



Cash conversion cycle and firm's performance of Japanese firms

Cash conversion
cycle

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Abstract

Purpose – The purpose of this paper is to investigate the relation between a firm's cash conversion cycle and its profitability.

Design/methodology/approach – The relation between the firm's cash conversion cycle and its profitability is examined using dynamic panel data analysis for a sample of Japanese firms for the period from 1990 to 2004. The analysis is applied at the levels of the full sample and divisions of the sample by industry and by size.

Findings – A strong negative relation between the length of the firm's cash conversion cycle and its profitability is found in all of the authors' study samples except for consumer goods companies and services companies.

Originality/value – Traditional focus in corporate finance was on the long-term financial decisions, particularly capital structure, dividends, and company valuation decisions. However, the recent trend in corporate finance is the focus on working capital management. Most of working capital management literature is based on the US experience. This study investigates the relation between the firm's cash conversion cycle and its profitability of Japanese firms where the organizational structure is totally different from that of the US firms; most of the Japanese firms are interconnected and related through corporate groups (*keiretsu*).

Keywords Japan, Organizational performance, Working capital, Cash conversion cycle, Return on investment

Paper type Research paper

1. Introduction

The traditional focus in corporate finance was on the long-term financial decisions such as capital budgeting, capital structure, and dividends. However, the interest in working capital management has increased during the last two decades (Lyroudi and Lazaridis, 2000), and both academics and financial officers are showing more interest in working capital management. For example, Dell and Wal-Mart declare that their working capital management practices are an important source of their competitive advantage (Ruback, 2003). One good example about the importance of the efficiency of a corporation's working capital management is given by Shin and Soenen (1998). They point out that Wal-Mart and Kmart had similar capital structures in 1994, but Kmart had a cash conversion cycle of roughly 61 days while Wal-Mart had a cash conversion cycle of 40 days. Probably for that reason, Kmart faced an additional \$198.3 million per year in financing expenses. Such evidence demonstrates that Kmart's poor management of its working capital contributed to its bankruptcy (Moussawi *et al.*, 2006).



Efficiency of working capital management is based on the principle of speeding up collections as much as possible and slowing down disbursements as much as possible. This working management principle, based on the traditional concepts of the cash conversion cycle introduced by Richards and Laughlin (1980), is a powerful performance measure for assisting how well a company is managing its working capital. Gentry *et al.* (1990) argue that a short cash conversion cycle is indirectly related to firm's value. A short cash conversion cycle indicates that the firm is collecting the receivables as quickly as possible and delaying the payments to suppliers as much as possible. This leads to relatively high net present value of cash flow and relatively high firm value.

Cash conversion cycle definitions are not constant. For example, Stewart (1995) defines a cash conversion cycle as a composite metric describing the average period of time needed to turn a dollar invested in raw materials into a dollar collected from a customer. Besley and Brigham (2005) describe a cash conversion cycle as the average length of time from the payment for the purchase of raw materials to until the collection of receivables associated with the sale of the product.

A shorter cash conversion cycle could be associated with high profitability because it improves the efficiency of using the working capital. A short cash conversion cycle indicates that the company manages and processes inventory more quickly, collects cash from receivables more quickly, and slows down cash payments to suppliers. This increases the efficiency of internal operations of a firm and results in higher profitability, higher net present value of cash flows, and higher market value of a firm (Gentry *et al.*, 1990). The cash conversion cycle can be shortened by reducing the time that cash is tied up in working capital. This could happen by shortening the inventory conversion period via quicker processing and selling goods to customers, or by shortening the receivable collection period via speeding up collections, or by lengthening the payable deferral period via slowing down payments to suppliers. On the other hand, shortening the cash conversion cycle could harm the firm's operations and lead to poor performance. Reducing the inventory conversion period could increase the shortage cost and make the companies lose their good credit customers, and lengthening the payable period could damage the firm's credit reputation.

The cash conversion cycle is a useful way of assessing the liquidity of a firm, especially for small companies that are usually operated with fewer financial resources, compared to larger companies that have better access to both money and capital markets. Shortening the cash conversion cycle could be one important source of financing for small firms.

The purpose of this paper, therefore, is to investigate the relation between the length of cash conversion cycle and firm profitability for a sample of 34,771 firm years covering the period 1990-2004 for Japanese non-financial firms listed on the Tokyo Stock Exchange, and to examine the relation between the length of the cash conversion cycle and the firm's profitability for different firm sizes and for firms from different industries.

The rest of the paper is organized along the following lines. The next section discusses the theoretical framework for the study. Section 4 reviews the existing literature, Section 5 discusses the context of Japanese firms, Section 6 discusses the results, and, finally, Section 7 concludes the paper.

2. Theoretical framework

Efficient working capital management of business firms includes freeing up cash from inventory, accounts receivable, and accounts payable. By managing these components

effectively, companies can reduce their dependence on expensive external funding sources. This will increase the efficiency of using working capital components and lead to more profitability and creating more market value.

The cash conversion cycle is the most popular measure of the efficiency of working capital management. The cash conversion cycle is calculated as $(\text{accounts receivables/sales}) \times 365 + (\text{inventories/cost of goods sold}) \times 365 - (\text{accounts payable/cost of goods sold}) \times 365$. It shows the average length of time between expenditure for the purchase of raw materials and the collection of cash from receivables. So, the longer this time lag, the larger the investment in working capital.

Shortening the cash conversion cycle leads to high profitability because it improves the efficiency of using the working capital. The cash conversion cycle can be shortened by reducing the time that cash is tied up in working capital. This could happen by shortening the inventory conversion period via processing and selling goods to customers more quickly, or by shortening the receivable collection period via speeding up collections, or by lengthening the payable deferral period via slowing down payments to suppliers. This increases the efficiency of internal operations of a firm and results in higher profitability, higher net present value of cash flows, and higher market value of a firm (Gentry *et al.*, 1990).

Working capital management is examined from two distinct dimensions: static or dynamic views (see Lancaster *et al.*, 1999; Farris and Hutchison, 2002; Moss and Stine, 1993). The static inspection is based on commonly used traditional liquidity ratios, such as current and quick ratios, calculated from data obtained from the balance sheet figures. These ratios measure liquidity at a given point in time, whereas dynamic inspection measures ongoing liquidity from the firm's operations. The cash conversion cycle is a dynamic measure of the time between paying cash for raw materials and collecting cash from receivables.

3. Literature review

In this section, the researchers review the existing literature on the link between the length of cash conversion cycle (as a dynamic measure of working capital management) and firm's profitability. Most of the results of studies that empirically examined the relationship between cash conversion cycle and profitability showed a significant and negative relationship.

The results of a study by Deloof (2003) showed significant and negative relationships between cash conversion cycle and profitability of Belgian firms. Shin and Soenen (1998) also reported significant negative relationship between net trade cycle and profitability for US firms. ALShubiri (2011) argues that funds committed to working capital can be seen as hidden sources that can be used for improving firm's profitability. The results of the study of Karaduman *et al.* (2011) showed significant and negative relationship between the cash conversion cycle and profitability measured by return on assets of companies listed on Istanbul Stock Exchange.

Sensitivity of working capital management to market imperfections such as asymmetric information, agency conflicts or financial distress was examined by Caballero *et al.* (2010). Their results showed that the working capital competes with investment in fixed assets for the funds of the firms when it has financial constraints. Their findings also showed that working capital management depends on bargaining power and other financial factors such as the availability of internal finance, cost of financing, and access to capital markets. Uyar (2009) examined the relationship among the cash conversion cycle, size and profitability for firms listed on Istanbul Stock

Exchange. The results showed significant negative correlation between the cash conversion cycle and profitability, as well as between the cash conversion cycle and firm size. The results also showed a shorter cash conversion cycle of the retail/wholesale industry than that of manufacturing industries.

The effect of aggressive working capital policy on financial ratios was examined by Boisjoly (2009), who found that cash flow per share significantly improved due to aggressive management of working capital and that productivity increased. The relationship between profitability and working capital management for firms listed on the Athens Stock Exchange was examined by Lazaridis and Tryfonidis (2006). The results showed significant relationship between operational profitability and the cash conversion cycle, the results also showed that executives can increase profitability of their firms by correctly handling the individual components of working capital to an optimal level.

This paper aims at contributing to our knowledge by studying the cash conversion cycle and its relation to firm performance in a different context, Japan. As the Japanese business environment is relatively different from that of other top economies of the world, it is interesting to examine whether the characteristics of the Japanese firm might have an effect on their cash conversion cycle and therefore their profitability.

4. The organization of Japanese firms

In this paper, the researchers investigate the relation between the length of the cash conversion cycle and firm profitability for a sample of 2,123 Japanese non-financial firms listed on the Tokyo Stock Exchange for the period 1990-2004.

The Tokyo Stock Exchange is among the largest stock exchanges in the world. Japan is a developed nation with a well-diversified economy that relies on advanced technology which makes Japan among the top largest economies in the world. Japanese firms' organizational structure is totally different from that of US firms and the rest of the world, after Second World War, "keiretsu" spread into financial institutions in Japan. "Keiretsu" is a unique Japanese form of corporate organization. A "keiretsu" is a grouping or family of affiliated companies that form a tight-knit alliance to work toward each other's mutual success. The "keiretsu" system is also based on a close partnership between government and businesses. It is an intricate web of relationships that links banks, manufacturers, suppliers, and distributors with each other and with the Japanese government (see www.searchcio-midmarket.com). The banking system and the role of banks in Japan are different than it is in the USA; "keiretsu" grouping is unique because of the typical role played by Japanese banks in these organizations. At the core of each "keiretsu" group is a large and a powerful bank. The role of these banks, in addition to being stockholders, is to participate in the financing of the "keiretsu" member firms. Unlike in the USA – where the Glass-Steagall Act prohibits US banks from holding stock interest in US firms, it is legal in Japan for Japanese banks to hold ownership interest in the Japanese corporations (Ouanlous and Philippatos, 1999). This makes working capital management of firms operated in Japan different than the firms operated in the USA and most of the rest of the world. With a different organizational structure of firms between Japan and other countries, it would be instructive, therefore, to examine working capital management and its impact on corporate profitability in Japan.

5. Data and methodology

The data set in this study was obtained from the DataStream & World Scope. It includes yearly data of sales, cost of good sold, receivables, payables, inventory, and

return on investment. These data are used to calculate the receivable collection period, the inventory conversion period, the payable deferral period, and the cash conversion cycle. The data includes all non-financial firms listed on the Tokyo Stock Exchange. Some firms with missing data are excluded from the sample. The final sample contains 34,771 firm years covering the period 1990-2004.

While the study period (1990-2004) is arguably relevant by itself to merit useful findings and conclusions for this study, the researchers were limited by being unable to access data for the years after 2004. However, given that the 1990-2004 period is arguably long enough, data from the years 2005-2007 might be unlikely to cause significant differences to the results of this study. Data from the years 2008-2010 may possibly be relatively different, due to the global financial crisis. However, in this case, had the researchers had access to such data, they might probably have considered them as outlier years and excluded them from the study sample or analyzed them independently from the rest of the data.

To investigate the relationships between the study variables, the researchers use a generalized method of moment system estimation (GMM) applied to dynamic panel data. The researchers used this estimation for the following reasons: first, the dependent variables are likely to be measured using annual data, and it seemed desirable to use a dynamic specification to allow for it, and second, there is a possibility of unobserved province-specific effects correlated with the regressors, and it seemed desirable to control for such effects. De Grauwe and Skudenly (2000) mention that the lagged-dependent variable in the dynamic panel data estimation catches up some of the effects of omitted variables varying over time, so it helps to correct for autocorrelation. The GMM applied in this study is proposed by Arellano and Bover (1995) and Blundell and Bond (1998), who have shown in Monte Carlo estimations that the estimators behave better than the GMM difference estimators proposed by Arellano and Bond (1991) for the short sample period and for variables persistent over time. Roodman (2005) mentioned that the Arellano-Bond estimators have one and two-step variants. He argued that the two-step estimate of the standard errors tends to be severely downward biased. Therefore, the researchers apply the finite sample correction for the asymptotic variance of the two-step GMM estimator (see Windmeijer, 2005). This estimation approach leads to the following estimation equation:

$$roi_{it} = \alpha + \beta_1 roi_{it-1} + \beta_2 ccc_{it} + \varepsilon_{it} \quad (1)$$

where (roi_{it}) is the first difference return on investment.

Existing literature that examined the relationship between the efficiency of working capital management and corporate profitability used different profitability measures. For example, Shin and Soenen (1998) applied operational measures of profitability such as operating income plus depreciation divided by total assets, and operating income plus depreciation divided by net sales. Deloof (2003) applied two profitability measures: net operating income divided by total assets minus financial assets, and gross operating income to total assets minus financial assets. Net operating income is sales minus costs of goods sold, including depreciation and amortization. Gross operating income is net operating income plus depreciation and amortization. Deloof (2003) argues that financial assets are a significant part of total assets, which are mainly shares in other firms. This is the reason why return on assets is not considered as a measure of profitability. Other studies, such as Samiloglu and Demirgunes (2008) and Karaduman *et al.* (2011), applied return on assets as a measure of profitability in

analyzing the effect of the efficiency of working capital management on profitability for Turkish firms. However, Schilling (1996) argued that return on investment is the more appropriate measure of profitability, compared with other profitability measures, when dealing with working capital management. According to Schilling (1996), it is critical to allocate resources between working capital and capital investment. Since the return on investment is usually less than the return on capital investment, allocating resources on working capital, as much as to maintain optimal liquidity position, is necessary. Following the study of Schilling (1996), the return on investment is used as a profitability measure in our study.

The exploratory variables in our model include the differenced lagged dependent variable (roi_{it-1}) and the first difference of cash conversion cycle (ccc_{it}). The cash conversion cycle is simply calculated as (Receivable collection period + Inventory conversion period – Payable deferral period). The receivable collection period measures the average number of days from the sale of goods to collection of resulting receivables. It is calculated as [(accounts receivable/sales) $\times$ 365]. The inventory conversion period is the length of time on average needed for converting raw materials into finished goods and selling these goods. It is calculated as [(inventory/cost of good sold) $\times$ 365]. The payable deferral period is the average length of time needed to purchase goods and pay for them. It is computed as [(accounts payable/cost of goods sold) $\times$ 365]. In this study, the researchers hypothesize that shortening the length of the cash conversion cycle improves the company's performance. This means that the coefficient of the cash conversion cycle should be significant and negative.

6. Empirical results

In this section, the researchers present their estimation results concerning the effect of the length of the cash conversion cycle on corporate performance. The estimated coefficients based on Equation (1) are reported in Table I. The results show that the length of the cash conversion cycle (ccc_{it}) had a significant and negative impact on the companies' performance, measured by return on investments (roi_{it}) for the full sample and for all the sub-samples, except for consumer goods and services companies, where the coefficients of the cash conversion cycle are negative and insignificant. This indicates that shortening the cash conversion cycle by reducing the time that cash is tied up in working capital and by speeding up collections results in high return on investments (roi_{it}). These results are consistent with the results of the existing working capital management literature such as (Deloof, 2003) and (Shin and Soenen, 1998).

Results of the lagged return on investments (roi_{it-1}) indicate that the company's performance in the previous period has a strong positive effect on the company's performance in the current period for the full sample and for all the sub-samples of the study except small companies, where the coefficient is positive and insignificant, and for basic industries and information companies where the coefficients are significant and negative.

The first objective of our study was to explore the relation between the cash conversion cycle and firm profitability, measured by the return on investment. Our results indicated that there is a significant and negative relationship between the cash conversion cycle and return on investment. The firms with shorter cash conversion cycles are more likely to be profitable than firms with longer cash conversion cycles. A possible explanation to this finding is that when the cash conversion cycle is relatively shorter, the firm may not need external financing, which results in incurring less borrowing cost and interest expense, hence increasing profitability (see Uyar, 2009).

Study samples	LROI	Exploratory variables		Cash conversion cycle
		CCC	Constant	
Full sample	0.1082179**	−0.0082981**	−0.3242791**	
Small size	0.0253326	−0.0038462*	−0.4712807**	
Medium size	0.099843**	−0.0116027**	−0.3606753**	
Large size	0.2328998**	−0.0108979**	−0.1846034**	
Basic industries ^a	−0.0234192**	−0.0078771**	−0.5024529**	
General industries ^b	0.2412124**	−0.0214374**	−0.2476479**	
Consumer goods ^c	0.4129598**	−0.0047878	−0.0785687**	
Services ^d	0.1024312**	−0.0010285	−0.2882625**	
Information technology ^e	−0.0782775**	−0.0216819**	−0.4640247**	

Notes: The results of Arellano-Bond dynamic panel-data two-step GMM system estimation for the relationship between the cash conversion cycle and firm's performance for an unbalanced sample of 2,318 Japanese non-financial firms listed in the Tokyo Stock Exchange, for the period 1990-2004 (34,770 firm-year observation). The dependent variable and the independent variables are in the form of first difference. ROI is the dependent variable of return on investment. The exploratory variables are LROI, is the lagged return on investment, and CCC, is the cash conversion cycle. The analysis includes the results for the full sample and all the sub samples that includes three size levels and five industries:

^aBasic industries include "mining," "oil and gas," "chemicals," "construction and building materials," "forestry and papers," and "steel and other metals." ^bGeneral industries includes "aerospace and defense," "diversified industries," "electronic and electrical equipment" and "engineering machinery."

^cConsumer goods consists of "automobiles and parts," "household goods and textiles," "beverages," "food producers and processors," "health," "personal care and household products," "pharmaceuticals and biotechnology" and "tobacco." ^dServices include "general retailers," "leisure," "entertainment and hotels," "media and photography," "support services," "transport," "food and drug retailers," "telecommunication services," "electricity," "gas distribution" and "water." ^eInformation technology includes "information technology hardware" and "software and computer services." *Significant at 95 percent confidence level; **significant at 99 percent confidence level

Table I.
Two-steps results of GMM system estimation for the relationship between the cash conversion cycle and firm's performance

Another important aim of our study was to examine the relationship between the cash conversion cycle and profitability for corporations of different size levels. The results show that shorter cash conversion cycle is associated with high profitability for firms of all size levels. Existing literature showed that the relationship between working capital management and profitability is stronger in small size firms, because small firms have limited access to bank loans (Moss and Stine, 1993). However, the negative and significant relationship between cash conversion cycle and profitability for all size levels of Japanese firms could be interpreted by the unique financial and institutional system in Japan, where firms have stronger relationships with the bank inside their "keiretsu" group. Therefore, the Japanese organization of firms arguably probably has some effect on firms' cash conversion cycle and profitability by eliminating the size factor of firms due to their group (keiretsu) organization.

Our study also aimed to examine the relationship between the cash conversion cycle and profitability for corporations of different industries. The results of our study show that the cash conversion cycle has significant and negative relationship in the cases of basic industries, general industries, and information technology. The results show an insignificant relationship between cash conversion cycle and profitability in the cases of consumer goods and service companies that are mainly retailers. According to the existing literature (see Jose *et al.*, 1996; Teruel and Solano, 2007; Uyar, 2009), retail

industries store inventories for a relatively short period, and manufacturing industries for longer. This indicates that reducing longer cash conversion cycles for manufacturing firms may improve profitability.

7. Conclusions

The cash conversion cycle is a powerful performance measure for assisting how well a company is managing its working capital. Shin and Soenen (1998) show a strong negative relation between the length of the cash conversion cycle and corporate profitability of listed US firms covering the period 1975-1994. In our study, a significant negative relationship was found between the cash conversion cycle and return on investment for the Japanese firms for the full sample, small companies, medium companies, and large companies, and for all industries except for consumer goods and services.

The results also show that the company's performance in the previous period has a strong positive effect on the company's performance in the current period for all the study samples except for small companies where the coefficient is positive and insignificant, and for basic industries and information companies where the coefficients are significant and negative.

These results suggest that working capital managers of the Japanese firms can improve the profitability of their firms by shortening the cash conversion cycle. Cash conversion cycle can be shortened by reducing the inventory conversion period via processing and selling goods more quickly, or by reducing the receivable collection period via speeding up collections, or by lengthening the payable deferral period through slowing down payments to suppliers. Shortening the cash conversion cycle improves profitability of a firm because the longer the cash conversion cycle the greater the need for expensive external financing. Therefore, by reducing the time that cash are tied up in working capital, a firm can operate more efficiently (Moss and Stine 1993).

Several policy implications can be drawn from the above findings of the study. These include implications that working capital management should be the concern of all industries. The findings indicate that firm executives can improve profitability of the firms by reducing the number of days in the cash conversion cycle. Working capital management should also be the concern of corporations from all size levels (large, medium, and small) where managers can increase profitability of their firms by shortening the cash conversion cycle.

The main limitation of this study is the constraining of the study period in the years 1990-2004 and not extending it further. Other limitations include the lack of access to operational measures of profitability of Japanese firms such as operating income to total assets and operating income to sales.

Avenues for future research include two directions. First, there should be similar studies in countries with different institutional characteristics and financial systems. Second, there should be studies that focus on the working capital management policies and profitability of Japanese firms. Working capital management policies include both investing and financing policies, existing literature is based on the US experience, so it looks appropriate to test the effect of working capital management policies and profitability of Japanese firms that have a different institutional structure.

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Further reading

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