DETERMINANTS OF WORKING CAPITAL MANAGEMENT IN LATIN AMERICAN COMPANIES

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ABSTRACT

The aim of this study is to determine the factors that affect working capital management in Latin American companies. Using an unbalanced panel data analysis for companies quoted in five Latin American capital markets it is shown that companies in Argentina, Brazil, Chile and Mexico are holding cash excesses, which could destroy firm value. Results show that the industry cash conversion cycle, the company market power, its future sales and country risk have an influence on the way Latin American companies manage their working capital with significant differences among countries in the region.

Keywords: Working capital, emerging markets

JEL Code: M16

1. INTRODUCTION

Firms face a number of important decisions in their current operations and one of these important decisions concerns the efficient management of liquidity. This decision is critical, as it is the reason for which many firms go bankrupt. To understand how important it is to have good liquidity management one may refer to two North American supermarkets: Walmart and Kmart (Shin and Soenen, 1998). These two companies had similar capital structures in 1994; however, Kmart had a cash conversion cycle[1] (CCC) of 61 days while Walmart had a CCC of 40 days. As a consequence of this difference Kmart faced additional financial costs in the order of US$ 200 million per year. Clearly, this situation was not sustainable because poor working capital management eventually contributed to Kmart's bankruptcy. This example illustrates how working capital management, a key variable for an efficient management of liquidity, could lead the firm to bankruptcy when it is poorly handed.

For this reason, the analysis of working capital management is critical, as this practice encompasses a number of policies relative to the management of liquidity. Working capital management (WCM) provides the firm with information on the liquidity needed to operate efficiently. When payables are due before collectables there is a liquidity problem and, in extreme cases, payments can be suspended, which eventually could lead to the company's financial distress.

Empirical evidence shows that WCM in the United States (Kieschnick, La Plante and Moussawi, 2006) has significant effects on companies with two different results in place. On the one hand, to hold an adequate level of working capital, that is to say, an adequate management of the CCC may generate a situation in which the company may incur lower financial expenses and maintain a stable growth. On the other hand, there can be negative effect on the accumulation of working capital, because overinvestment could destroy the value of companies. An example from Kieschnick et al. (2006) showed that the relationship between working capital management and the value of North American companies over the recent past decades was negative precisely due to this overinvestment.

The case of Europe is very similar. The results of the survey conducted by KPMG (2005) reveal that 74% of the leading companies admit that capital management is very important, and consequently, they have developed policies which help to improve its management. However, the European setting shows two problems relative to working capital management. The first is that they do not analyze the components of CCC as a whole (i.e., they do not integrate credit, cash and inventory policies with the process of sales projections) quite the contrary, the WCM is carried out from different perspectives assigning unequal objectives to each one of the policies and therefore maintaining an inefficient management of working capital. Only 33% of the European firms analyze CCC in an integrated manner.

The second problem in European firms lies in the conflict between target financial ratios and CCC. The main objective of 58% of surveyed firms is to keep the levels of sales high in order to obtain greater profit to fulfill target financial ratios. Furthermore, the survey showed that there is no good follow-up of the CCC meaning that WCM could be more reactive to the circumstances of the company rather than well planned and monitored.

[1] The cash conversion cycle – CCC –reflects the interval of time (days) required to convert a dollar invested in current assets in cash. It is calculated by adding the average period to collect to the average inventory period and subtracting the average period of payment.

WCM in firms that operate in Latin America shows an evident backward step over the last years. In the mid nineties it was common to obtain loans from abroad, which were channeled through local banks. These loans were placed at very low rates and for periods of 180 days on average.

Furthermore, these loans could be renewed, so that they were substituted by a new loan. For this reason, these loans were considered a permanent source of income. However, since 1997, there was a series of international financial crises, which generated an interruption of these financing sources and companies had to face their obligations by cutting back their operating investments. This led to the financial distress of a great number of companies.

Firms sold less and tried to finance themselves with their suppliers, who did not collect and hence were in no position to give them extended periods of payment. This is one possible explanation for why companies could have held excessive working capital in recent years so as to face this situation of scarcity of suppliers' credit.

The survey carried out by Payne and Bustos (2008) and the study conducted by Elizalde (2003) arrived at the conclusion that companies in Latin American are inadequately managing their working capital. The uncertainty with regard to payments and collections as well as a poor implementation of sales projections has led firms in Latin America to overinvest in working capital.

However, another possible explanation for this overinvestment by firms in Latin America is related to the short term investment horizon. The growth that Latin America has recorded is recent, and consequently investment policies have not aimed at the long term, but at the short term (Mongrut and Wong, 2005).

This study seeks to analyze the WCM by firms operating in Latin America. The purpose is to assess whether they are overinvesting in working capital and subsequently to identify which variables have an impact on their CCC. The study is divided into three additional parts:

The second part reviews the literature and describes the working capital management policies in Latin America.

The third part is devoted to find out whether firms in our sample from Argentina, Brazil, Chile, Mexico and Peru keep deficit or excess in cash.

In the fourth section a second set of variables was used to analyze the determinants of CCC.

In the fifth part, the conclusions of the study are discussed, while at the same time some policy recommendations for the managing of working capital in Latin America are proposed.

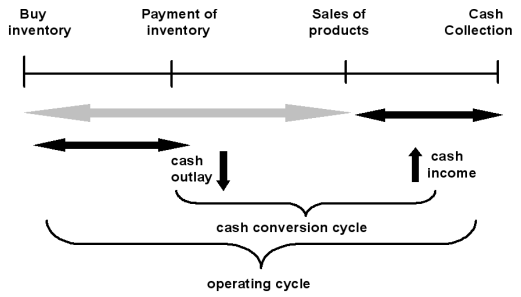
2. THEORETICAL FRAMEWORK

2.1 The Cash Conversion Cycle (CCC)

Working capital are the funds which are used to operate in the short term. If receivables are postponed there can be delays in payments and these could be suspended causing a situation of illiquidity for the firm.

In this context, CCC is an important tool of analysis that enables us to establish more easily why and how the business needs more cash to operate and when and how it will be in a position to refund the negotiated resources. Figure 1 illustrates the CCC.

Figure 1: The Cash Conversion Cycle (CCC)



KPMG (2005)

A business can generate losses during a number of different periods, but it cannot go on indefinitely with poor CCC management.

The activities that are directly related to CCC management are the following:

- Determining the effective number of days to collect receivables
- Determining the inventory needs
- Determining the future growth of sales

These activities must be integrated in such a way that the period of time in which the cash is not being used to fund the working capital is minimized. These three activities are carried out through the implementation of three policies: credit policy, inventory policy and cash management policy. The first policy is responsible for planning, executing, and monitoring sales growth projections.

In brief, the goal of working capital management should be to minimize the CCC without having a negative impact on the quality of its components. That is to say, it is just as bad to have a surplus of working capital as it is to have a deficit of working capital. It is worth stressing that there is no specific manual on how to manage working capital, since it depends to a very great extent on the specific circumstances of each company.

2.2 Review of the literature

Existing literature on working capital seems to have lost popularity after the glorious period of the sixties and the seventies when most of the models of working capital management were developed. Even though these models were not formulated in an integrated manner, they were a very important topic for discussion given their direct effect on the value of firms.

Due to this “gap” in the literature on the subject, only the more recent papers shall be mentioned as they are aimed at nurturing the discussion on working capital management.

Shin and Soenen (1998) investigated the relationship between CCC and the profitability of the firms for a sample of companies listed in the United States Stock Exchange during the period spanning from 1975 to 1994; they found a significant negative relationship between the value of the companies and the CCC of the same companies.

In addition to this, Shin and Soenen (1998) intended to come up with the determinants of working capital and found that its management is correlated in a positive way to firm size. They also established that industry concentration does not affect working capital management and that a greater compensation paid to the CEO of the firm definitely improves the company’s management of working capital. These results suggest that WCM has an important impact on the profitability of the firms.

Deloof (2003), in turn, carried out research on the relationship between working capital management and the performance of Belgian companies. This author used a sample of 1009 non-financial Belgian companies for the period from 1992 to 1996.

He came across a significantly negative relationship between gross profits and the average period of receivables, the average period of inventories, and average period of payables. The results suggest that the managers could create value for stockholders if they were to reduce the time periods of receivables and inventories to reasonably minimum levels. These results show that there is a certain level of working capital that maximizes the value of the firms.

Arcos and Benavides (2006) wanted to estimate the entrepreneurial efficiency of a set of companies in the non-financial sector in Colombia for the period from 2001 to 2004. The results obtained were consistent with similar studies conducted abroad in that the CCC was inversely related to the profitability of the companies when measured with respect to the level of sales.

Lazaridis and Tryfonidis (2006) conducted a statistical analysis of 131 firms in Athens for the period 2001 to 2004 and arrived at the conclusion that managers may create benefits for the companies if they manage an adequate level of CCC and maintain each one of its components at an optimal level. They also detected a negative relationship between the company's working capital and its profitability.

Vélez-Pareja and Magni (2009) carried out a study in order to determine the market perception of the use of liquidity surpluses that remain invested in cash and/or short term investments. The results confirmed the agency problem with respect to the undistributed cash by the companies. Liquidity surpluses should be distributed because if they are not, they destroy the value of firms because the market attaches greater value to the expected value of the share than the flow of dividends paid out in cash. For this reason, financial analysts should not include the variation in undistributed liquid assets as part of the cash flow of the company due to the fact the market is interested not in the potential dividend but in the cash which is actually received.

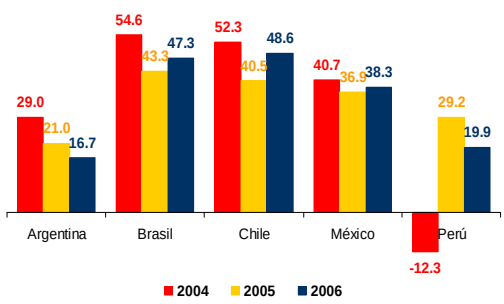
2.3 Analysis of working capital management in Latin America

Latin America has recorded a very dynamic development over the past years. It has been possible to observe high levels of sales, which reveal growth rates with two digit figures. Likewise, capital markets have become more integrated to the world markets (Mongrut and Fuenzalida, 2007).

Even though financial integration is far from being substantial, the cost of capital for investments has gone down and, as a result of this, Latin America has witnessed the entry of foreign investors with direct investments (Fuenzalida and Mongrut, 2010).

Despite the remarkable growth which Latin America has experienced, the management of average working capital has not been adequate. The evidence shows the deterioration of CCC (see Figure 2), due to several problems such as deficient collection policies and poor implementation of sales projections, among others. The results of these problems lead firms in Latin America to hold, on average, an excess of liquidity which losses the alternative return of short term investments (Lozano, Miguel and Pindado, 2002).

Figure 2: CCC in Latin America (in days)



Payne and Bustos (2008)

One sees that the CCC of Latin American companies have recorded an average increase from 36.9 days in the year 2005 to 37.6 days in 2007. In year 2006 one can see that, with the exception of Peru and Argentina, there has been an increase in CCC in Mexico, Brazil and Chile. It is also worth pointing out the high volatility of the CCC shown in the three years that are summarized in Figure No. 2.

Despite this situation, there are companies that have experienced a good working capital management, where on average the receivables period as well as the inventory turnover has decreased, while the average payables period has increased.

A comparison of the firms that have the best WCM with those firms that have an average management reveals that the gap has expanded remarkably and this is reflected in an average overinvestment in working capital of US $ 46 billion in year 2006 (Payne and Bustos, 2008).

3. Do firms in Latin America have excess of cash?

This section provides an explanation of the methodology used to find out whether the companies, on average, keep excess of cash. This section is divided in two parts; in the first part a model with two versions is introduced that will help us to find out whether firms, on average, have an excess of cash. In the second part, one describes the sample and discusses the results.

3.1 WCM and firm value

The general hypothesis upon which this section is based is that, on average, the companies in Latin American countries hold an overinvestment in working capital. Therefore, it is expected that the relationship between investment in working capital and the value of the firm is negative.

In order to find out the net effect of the investment in working capital on the value of firms, the valuation model developed by Kaplan and Ruback (1995) and followed by Kieschnick, La Plante and Moussawi (2006) is used:

$$PV_F(0) = CASH(0) + \sum_{t=1}^{\infty} \frac{CCF(t)}{(1+r)^t}$$

Where $PV_F(0)$ is the current value of the firm, $CASH(0)$ is the present value of its cash assets, and $CCF(t)$ is the capital cash flow that must be discounted at the unlevered cost of equity (r). This equation could be expressed alternatively in the following way:

$$PV_F(0) = CASH(0) + \sum_{t=1}^{\infty} \frac{OCF(t) - INV_L(t) - INV_S(t)}{(1+r)^t} \quad (1)$$

Where the firm operating cash flow OCF(t) is equal to:

$$OCF(t) = REV(t) - EXP(t) + OTH(t)$$

And where $REV(t)$ is equal to net revenues, $EXP(t)$ is equal to cost of goods sold plus administrative and selling expenses plus taxes, and $OTH(t)$ is depreciation plus amortization. $INV_L(t)$ is investment in long-term assets and $INV_S(t)$ is investment in current assets (cash balances plus account receivables plus inventory) less current operating liabilities (accounts payables and accrued expenses). However, what matters is the net operating working capital excluding cash balances. A way to account for this is to add up the present value of the cash assets "$CASH(0)$", which is equal to the present value of all cash balances:

$$CASH(0) = \sum_{t=1}^{\infty} \frac{CASH(t)}{(1+r)^t}$$

This way of defining expression (1) allows us to separate the effect of cash management from the rest of the WCM. On the basis of the previous method known as the Capital Cash Flow (CCF) Method or the Compressed Adjusted Present Value, one can obtain the first order condition to maximize the company value:

$$\frac{\delta PV_F(t)}{\delta INV_S(t)} = 0 \qquad \text{If, } \frac{\delta REV(t)}{\delta INV_S(t)} = 1$$

Hence, the company maximizes its value to the extent that a dollar invested in working capital is equal to a dollar in sales. According to Kieschnick et al. (2006), in order to analyze the relationship between the value of the firm and its WCM, one could use two versions of model (1).

3.1.1 First version

For purposes of the analysis, it is assumed that cash flows grow at a constant rate, so that model (1) may be rewritten as equation (2):

$$PV_F(t) = CASH(t) + \frac{[OCF(t+1) - INV_L(t+1) - INV_S(t+1)]}{(r-g)} \qquad (2)$$

Rewriting the equation yields:

$$PV_F(t) = CASH(t) + OCF(t+1)\left(\frac{1}{r-g}\right) - INV_L(t+1)\left(\frac{1}{r-g}\right)$$

$$- INV_S(t+1)\left(\frac{1}{r-g}\right)$$

The equation can be restated by means of the following regression model:

$$E(PV_F(t)/X) = \beta_0 + \beta_1 CASH(t) + \beta_2 OCF^*(t)$$

$$+ \beta_3 INV_L^*(t) + \beta_4 INV_S^*(t) \qquad (3)$$

Where:

$$OCF^*(t) = OCF(t)\left(\frac{1}{r-g}\right)$$

$$INV_L^*(t) = INV_L(t)\left(\frac{1}{r-g}\right)$$

$$INV_S^*(t) = INV_S(t)\left(\frac{1}{r-g}\right)$$

The marginal effect of net working capital investment is equal to:

$$\frac{\delta PV_F(t)}{\delta INV_S(t)} = \frac{\delta OCF(t)}{\delta INV_S(t)}\left(\frac{1}{r-g}\right) - \left(\frac{1}{r-g}\right)$$

$$\frac{\delta PV_F(t)}{\delta INV_S(t)} = \left[\frac{\delta OCF(t)}{\delta INV_S(t)} - 1\right]\left(\frac{1}{r-g}\right) = \beta_4$$

In this way, the optimal level of working capital is attained when β_4 is equal to zero. Besides, given that $(r-g)^{-1}$>0, if β_4<0 would mean that there is overinvestment in net working capital and if β_4>0 would mean that there is underinvestment in working capital.

3.1.2 Second version

The previous version does not establish any difference between the effect of working capital and the effect of the change in the level of cash and cash equivalents of the company. Therefore, following Kieschnick et. al (2006) equation (2) could be written as follows:

$$PV_F(t) = CASH(t) + \frac{[OCF(t+1) - INV_L(t+1)]}{(r-g)}$$

$$+ \frac{[-INV_{ns}(t+1) - INV_C(t+1)]}{(r-g)} \qquad (4)$$

In equation (4) the investment in net operating working capital is separated in two parts: the investment in non-cash working capital "$INV_{ns}(t+1)$" and the investment in cash "$INV_C(t+1)$". In this way, it will be possible to identify the effect of investment in cash.

Rewriting the above equation yields:

$$PV_F(t) = CASH(t) + OCF(t+1)\left(\frac{1}{r-g}\right)$$

$$- INV_L(t+1)\left(\frac{1}{r-g}\right) - INV_{ns}(t+1)\left(\frac{1}{r-g}\right)$$

$$- INV_C(t+1)\left(\frac{1}{r-g}\right)$$

Using the regression version of the model:

$$E(PV_F(t)/X) = \beta_0 + \beta_1 CASH(t) + \beta_2 OCF^*(t)$$

$$+ \beta_3 INV_L^*(t) + \beta_4 INV_S^*(t) + \beta_5^* INV_C^*(t) \quad (5)$$

Where:

$$OCF^*(t) = OCF(t)\left(\frac{1}{r-g}\right)$$

$$INV_L^*(t) = INV_L(t)\left(\frac{1}{r-g}\right)$$

$$INV_S^*(t) = INV_{nS}(t)\left(\frac{1}{r-g}\right)$$

$$INV_C^*(t) = INV_C(t)\left(\frac{1}{r-g}\right)$$

The marginal effect of investment in net working capital is equal to:

$$\frac{\delta PV_F(t)}{\delta INV_S(t)} = \frac{\delta OCF(t)}{\delta INV_S(t)}\left(\frac{1}{r-g}\right) - \left(\frac{1}{r-g}\right)$$

$$\frac{\delta PV_F(t)}{\delta INV_S(t)} = \left[\frac{\delta OCF(t)}{\delta INV_S(t)} - 1\right]\left(\frac{1}{r-g}\right) = \beta_4$$

In the regression of the second version, the coefficients β_4<0 and β_5<0, are interpreted as overinvestment in working capital and in cash, respectively.

The prior specifications will be estimated using firm level data. Therefore, the final specifications of equations (3) and (5) are the following ones:

For equation (3):

$$PV_F(i,t) = \beta_0 + \beta_1 CASH(i,t) + \beta_2 OCF^*(i,t)$$

$$+ \beta_3 INV_L^*(i,t) + \beta_4 INV_S(i,t) + \mu(i,t)$$

For equation (5):

$$PV_F(i,t) = \beta_0 + \beta_1 CASH(i,t) + \beta_2 OCF^*(i,t)$$

$$+ \beta_3 INV_L^*(i,t) + \beta_4 INV_S^*(i,t) + \beta_5 INV_C^*(i,t) + \mu(i,t)$$

Where sub-index "i" indicates the different firms by country and sub-index "t" indicates the period.

Table 1 shows the proxies that one uses to calculate the variables to run the regression models (3) and (5).

Table 1: Proxies to estimate the variables of the models 3 and 5

MVF(t)	**Firm value**	*Market capitalization + Total Debt + Cash*
CASH(t)	**Cash**	*Cash + Cash equivalents*
OCF(t)	**EBIDTA**	*EBIT + Depreciation and Amortization*
INV_L(t)	**CAPEX**	*Change in gross fixed assets*
INVS(t)	**Working capital**	*Current Assets – Current operating Liabilities*
INV_C(t)	**Cash**	*Cash Differential*

Source: Authors

3.2 Sample and results

This study included information of non-financial companies from Argentina, Brazil, Chile, Mexico and Peru for the period 1996-2008. One has excluded Colombia and Venezuela due to the high volatility of the necessary data required for the study.

The information about the companies was obtained from the financial databases "Economatica" and "Bloomberg" and in certain cases it was completed with public information available at the stock exchanges of the corresponding countries.

For example, in the case of Peru, the information contained in the mentioned databases was complemented with information provided by the Lima Stock Exchange. In some cases, some companies were dropped from the sample given the high volatility of their data.

In the case of Brazil, there was a smaller amount of data than for the other countries because information on investments in fixed assets was available only from the year 2004 onwards.

In the five countries analyzed, the firms that had very scarce information were also left out of the analysis. This is the reason why the number of companies per country differs throughout the years. Table 2 (see Appendix) summarizes the number of firms analyzed in each quarter. Only in the case of Chile is the number of firms the same during the study period. Nevertheless, the companies selected are the most representative of the Stock Exchanges in each country by market capitalization.

The methodology used to estimate equations 3 and 5 was based on unbalanced Panel data model given that in some cases no information was available for any firms in certain years. The next issue was to choose the proper estimation method for the models. Initially pool estimation was considered with ordinary least squares, but the high remaining volatility of the financial data rendered the mean of the sample unrepresentative.

Hence, we decide to use a regression per each quantile which is a non parametric estimation with respect to the median, not with respect to the mean of the dependent variable. Furthermore, in the later estimation any problem of heteroskedaskicity that could arise as information is grouped by quantiles can also be corrected

Table 3 (see Appendix) shows the results from estimating the two versions of the first model (equations 3 and 5) with the nonparametric methodology. The first observation is that in the five countries studied the EBITDA and the investments in fixed assets are positively related with the dependent variable, which suggests that additional EBITDA and investments in fixed assets would generate an increase in the value for most of the companies.

According to the results, the firms operating in Peru are the only ones that clearly are managing their working capital well. Chile is in a process of improvement, but in the cases of Argentine, Brazil and Mexico the hypothesis of overinvestment in working capital is verified.

Furthermore, it is important to note that the effect of overinvestment in cash and cash equivalents is verified in three of the countries studied (Brazilian companies could also be included because they have overinvestment in working capital). This is consistent with the results obtained by Vélez and Magni (2009) where the same problem arose with respect to funds undistributed by the firms.

4. Determinants of the CCC

It is important to identify which factors could have an effect in the cash conversion cycle (CCC). To accomplish this goal, this section is divided in two parts: in the first part one explains the model to identify the factors and in the second part one describes the sample and explains the results.

4.1 Model for the CCC

The investment in working capital that an industrial company may have is quite different to that of a services company. Because of this, it is important to analyze the average working capital by industry.

A positive relationship between the level of working capital of the industry and the level of working capital of the company is expected to be found (Hawawini, Viallet and Vora, 1986).

The size of the company is an important variable when it comes to establishing a working capital policy. In principle, larger sized companies ought to have a greater working capital given their higher sales.

Despite this, larger sized companies may also have a better relationship with their suppliers and in this way it is expected that they should maintain a lower investment in working capital. Therefore, the effect that the size of the company may have on its working capital is uncertain.

The proportion of tangible assets that is accounted for by fixed assets exerts an impact on the working capital and it differs across companies. For example, the inventory problems of a manufacturer of parts for motorcars will differ from those of a manufacturer of software. Added to this, the problems of accounts receivable that these two companies may have will be different. It is expected that companies that are more capital intensive may need to decrease their working capital.

A firm's sales expectations have an influence on the investment in working capital (Nunn, 1981), and they will also affect the CCC because if a firm anticipates the growth of its sales, it is quite likely that it may increase the investment in inventories. As a result, it is likely that the firm may also increase the use of loans.

Country risk is a variable which is expected to have a significant impact on CCC. Country risk is being measured with an index called "Emerging Markets Bond Index (EMBI)" that indicates the risk premium that international investors must charge for investing in debt issued by public and private companies.

In the face of a lower country risk, companies will increase their short and long term investments issuing debt because the risk premium they will have to pay is smaller.

Finally, Kieschnick et al. (2006) argue that the market power of the company allows it to have better relationships with its suppliers and clients providing it with advantages over its competitors. Hence, the more concentrated the industry, the greater the company's influence will be over its CCC.

The following model (Kieschnick et al., 2006) allows us to identify how the aforementioned factors affect the company working capital. In this case, the dependent variable will be the cash conversion cycle (CCC).

$$CCC(i,t) = \beta_0 + \beta_1 ACCC(i,t) + \beta_2 SIZE(i,t)$$

$$+ \beta_3 PTA(i,t) + \beta_4 FSG(i,t+8) + \beta_5 HHI(i,t)$$

$$+ \beta_6 EMBI(t) + \mu(i,t) \qquad (6)$$

Where sub-index "i" indicates the different companies in each country and the sub-index "t" indicates the period.

Table 4 shows the proxies used to calculate the variables to run the regression model in equation 6.

Table 4: Determinants of the Cash Conversion Cycle (CCC)

CCC	***Cash conversion cycle***	*Average collection period + Average period of inventories + Average payable period*
ACCC	***Average Industry CCC***	*Average of cash conversion cycle of the companies belonging to the same industry*
SIZE	***Firm size***	*Logarithm of sales*
PTA	***Proportion of tangible assets***	*Ratio of tangible fixed assets (property, plant, machinery and equipment, among others) / Total assets*
FGS	***Future sales***	*Percentage growth of sales from two years in the future*
HHI	***Herfindahl-Hirschman Index***	*Ratio of firm's sales / Industry's total sales*
EMBI	***Country risk***	*EMBI of the country*

Source: Authors

4.2 Sample and results

In order to estimate the second model, non-financial firms were analyzed in Brazil, Chile, Mexico and Peru for the period 1998-2008. In this case Argentina was excluded from the analysis because the Buenos Aires Stock Exchange didn't provide a distribution of companies by industry. Besides, some key information for building the explanatory variables was not found. For the remaining cases, the industrial variables were constructed on the basis of the industry classification given by each country's stock exchange.

Again the data was obtained from Economatica and Bloomberg and the companies selected are the most representative ones within each stock exchange according to their market capitalization.

The model to estimate was again an unbalanced panel data model since information was not available for all companies in all years. The necessary corrections for autocorrelation were also made.

Wooldridge (2002) developed a very flexible test in which the lack of autocorrelation is the null hypothesis of this test. If this test is rejected, one may suspect the presence of autocorrelation. This test was applied to each one of the countries studied, and only in the case of Mexico was there a problem of this type.

The other problem to be dealt with was heteroskedasticity. For the purposes of this paper, one applies Wald's modified test of Wald for heteroskedasticity, as this test operates even when the assumption of normality with respect to the errors is not fulfilled.

The null hypothesis of this test is that this problem $\sigma_i^2 = \sigma^2$ does not exist for all the i=1…N, where N is the number of companies. When this null hypothesis is rejected, a problem of heteroskedasticity exists. Once again, the test was applied to the countries selected and this problem was found in the four countries.

Once the problems mentioned earlier were identified, adequate solutions were implemented in each case. In the case of Brazil, Chile and Peru feasible generalized least squares estimators were used because they only presented heteroskedasticity. In the case of Mexico, which also presented the autocorrelation problem, one used the *Prais-Winsten regression* for an unbalanced panel data model.

Table 5 (see Appendix) shows the results of estimating equation 6. In two of the four countries analyzed the market power of the companies seems to not play an important role in the CCC. This is due to a very high correlation between the size of the company and the Herfindahl-Hirschman index (not reported). Therefore, by including the variable size both effects are captured.

In this sense, it can be stated that market power is a variable that affects CCC as long as the firm is large. This result suggests that to the extent that a big company has greater market power, it will have a lower CCC.

The results show that the size of the company has a significantly negative relationship with the CCC because they may have better relationships with their suppliers. In addition to this, larger firms in Latin America are subject to less financing restrictions since they have a greater access to the financial market at lower financial costs than their smaller counterparts.

The practices adopted by the industry also determine the working capital policy. In all countries the average industry CCC is significant and has a positive relationship with the company's CCC, which means that companies try to stay close to industry policy. The expectation of sales growth is positively associated with the company's CCC. As a rule, companies increase their investment in inventories whenever they anticipate a growth in their sales.

Although it was not significant in three of the four countries, country risk is an important variable in Brazil because in those countries where a lower country risk is faced, company uncertainty with respect to market behavior is lower and consequently the investment in working capital increases and the CCC increases.

Finally, the results show that the companies which are more intensive in tangible assets seek to reduce the investment in working capital, which means that their CCC will decrease too.

4. CONCLUSIONS

The initial hypothesis was that Latin American companies had recorded an overinvestment in working capital during the last decade given their short term investment horizon. In order to verify this hypothesis, two versions of the first model were analyzed. As a result, one could verify this overinvestment hypothesis in three out of the five countries studied (Brazil, Chile and Mexico). However, in the two remaining countries, only in the case of Peru can it be argued clearly that there is evidence of an improvement in WCM.

Given the importance of WCM, a second model was studied to find out the determinants of the companies' CCC. The results show that the CCC is negatively correlated with firm size and positively correlated with the industry concentration index, which suggests that Latin American companies are using market power to reduce their CCC.

Similarly, practices adopted by the industry are very important in determining the companies' level of working capital. It was also verified that companies tend to invest in working capital when they anticipate a sales growth and companies in Brazil invest more in working capital whenever there is a lower country risk following in this way a window opportunity as it is also the case with the Initial Public Offerings issued by Latin American companies (Mongrut, Valenzuela and Garay, 2009).

On the basis of these results and the empirical evidence obtained in prior studies it can be argued that it is necessary to conduct a more exhaustive follow-up study of the working capital policy in Latin American companies in order to formulate a strategy to help companies avoid the chronic problem of overinvestment that could destroy their firm's value.

To this end, Anand and Gupta (2002) made a proposal to develop a monthly report of the main ratios that are part of the CCC and make a ranking of the companies by sectors. This type of ranking could foster financial managers to keep their level of working capital within reasonable bounds.

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Appendix

Table 2: Number of companies studied in each country to estimate versions 1 and 2 of the first model.

This table shows the number of companies analyzed in each country to compute equations 3 and 5.

Date	Companies				
	Argentine	Brazil	Chile	Mexico	Peru
1Q1996	61	51	33	70	45
2Q1996	61	52	34	72	46
3Q1996	61	52	35	76	48
4Q1996	63	52	38	76	48
1Q1997	63	52	38	77	52
2Q1997	63	52	38	77	52
3Q1997	64	52	38	77	52
4Q1997	64	59	38	78	54
1Q1998	64	71	38	78	55
2Q1998	65	72	38	78	56
3Q1998	69	73	38	78	56
4Q1998	75	75	38	78	56
1Q1999	76	76	38	78	56
2Q1999	76	77	38	79	56
3Q1999	76	77	38	80	57
4Q1999	78	77	38	80	57
1Q2000	78	77	38	81	57
2Q2000	78	77	38	81	58
3Q2000	78	77	38	81	58
4Q2000	78	77	38	83	58
1Q2001	78	77	38	83	59
2Q2001	78	77	38	83	60
3Q2001	78	77	38	83	60
4Q2001	80	79	38	84	60
1Q2002	80	79	38	84	60
2Q2002	80	79	38	84	60
3Q2002	80	79	38	85	60
4Q2002	80	79	38	85	60
1Q2003	80	79	38	85	60
2Q2003	80	79	39	85	60
3Q2003	80	79	39	85	60
4Q2003	80	81	39	85	60
1Q2004	80	81	39	85	61
2Q2004	80	81	39	85	61
3Q2004	80	81	39	86	61
4Q2004	82	81	40	88	62
1Q2005	82	81	41	88	62
2Q2005	82	81	41	88	62
3Q2005	82	81	41	89	64
4Q2005	82	81	41	89	64
1Q2006	82	81	41	89	64
2Q2006	82	81	41	89	64
3Q2006	82	81	41	89	64
4Q2006	82	81	41	89	64
1Q2007	82	81	41	89	64
2Q2007	82	81	41	89	64
3Q2007	82	81	41	89	64
4Q2007	82	81	41	89	64
1Q2008	82	81	41	89	64

Table 3: Excess of cash in Latin American Companies

These are the results of estimating equations 3 and 5. PVF(t) is the dependent variable and represents the value of the firm at time t, calculated as the stock exchange capitalization, less Total Debt, plus Cash . CASH(t) represents the level of accumulation of cash and cash equivalents of the company in time t. OCF(t) represents the firm's EBITDA of year t. INVL (t) represents the investment in fixed assets made during year t. INVS (t) represents the investment in net working capital, where net working capital is defined as current assets minus current operating liabilities (period t minus t-1) and less cash (equation 5). INVC (t) represents the investment made in cash and in cash equivalents during the year t. The nonparametric technique used is the regression by quantiles.

	Equation 3					Equation 5				
	Peru	Chile	Mexico	Argentine	Brazil	Peru	Chile	Mexico	Argentine	Brazil
Obs.	1045	1274	3230	2267	270	1045	1272	3226	2259	285
_cons	12543.99 0.00	-7819.93 0.00	13866.0 0.00	2283.67 0.05	450000000 0.00	10161.6 0.00	-9352.62 0.00	79.19 0.97	-5952.2 0.03	553000000 0.00
CASH(t)	0.5313 0.00	1.1841 0.00	1.0928 0.00	1.8793 0.00	-8752.2 0.00	0.71792 0.00	1.27674 0.00	0.98926 0.00	2.24289 0.00	-16825.3 0.00
OCF(t)	16.0681 0.00	31.6181 0.00	20.7797 0.00	19.0132 0.00	20005.6 0.00	16.3092 0.00	31.6668 0.00	21.0234 0.00	18.4016 0.00	35736.3 0.00
INVS(t)	4.4161 0.00	0.2512 0.00	-0.3079 0.00	0.3134 0.00	-9295.52 0.00	4.22492 0.00	-0.4716 0.00	-0.06469 0.00	-0.0635 0.01	-3294.03 0.06
INVL(t)	3.6942 0.00	10.5606 0.00	12.7767 0.00	5.2757 0.00	2188.73 0.00	3.13174 0.00	10.7696 0.00	12.3064 0.00	5.75019 0.00	2053.09 0.08
INVC(t)						0.62336 0.00	1.17636 0.00	-1.6006 0.00	-1.6784 0.00	
Pseudo R2	0.5498	0.605	0.6522	0.7149	0.3737	0.5553	0.6069	0.6537	0.7185	0.3191

Note: P-values below each coefficient

Table No. 5: Determinants of Cash Conversion Cycle (CCC) in Latin American Companies

These are the results of estimating equation (6). CCE stands for the *cash conversion cycle (CCC)*, defined as the sum of the average period of collection with the average period of inventory, less the average period of payment. A*CCC stands for the average cash conversion cycle* of the industry, considering the industries detailed by the Stock Exchanges of each country. *FGS* represents the rate of growth of the sales for the two following years (eight quarters). *PTA* represents the tangibility of the fixed assets of the company, as the company is more intensive in fixed assets this variable is closer to 1. SIZE stands for the logarithm of sales of the company. *HHI* represents the concentration of industry and *EMBI* represents country risk.

	Peru	Brazil	Chile	Mexico
	GLS	GLS	GLS	PWR
Obs.	2418	2738	1201	2897
Number firms	79	77	35	88
Prob>chi2	0	0	0	0
Log-Likelihood	-13552.12	-13746.64	-6514.728	0
R-sq				0.4087

CCC	GLS	GLS	GLS	PWR
ACCC	0.54	0.74	0.62	0.65
p-value	0.00	0.00	0.00	0.00
FGS(t+8)	7.75	15.33	14.66	36.18
p-value	0.00	0.00	0.00	0.00
PTA	-78.42		-68.67	-56.31
p-value	0.00		0.00	0.00
SIZE	-19.33	-1.68	-17.75	-52.37
p-value	0.00	0.00	0.00	0.00
HHI	61.62	29.00	115.40	148.73
p-value	0.679	0.00	0.00	0.134
EMBI	-0.003	-0.01	-0.02	-0.02
p-value	0.513	0.00	0.286	0.197
cons	266.12	39.48	227.08	684.20
p-value	0.00	0.00	0.00	0.00

std. Err.				
ACCC	0.0226	0.0247	0.0387	0.0674
FGS(t+8)	2.1519	1.8889	3.0399	3.3569
PTA	5.2676		3.9586	15.6962
SIZE	1.1727	0.4987	0.9141	5.9116
HHI	14.3983	3.8957	10.9063	33.6259
EMBI	0.0041	0.0013	0.0202	0.01398
cons	12.7108	7.0651	9.8438	71.0945

Notes:

GLS: Generalised Least Squares
PWR: Prais-Winsten Regression