the results also show that the WCR increased significantly with increasing in the firm’s profitability. In contrast, the WCR decreases significantly with increasing in the size and fixed investment of the firm. From the results obtained, this study provides important implications to corporate financial managers in effective management of the WCR.
1. Introduction

In recent years, although there is growing empirical evidence in different countries that firms are over investing in working capital, however only few studies focus on the pursuit of target WCR and speed of adjustment. For example Baños-Caballero, García-Teruel, and Martínez-Solano (2010), analyzed the determinants of cash conversion cycle (CCC) for Spanish SMEs (small- and medium-sized firms) over the period 2001–2005. The results indicate that Spanish SMEs pursue a target CCC that balances the costs and benefits of maintaining it. In addition, they found that Spanish SMEs adjust their current CCC to their target quickly with an adjustment coefficient of 0.87. The next study by Baños-Caballero, García-Teruel, and Martínez-Solano (2013) analyzed a sample of non-financial Spanish companies over the period 1997–2004. Using net trade cycle (NTC) as a measure of working capital requirement, they found that Spanish firms have target working capital requirement levels and they partially adjust their working capital investment level in an attempt to reach this target (their adjustment coefficient is 0.6). Moreover, they found that the speed of adjustment is not equal across all firms and varies according to their external finance constraints and their bargaining power. Other studies, for example Mutua Mathuva (2014) examined the speed of adjustment to the target CCC on a sample of 33 publicly traded firms on the Nairobi Securities Exchange for the period between 1993 and 2008. They found that Nairobi Securities Exchange-listed firms pursue target CCC levels and they adjust relatively slowly towards their target levels (the adjustment coefficient is 0.56). Kwenda and Holden (2014) examined the Johannesburg Stock Exchange listed firms over the period 2001-2010. Using current assets to total assets (CATA) as a measure of working capital investment, the results found that South African-listed firms pursue target working capital investment levels and they adjust relatively slowly towards their target levels (their average adjustment coefficient is 0.5). To our knowledge, it can be concluded that there is no published papers where a partial adjustment model of WCR is applied on a sample of Vietnam’s listed enterprises.

From the above practices, the standard partial adjustment model and panel data regression analysis is used to investigate whether non-financial firms listed on the VietNam Exchange exhibit a target working capital requirement (WCR). The study also investigate the determinants of WCR and the speed with which firms can adjust toward their target WCR.

This paper is divided into five sections. The next session presents an overview of the literature on working capital investment policies, discusses substantive issues related to target the WCR and develops testable hypotheses. In section 3, we describe our data and the
empirical model, the method used to estimate the model. The fourth section presents the results of the empirical analysis. Finally, we summarize our findings and suggest some implications in the last section.

2. Literature Review and Testable Hypotheses

Most previous studies have shown that there are a number of factors that affect the company's WCR, such as company size, profitability, tangible fixed assets, growth opportunities, external finance costs, and so on. In this section, we will analyze the relationship between these factors and the company's WCR used in this study.

**Company Size:** The size of the company is considered to be an important determinant of the company's WCR. However, there are two contradictory arguments on this point. First, according to the pecking order theory (Myers & Majluf, 1984), large-scale companies are expected to have greater capital investment. Because larger companies have less information asymmetry, thus allowing them to more easily access capital than small companies. This means that, a positive relationship between the WCR and the size of the company is expected. Empirical studies support this view including Chiou, Cheng, and Wu (2006), Hill, Kelly, and Highfield (2010), Baños-Caballero et al. (2010), Akinlo (2012). On the contrary, the opposite view indicates that the relationship between firm size and WCR is negative. They argue that large companies may have greater bargaining power with suppliers and customers, so they spend less on working capital (Abbadi & Abbadi, 2012; Azeem & Marsap, 2015; Wasiuzzaman & Arumugam, 2013). Thus, the expected relationship between size of the company and WCR is unclear. Therefore, the hypothesis of this relationship is as follows.

**Hypothesis 1A (H1A):** The size of the company has a positive impact on the company’s WCR.

**Hypothesis 1B (H1B):** The size of the company has a negative impact on the company’s WCR.

**Profitability:** According to the pecking-order theory (Myers & Majluf, 1984), a negative relationship between profitability and WCR is expected. This means that highly profitable companies will have relatively low WCRs. Empirical studies supporting this view include Chiou et al. (2006), Baños-Caballero et al. (2010), Baños-Caballero et al. (2013), Mutua Mathuva (2014), Azeem and Marsap (2015). Conversely, the other view is that since high-profit companies have money to invest in operations, they will not care about the efficiency of working capital management. Therefore, the positive relationship between profitability and WCR is predicted. The results of Abbadi and Abbadi (2012), Wasiuzzaman and Arumugam (2013) confirm this. Thus, the expected relationship between profitability and WCR is unclear. Therefore, the hypothesis of this relationship is as follows.
Hypothesis 2A (H2A): Profitability has a positive impact on the company’s WCR.

Hypothesis 2B (H2B): Profitability has a negative impact on the company’s WCR.

Investment in Fixed Assets: Baños-Caballero et al. (2010), Baños-Caballero et al. (2013), Wasiuzzaman and Arumugam (2013), Mutua Mathuva (2014), Kwenda and Holden (2014) found that the more the company invested in fixed assets, the smaller the WCR is. This indicates that there is a negative relationship between the fixed asset and the WCR. Therefore, the hypothesis of this relationship is as follows.

Hypothesis 3 (H3): Fixed asset investment has a negative impact on the company’s WCR.

Growth Opportunities: According to the pecking-order theory (Myers & Majluf, 1984), a company that expects more growth opportunities will need more capital in the future and therefore will need more internal financing. This means that a positive relationship between growth opportunities and WCR is expected. The results of Akinlo (2012), Wasiuzzaman and Arumugam (2013) confirm this. In contrast, another viewpoint points to the existence of a negative relationship between the growth opportunities and the company's WCR. They argued that high growth companies tend to provide less commercial credit to customers (Molina & Preve, 2009) and use more commercial credit as a source of financing (Cunat, 2007). The negative impact of growth opportunities on WCR is also confirmed by Hill et al. (2010), Baños-Caballero et al. (2010), Baños-Caballero et al. (2013), Mutua Mathuva (2014). Based on the above arguments, there is no clear consensus on the relationship between growth opportunities and WCR. Therefore, the hypothesis of this relationship is as follows.

Hypothesis 4A (H4A): Growth opportunities have a positive impact on the company’s WCR.

Hypothesis 4B (H4B): Growth opportunities have a negative impact on the company’s WCR.

Cost of External Financing: Filbeck and Krueger (2005) observed that changes in interest rates affect working capital demand. They argued that with higher interest rates, companies are reluctant to pay early, leading to prolonged payouts. This means that a negative relationship between external financing costs and WCR has been detected. The results of Baños-Caballero et al. (2013) also found that firms with higher external financial costs had lower WCRs. In this way of thinking, the negative relationship between external financial costs and WCR will be predicted in this study. Therefore, the hypothesis of this relationship is as follows.

Hypothesis 5 (H5): External financing costs have a negative impact on the company’s WCR.

3. Data and Methodology
3.1. Data and Measurement Variables

The study used secondary data collected from financial statements of 314 non-financial firms listed on the VietNam Exchange during 2010–2015. The unit period for determining variables’ value is year, the total number of observations used in the model is 1884 observations.

In this study, variables are measured by book values. The variables in the model are measured as follows.

**Working Capital Requirement (WCR_TA):** The study used indicators working capital requirement to total assets representing investments in working capital of enterprises. This measure is in line with Chiou et al. (2006), Azeem and Marsap (2015).

\[
WCR = \frac{Current\ assets - Liabilities}{Total\ assets}
\]

**Company Size (SIZE):** According to Chiou et al. (2006), Wasiuzzaman and Arumugam (2013), Baños-Caballero et al. (2013), Azeem and Marsap (2015), the study used the natural logarithm of the total assets as a measure of the company’s size.

\[
SIZE = \ln(\text{Total assets})
\]

**Profitability (PROF):** According to Chiou et al. (2006), Baños-Caballero et al. (2013), Mutua Mathuva (2014), the ratio of profit before interest and tax to total assets is used as a measure of corporate profitability. In this study profitability is measured as follows.

\[
PROF = \frac{\text{Earnings before tax and interest}}{\text{Total assets}}
\]

**Investment in Fixed Assets (TANG):** According to Baños-Caballero et al. (2010), Wasiuzzaman and Arumugam (2013), Mutua Mathuva (2014), Kwenda and Holden (2014), this study uses the ratio of tangible fixed assets to total assets to measure investment in fixed assets of the company.

\[
TANG = \frac{\text{Tangible\ fixed\ assets}}{\text{Total\ assets}}
\]

**Growth Opportunities (GRO):** According to Hill et al. (2010), Baños-Caballero et al. (2010), Wasiuzzaman and Arumugam (2013), Mutua Mathuva (2014), Azeem and Marsap (2015), sales growth rate is used to measure the growth opportunities of the company in this study.

\[
SG = \frac{(\text{This\ year's\ revenue} - \text{The\ previous\ year's\ revenue})}{\text{Previous\ year's\ revenue}}
\]
External Financing (FCOST): According to Baños-Caballero et al. (2013), in this study the ratio of interest expenses on total debt is used as a measure of external financing costs.

\[
FCOST = \frac{\text{Interest expense}}{\text{Total debt}}
\]

3.2. Models and Methods of Estimation

Based on the estimation model proposed by Baños-Caballero et al. (2013), however this study uses the dependent variable WCR_TA and applies the partial adjustment model as follows:

\[
WCR_{TA_{i,t}} - WCR_{TA_{i,t-1}} = \gamma \left( WCR_{TA_{i,t-1}} - WCR_{TA_{i,t-1}} \right), \quad 0 < \gamma < 1
\]

where \(WCR_{TA_{i,t}}\) is the WCR deflated by total assets of firm \(i\) at time \(t\), and \(WCR_{TA_{i,t}}\) is the target WCR deflated by total assets of firm \(i\) at time \(t\). Therefore, \((WCR_{TA_{i,t}} - WCR_{TA_{i,t-1}})\) is the adjustment required to reach the firm’s target level, and the coefficient \(\gamma\) measures the speed of adjustment which is inversely related to adjustment costs, and takes values between 0 and 1. If \(\gamma = 0\), then \(WCR_{TA_{i,t}} = WCR_{TA_{i,t-1}}\), and the current WCR\_TA remains as in the previous period, indicating that companies bear high adjustment costs. However, if \(\gamma = 1\), then \(WCR_{TA_{i,t}} = WCR_{TA_{i,t}}\), and firms immediately adjust their WCR\_TA to their targets.

To model a target WCR, we use a set of variables that appears regularly in the literature as determinants of a firm’s WCR (see section 2). Accordingly, a firm’s target WCR is estimated by:

\[
WCR_{TA_{i,t}} = \beta_0 + \beta_1 SIZE_{i,t} + \beta_2 PROF_{i,t} + \beta_3 TANG_{i,t} + \beta_4 GRO_{i,t} + \beta_5 FCOST_{i,t}
\]

If equation (2) is substituted into equation (1), and the unobservable heterogeneity and the time dummy variables are included, the current WCR is determined by:

\[
WCR_{TA_{i,t}} = \gamma \beta_0 + (1 - \gamma)WCR_{TA_{i,t-1}} + \gamma \beta_1 SIZE_{i,t} + \gamma \beta_2 PROF_{i,t} + \gamma \beta_3 TANG_{i,t}
+ \gamma \beta_4 GRO_{i,t} + \gamma \beta_5 FCOST_{i,t} + \eta_i + \lambda_t
+ \gamma \epsilon_{i,t}
\]

Equation (3) can be rewritten as follows:
\[ WCR_{TA_{i,t}} = \alpha + \rho WCR_{TA_{i,t-1}} + \delta_1 SIZE_{i,t} + \delta_2 PROF_{i,t} + \delta_3 TANG_{i,t} + \delta_4 GRO_{i,t} + \delta_5 FCOST_{i,t} + \eta_t + \lambda_t \]

Where \( \alpha = \gamma \beta_0 \); \( \rho = (1 - \gamma) \); \( \delta_k = \gamma \beta_k \); \( \nu_{i,t} = \gamma \epsilon_{i,t} \). \( SIZE \) is the natural logarithm of total assets; \( PROF \) is earning before interest and tax on total assets; \( TANG \) is the ratio of tangible fixed assets to total assets; \( GRO \) is the growth rate of revenue; \( FCOST \) is the external financial expense. The parameter \( \lambda_t \) is the dummy variable that represents the time impact on the demand for working capital but the company cannot control it. The \( \eta_t \) parameter represents the heterogeneity of the companies representing individual characteristics of the company and is not observable. The error \( \epsilon_{i,t} \) is assumed to be independent and has a standard distribution \( (\epsilon_{i,t} \sim iid (0, \sigma^2)) \).

To test hypotheses, this study uses the Generalized Method of Moment (GMM) method proposed by Blundell and Bond (1998). One of the GMM method’s advantages compared with other estimation methods (OLS, FEM, ...) is that the GMM method allows the control of endogenous problems in the model using the tool variables. To determine the suitability of tool variables or to test endogenous limit in the model, this study used the Hansen test. At the same time, this research also uses Arellano-Bond testing to examine the autocorrelation for residuals. In addition, to determine whether multicollinearity between variables existed, the study used the Variance Inflation Factor (VIF) test.

4. Research Results

4.1. Descriptive Statistics

Table 1 presents the descriptive statistics for variables used in the model. All these variables are calculated based on the formulas in Section 3.1 and on the basis of financial information collected from the balance sheets and the statement of business outcomes reports of 314 companies listed on Vietnamese stock market in the period of 2010-2015.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Observations</th>
<th>Mean</th>
<th>Std. Dev</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>WCR_TAI_{i,t}</td>
<td>1884</td>
<td>0.2027</td>
<td>0.2437</td>
<td>-0.9686</td>
<td>0.9838</td>
</tr>
<tr>
<td>SIZE_{i,t}</td>
<td>1884</td>
<td>26.8014</td>
<td>1.5063</td>
<td>23.0265</td>
<td>31.9056</td>
</tr>
<tr>
<td>PROF_{i,t}</td>
<td>1884</td>
<td>0.0903</td>
<td>0.1044</td>
<td>-0.9739</td>
<td>0.9970</td>
</tr>
<tr>
<td>TANG_{i,t}</td>
<td>1884</td>
<td>0.2772</td>
<td>0.2315</td>
<td>0.0000</td>
<td>0.9289</td>
</tr>
<tr>
<td>GRO_{i,t}</td>
<td>1570</td>
<td>0.2805</td>
<td>1.8104</td>
<td>-0.9940</td>
<td>31.5481</td>
</tr>
<tr>
<td>FCOST_{i,t}</td>
<td>1884</td>
<td>0.0372</td>
<td>0.0455</td>
<td>0.0000</td>
<td>0.8610</td>
</tr>
</tbody>
</table>
The statistical results described in Table 1 show that the average WCR_TA of firms is 0.2027, indicating that the working capital requirement per total assets of companies is 20.27%. The company has the largest WCR_TA of 98.38% and the smallest of -96.86%. The standard deviation is 24.37%. The statistical parameters of SIZE, PROF, TANG, GRO and FCOST are detailed in Table 1.

4.2. Correlational Analysis

Before running the regression, the correlations are checked to ensure that there are no cases of multicollinearity. Gujarati (2009) explains that multicollinearity indicates the existence of a perfect or less than perfect linear relationship between some or all explanatory variables of a regression model. To test the existence of multicollinearity in the regression model, VIF (Variance Inflation Factor) is used. If VIF value is greater than 10, it indicates multicollinearity (Studenmund, 2011).

**Table 2**
Correlation matrix and VIF between independent variables

<table>
<thead>
<tr>
<th>WCR_TA_{i,t-1}</th>
<th>FCOST_{i,t}</th>
<th>SIZE_{i,t}</th>
<th>PROF_{i,t}</th>
<th>TANG_{i,t}</th>
<th>GRO_{i,t}</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.51</td>
</tr>
<tr>
<td><strong>-0.3080</strong></td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.12</td>
</tr>
<tr>
<td><strong>-0.1373</strong></td>
<td>0.0335</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td>1.03</td>
</tr>
<tr>
<td><strong>0.2061</strong></td>
<td>-0.0103</td>
<td>-0.0246</td>
<td>1.0000</td>
<td></td>
<td></td>
<td>1.05</td>
</tr>
<tr>
<td><strong>-0.4927</strong></td>
<td><strong>0.2261</strong></td>
<td><strong>-0.0285</strong></td>
<td><strong>-0.0561</strong></td>
<td>1.0000</td>
<td></td>
<td>1.35</td>
</tr>
<tr>
<td>0.0407</td>
<td>-0.0302</td>
<td>0.0179</td>
<td>-0.0015</td>
<td><strong>-0.0659</strong></td>
<td>1.0000</td>
<td>1.01</td>
</tr>
</tbody>
</table>

**Notes:** WCR_TA_{i,t-1} is the lagged dependent variable introduced as an independent variable. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

The results in Table 2 show that the magnification factor variance factorization (VIF) of the independent variables in the model are less than 1.6. Therefore, it can be concluded that there is no multicollinearity between independent variables occurring in the model (Studenmund, 2011).

4.3. Regression Results

**Table 3**
Results of regression of factors influencing WCR and speed of adjustment

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Coef.</th>
<th>t-Stat.</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WCR_TA_{i,t-1}</td>
<td>0.5427</td>
<td>11.51</td>
<td>***0.000</td>
</tr>
<tr>
<td>SIZE_{i,t}</td>
<td>-0.0167</td>
<td>-4.56</td>
<td>***0.000</td>
</tr>
<tr>
<td>PROF_{i,t}</td>
<td>0.4376</td>
<td>8.94</td>
<td>***0.000</td>
</tr>
<tr>
<td>TANG_{i,t}</td>
<td>-0.2891</td>
<td>-9.85</td>
<td>***0.000</td>
</tr>
<tr>
<td>GRO_{i,t}</td>
<td>-0.0001</td>
<td>-0.03</td>
<td>0.974</td>
</tr>
<tr>
<td>FCOST_{i,t}</td>
<td>-0.1219</td>
<td>-1.45</td>
<td>0.149</td>
</tr>
</tbody>
</table>
Table 3 shows the results of factors influencing WCR and the speed of adjustment of non-financial firms listed on the VietNam Exchange during 2010–2015 according to the two-step GMM estimation method.

To confirm the robustness of our results with the two-step system – Generalized Method of Moments estimator, the $m_2$ statistic was used to test for the absence of second-order serial correlation in the first difference residuals. The results in Table 3 show that the $m_2$ statistic has a p-value of 0.124, which mean that there is no second-order serial correlation. Besides, the results of the Hansen test for over-identifying restrictions are also shown, and indicate the absence of correlation between instruments and error term. According to the results estimated by two steps GMM in table 3 show that:

The coefficient of the lagged dependent variable ($\text{WCR}_{TA,i,t-1}$) is positive and statistically significant at 1%. This result implies that listed companies in Vietnam have a target WCR and are pursuing this goal. The regression coefficient of $\text{WCR}_{TA,i,t-1}$ is 0.5427, which implies that the adjusted coefficient ($\gamma$) on the target is $0.4573 \left(1 - 0.5427\right)$, indicating that firms are actively pursuing their goals. This adjustment coefficient is lower than that of Spanish SMEs (0.87), Spanish non-financial companies (0.6), companies listed on Nairobi Stock Exchange (0.56), companies listed on South African stock market (0.5) which were found by Baños-Caballero et al. (2010), Baños-Caballero et al. (2013), Mutua Mathuva (2014), Kwenda and Holden (2014) corresponding.

The regression coefficient of company size (SIZE) is negative (-0.0167) and significant at 1%. This result implies that large companies often invest in lower working capital than small firms. This result is consistent with findings from Abbadi and Abbadi (2012), Wasiuzzaman and Arumugam (2013), Azeem and Marsap (2015) as well as hypotheses 1B.

The regression coefficient of profitability (PROF) is positive (0.4376) and statistically significant at 1%. This result implies that more profitable companies will invest in more working capital. This finding is consistent with Abbadi and Abbadi (2012), Wasiuzzaman and Arumugam (2013) as well as hypotheses 2A.
The regression coefficient of fixed asset investment (TANG) is negative (-0.2891) and is statistically significant at 1%. This result implies that WCR_TA is significantly reduced with the increase in tangible fixed asset investment. This result is consistent with Baños-Caballero et al. (2010), Baños-Caballero et al. (2013), Wasiuzzaman and Arumugam (2013), Mutua Mathuva (2014), Kwenda and Holden (2014) as well as Hypothesis 3.

The opposite effect of the external finance cost (FCOST) and sales growth (GRO) on working capital demand (WCR_TA) but not statistically significant and there is no evidence about the impact of these variable on WCR_TA proved.

5. Conclusion and Policy Recommendations

This study has applied a two-step GMM estimation model on a sample of 314 companies listed on Vietnamese stock market for the period of 2010-2015 to investigate whether listed companies in Vietnam have a target WCR or not. The research also tests the target WCR adjustment rate and the factors that affect the WCR.

The research shows that listed companies in Vietnam pursue their target working capital investment and that they adjust relatively slowly to their targets with an average adjustment coefficient of 0.4573. In addition, according to the research findings, there is a negative relationship between WCR and tangible fixed asset investment as well as company size. Profitability is positively correlated with WCR. These results are consistent with previous studies by Baños-Caballero et al. (2013), Mutua Mathuva (2014), Kwenda and Holden (2014).

Information from this study may increase understanding of working capital investment decisions for companies listed on Vietnamese stock market. Moreover, it can be used by corporate finance managers to make better working capital investment decisions that contributes to maximizing company’s value. Companies that want to adjust current working capital demands forward to target working capital demands should note that the rate of adjustment is 45.73%. At the same time, in order to adjust the target WCR, companies should adopt policies that expand the size of the business and invest in fixed assets to help improve and enhance the company's profitability.

References


