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The effect of financial leverage on firm profitability and working capital management in the Asia-Pacific Region

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Aim: The main aim of this article is to examine the impact of financial leverage on firm profitability and working capital management of Asia-Pacific (APAC) firms listed in the United States and the United Kingdom.

Design / Research methods: The regression analyses are conducted with panel data over the period of 2013-2022 using the Ordinary Least Squares method. Historical financial data has been obtained by using Refinitiv Eikon. In addition to quantitative research, this study also provides case examples.

Conclusions / findings: The findings reveal that for APAC firms listed internationally, financial leverage has a negative relationship with firm profitability and a positive relationship with working capital levels. The study emphasizes the complex nature of financial leverage as a double-edged sword, capable of shaping the trajectories of APAC firms navigating the international business arena.

Originality / value of the article: Although the effect of financial leverage on firm profitability has been researched before, it has not been researched on the Asia-Pacific region as a whole, specifically for the companies that are listed internationally. Furthermore, the effect of financial leverage on working capital management is scant overall and has rarely been examined distinctively, especially in this particular geographical region.

Keywords: Leverage, Working Capital Management, Cash Conversion Cycle, Firm Profitability, Asia-Pacific, International Listings

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1. Introduction

Financing decisions made by firms play a pivotal role in attaining an optimal capital structure and fostering firm performance. When it comes to debt financing, it is first of all concerned with the trade-off between financing costs and gains derived from tax shields (Harris, Raviv 1991), and it is important to note that there exists a general threshold debt level after which the costs outweigh the gains associated with tax-sheltering. Obtaining an adequate debt level and capital structure is, therefore, vital for a firm to achieve firm value and profitability, as well as to position itself competitively in the market environment.

Several studies have established approaches to explain the relationship between financial leverage and firm profitability. According to Modigliani and Miller (1958), a firm's financing decisions do not impact the firm's value, including performance, in a perfect capital market. This perspective is based on a few assumptions; for instance, no taxes or transaction costs being involved, that there is no information asymmetry and that agency costs are present. Later, Modigliani and Miller (1963) suggested that firms can gain from the tax-deductible interest payments by augmenting debt in the capital structure. However, this proposition has been called into question due to its assumption of perfect market condition. Actual capital markets are less sophisticated, implying that these assumptions might not hold in reality – where markets are imperfect and are concerned with agency costs (Jensen, Meckling 1976), moral hazards (Greenwald, Stiglitz 1993), and information asymmetry (Stiglitz 1988).

Moreover, another concept critical for firm performance is working capital management and is an important tool for gaining competitive advantage. Working capital management (WCM) is vital in firms' short-term financial management. WCM is used by firms to ensure that a company operates efficiently by examining and using its current assets and liabilities to maintain adequate cash flow to meet short-term operating costs and short-term debt obligations. A company's net working capital consists of its current assets minus its current liabilities. WCM concerns the management of operating net current accounts and includes trade-offs. A firm may have a sales growth by extending larger amounts of trade credit to its customers, which increases accounts receivable; however, this might also be risky in terms of collection.

When a firm maintains minimum levels of inventory, it may increase its profits, but could cause operational issues if there are any shortages. A firm's profitability might grow by delaying payments of the accounts payables and making use of trade credits, but this poses a risk to the credibility of the firm, which might cause issues in the long run.

WCM and profitability are critical indicators of a firm's financial performance. By understanding how leverage affects these variables, firms can better manage their financial resources and optimize their performance. Moreover, firms can manage their financial risk more effectively and make informed decisions about their capital structure when the relationship between financial leverage and both WCM and profits is studied.

The study of the relationship between financial leverage and WCM is rather limited as a whole. Both aforementioned relationships lack studies in the rapidly growing Asia-Pacific (APAC) region. The APAC region includes nearly 50 nations, primarily from Eastern Asia, South Asia, and Oceania. APAC economies are generally growing economies and are of great interest for foreign markets to enter. However, gradually, APAC firms are also engaging in outward foreign direct investment whilst this is currently underexplored (Paul, Benito 2017).

The structure of the paper is as follows. The subsequent section presents the theoretical background, literature review, and hypotheses. The third section then introduces the research methodology, which includes the data and models used in this study. This is followed by a description and a discussion of the empirical results of the research in the fourth section. The paper finally ends with the limitations and conclusions of this study and proposes directions for future research.

This study contributes to literature by empirically presenting new evidence on the relationship between financial leverage (Debt-to-Equity Ratio) and both firm profitability (Return on Assets) and WCM (with Cash Conversion Cycle used as a measure). The analysis covers the period from 2013 to 2022 and focuses on APAC firms listed on major international exchanges in the United States and United Kingdom. Panel data analysis is employed to examine these relationships. The sample thus includes 52 firms headquartered in the APAC region that are listed on British and American stock exchanges, with data from the period of 2013-2022. The main APAC

countries included in the sample are Australia, China, Hong Kong, India, Macau, Malaysia, Singapore, Taiwan, and Thailand.

Research has been done on the aforementioned relationship locally, in countries in the APAC region separately, merely in Malaysia, Pakistan, and India. Also, general research has been done on European and US firms expanding to the APAC region, but not the other way. Interestingly, APAC firms internationalizing to (and listing in) Europe and the US is a recent trend. Furthermore, limited research has been done on firms that are cross-listed in the US or the UK, especially originating from the APAC. Hence, this study aims to understand the performance of the APAC firms listed merely abroad, or cross-listed abroad. This will be comprehended by researching how their financial leverage is affecting the WCM and profitability of firms in these countries. Although the effect of leverage on profitability has been researched before, it has not been researched on the APAC region as a whole, specifically the companies that are listed abroad. Moreover, research on the effect of leverage on WCM is scant, implying the research gap. These gaps in the research henceforth motivate the research topic.

This study, therefore, aims to answer the following research question "How does financial leverage affect profitability and the working capital level of firms from the APAC region that are listed in the United States and United Kingdom?" In order to answer the research question, a quantitative research approach will be used. First the descriptive statistics will be sought for, followed by a correlation analysis. Finally, a regression analysis for which the Ordinary Least Squares (OLS) regression model will be used to find out the relationship and the extent of the impact of financial leverage on firm profitability and WCM.

The dependent variables in this study will therefore be firm Return on Assets (for profitability) and Cash Conversion Cycle (as a measure of WCM) and the independent variable would thus be financial leverage. Control variables included in this research will be firm age and firm size. In addition to this, the COVID-19 years will be examined by means of a dummy variable to determine any potential alterations in the relationships during times of crisis.

2. Theoretical background, literature review and hypotheses

The Modigliani and Miller (1958) theorem suggested that the financial structure has no effect on firm value. However, several theoretical works, older and more recent, have argued against on financial structure in economic terms. Some studies have already been conducted on the effect of financial leverage on firms' profitability. Many suggest that there indeed is a relationship present between the two.

Based on these papers, researchers state that there is a negative relationship present between financial leverage and firm profitability, however some papers support a positive relationship between the two variables. The majority of papers concerning leverage and firm profitability in developing nations lean towards a negative relationship between the two (Majumdar, Chhibber 1999; Chiang et al. 2002; Abor 2007; Zeitun, Tian 2007; Foong, Idris 2012). However, research on the same variables in developed regions are more mixed (Wald 1999; Frank, Goyal 2003; Berger, Bonaccorsi di Patti 2006; Yazdanfar, Ohman 2015).

This study zooms in on four base papers. First, Dalci (2018) studied the impact of financial leverage on profitability of listed manufacturing firms in China. The sample consists of 1,503 firms listed in the Chinese capital markets from 2008 to 2016. In this study, the author uses initially a simultaneous equation approach to control for potential endogeneity. Afterwards, several regression analyses are used. As prior research shows mixed results regarding the two variables, the authors of this paper decided to hypothesize that the impact of leverage on profitability is inverted U-shaped, which was confirmed after conducting the research.

Moreover, Ohman and Yazdanfar (2014) also studied the effect of financial leverage on firm performance (profitability). This was done by using a sample of 15,897 Swedish SMEs over the period of 2009–2012. Their study confirms that debt ratios, in terms of trade credit, short-term debt, and long-term debt negatively affect firm performance in terms of profitability.

Considering the abovementioned research, even though the findings are mixed, several lean towards a negative relationship for firms headquartered in mainly Asian markets. Thus, this study establishes the following hypothesis concerning leverage and firm profitability:

Hypothesis 1*: There is a negative relationship between financial leverage and firm profitability.*

Furthermore, the relationship between leverage and WCM has not gained much attention thus far. There is ample research on the WCM effect on profit, with leverage as a moderator, but not many where leverage is the main independent variable on WCM. However, Yilmaz and Nobanee (2022) studied the determinants of WCM, using its length in terms of the Cash Conversion Cycle (CCC) as a proxy, in Middle Eastern and North African (MENA) countries. The data of 395 companies from 10 countries in the MENA region is used for six years (2013–2018), and dynamic panel regressions have been run. The authors consider several variables that might affect CCC, including operating cash flow, sales growth rate, operating profit margin, firm size, tangibility, and leverage. However, according to the findings, the effect of leverage on CCC is considered insignificant in some respects and significant with a negative relationship in a few cases depending on the country.

In addition to the abovementioned research, Banos-Caballero et al. (2010), also researched the determinants of CCC (as a proxy of WCM), using panel data of 4,076 Spanish SMEs in the period of 2001-2005, and have conducted OLS regression. Their independent variables include profitability (Return on Assets), cash flow, leverage, and growth. As for leverage, the authors conclude that the lower the leverage, the higher the CCC, hence referring to a negative relationship between the two variables.

Based on the aforementioned research, this study establishes the following hypothesis concerning leverage and WCM:

Hypothesis 2*: There is a negative relationship between financial leverage and working capital management (Cash Conversion Cycle).*

3. Research methodology & models

3.1. Sample & data

The sample of this study is composed of 52 Asia-Pacific (APAC) companies that are listed in the United States and the United Kingdom. The annual financial data ranges from 2013 to 2022. The APAC firm financial data is obtained by utilizing

Refinitiv Eikon and a few missing values are obtained using the U.S. Securities and Exchange Commission (SEC) 20-F forms. The initial raw data consisted of 709 firms, gathering data for ROA, CCC (comprising of accounts receivable days (ARD), accounts payable days (APD), and inventory days (INVD)), Leverage (Debt-to-Equity Ratio), market capitalization, and firm age. ARD, APD, and INVD are calculated after gathering the accounts receivable, accounts payable, total inventory, net sales, and cost of revenue. After eliminating the firms with missing and extreme data, done in Microsoft Excel, the sample remaining comprised of 52 APAC companies in total from 9 countries, over the course of 10 years, hence with 520 observations. As seen in Table 1, the firms used in this sample are headquartered in the 9 APAC nations or territories of Australia, China, Hong Kong, India, Macau, Malaysia, Singapore, Taiwan, and Thailand. Of this sample, 46 APAC firms are listed in the US and 6 in the UK.

Table 1. Company headquarters and listing distribution in sample

Country Number	Company Headquarters	Number of companies whole sample	Number of companies listed in the US	Number of companies listed in the UK
1	China (Mainland)	30	30	0
2	Hong Kong	6	5	1
3	Singapore	4	3	1
4	Australia	4	1	3
5	Taiwan	3	3	0
6	India	2	2	0
7	Malaysia	1	0	1
8	Macau	1	1	0
9	Thailand	1	1	0
TOTAL		52	46	6

Source: authors' own research.

Derived from this sample, four case examples will be provided in this study to further comprehend the results and application. The four companies are two small and two large companies in the manufacturing and technology industry.

3.2. Variable selection & measurements

3.2.1. Dependent variables and independent variable

According to Zhu and Jiao (2013), the stock markets in Asia, particularly China, exhibit lower efficiency compared to the US market. As a result, the market value of a company may not accurately represent its true performance. Consequently, the use of accounting-based measures is deemed preferable over market measures. Building upon prior research, this study will accordingly employ book measures for evaluating leverage, performance, and controls.

One of the dependent variables used, firm performance, can be measured in several ways. Profitability is a measure of how well a firm is performing. Several scholars, including Padachi (2006) and Dalci (2018), use Return on Assets (ROA) to measure firm performance. This is obtained by dividing the Net Income by Total Assets.

The other dependent variable in this study is working capital management (WCM), used by firms to ensure that a company operates efficiently by examining and using its current assets and liabilities to maintain adequate cash flow to meet short-term operating costs and short-term debt obligations. A company's net working capital consists of its current assets minus its current liabilities.

Several researchers such as Deloof (2003), Padachi (2006), Aktas et al. (2015), and Banos-Caballero et al. (2010) use Cash Conversion Cycle (CCC) as a popular measure for WCM. This fundamental concept had been first introduced by Richards and Laughlin (1980). WCM aids in maintaining the operation of the CCC – the minimum duration needed to convert net current assets and liabilities into cash. In essence, WCM helps determine the number of days of funding needed to fulfil current obligations. The longer the time lag, the larger the investment in working capital. In order words, the CCC is a measure of how long cash is tied up in working capital and it thus measures how efficiently a company is managing its WCM. The CCC is calculated by accounts receivable days (ARD) + inventory days (INVD) – accounts payable days (APD). ARD is obtained through [Accounts Receivable * 365]/sales, INVD by [inventories * 365]/cost of sales, and APD is calculated as [Accounts Payable * 365]/cost of sales, as shown in Table 2.

The independent variable used in this study is financial leverage. Leverage is the use of debt in order to take up an investment or project. It is intended to multiply the potential returns from a project. However, leverage may also multiply the potential risk in case the investment does not work out as planned. A firm or investment could be considered "highly leveraged", meaning that it has way more debt than equity, and thus this could lead to volatility in company profits. As per previous research, the Debt-to-Equity Ratio is utilized as a proxy for leverage.

3.2.2. Control variables

Majumdar and Chhibber (1999), Jermias (2008), and Ebaid (2009) suggest that the performance of a company can be impacted by its size. They state that larger firms may benefit from economies of scale and possess greater capabilities to diversify their products. Firm size can be represented in different ways, one of them being the market capitalization of the firm, which is used in this study.

Another control variable used is firm age, calculated by the year 2022 minus the founding year of the firm. Majumdar (1997) suggests that older firms negatively impact firm profitability, whereas the effect on CCC has not been actively researched.

To test for whether the recent years, primarily the COVID-19 years, had an effect on the outcome and relationships between these variables, the years 2020 and 2021 will be used as a dummy versus the other years.

3.3. Models

Panel data is utilized in this study for the following advantages. Hsiao (2003) states that the panel data methodology is able to control for unobserved heterogeneity, mitigate estimation bias, and handle data multicollinearity. There will be one panel data method used in this study, which is the Ordinary Least Squares (OLS) model. In addition to the abovementioned method, this study also conducts tests for heteroskedasticity and reliability.

There are six models in which the dependent variable is ROA or CCC. ROA indicates the efficiency with which the company is managing its resources and assets to generate profits. The independent variable in these models is financial leverage, also the Debt-to-Equity Ratio. The following models also include the control variables

SIZE, which is the company market capitalization and AGE, which is the age of the firm from 2022 minus its corresponding year. Two additional models are provided which include the dummy variable of COVID-19 years of 2020 and 2021.

Table 2. Variables & measurements

Abbreviation	Variable Name	Measurement	Based on
LEV (IV)	Financial Leverage	Debt-to-Equity Ratio	Deloof (2003); Padachi (2006)
CCC (DV)	Cash Conversion Cycle	ARD + INVD - APD	Deloof (2003); Padachi (2006), Aktas et al. (2015); Banos-Caballero et al. (2010); Chauhan, Banerjee (2016)
ARD	Accounts Receivable Days	[Accounts Receivable * 365]/sales	Deloof (2003); Yilmaz, Nobanee (2022); Banos-Caballero et al. (2010); Chauhan, Banerjee (2016)
INVD	Inventory Days	[Inventories * 365]/cost of sales	Deloof (2003); Yilmaz, Nobanee (2022); Banos-Caballero et al. (2010); Chauhan, Banerjee (2016)
APD	Accounts Payable Days	[Accounts Payable * 365]/cost of sales	Yilmaz, Nobanee (2022); Banos-Caballero et al. (2010); Chauhan, Banerjee (2016)
ROA (DV)	Return on Assets	Net Income / Total Assets	Dalci (2018); Padachi (2006)
SIZE (CV)	Firm Size	Company Market Capitalization	Majumdar, Chhibber (1999); Jermias (2008); Ebaid (2009)
AGE (CV)	Firm Age	2022 – Founded Year	Majumdar (1997)
COVYEAR (Dummy)	COVID-19 pandemic years	2021 and 2022: Yes (1), vs others: No (0)	

Source: authors' own research.

i. Regression with the dependent variable ROA

Equations for the total sample, for companies listed in the United States, the United Kingdom, and as a whole including the dummy variable years, respectively:

$$ROA_{i,t} = \beta_0 + \beta_1 LEV_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 AGE_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$ROA\_US_{i,t} = \beta_0 + \beta_1 LEV_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 AGE_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$ROA\_UK_{i,t} = \beta_0 + \beta_1 LEV_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 AGE_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$ROA_{i,t} = \beta_0 + \beta_1 LEV_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 AGE_{i,t} + \beta_4 COVYEAR_{i,t} + \varepsilon_{i,t} \quad (4)$$

ii. Regression with the dependent variable CCC

Equations for the total sample, for companies listed in the United States, the United Kingdom, and as a whole including the dummy variable years, respectively:

$$CCC_{i,t} = \beta_0 + \beta_1 LEV_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 AGE_{i,t} + \varepsilon_{i,t} \quad (5)$$

$$CCC\_US_{it} = \beta_0 + \beta_1 LEV_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 AGE_{i,t} + \varepsilon_{i,t} \quad (6)$$

$$CCC\_UK_{i,t} = \beta_0 + \beta_1 LEV_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 AGE_{i,t} + \varepsilon_{i,t} \quad (7)$$

$$CCC_{i,t} = \beta_0 + \beta_1 LEV_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 AGE_{i,t} + \beta_4 COVYEAR_{i,t} + \varepsilon_{i,t} \quad (8)$$

where:

β_0	= constant
i,t	= firm i in time t
$ROA_{i,t}$	= Return on Assets, as Net income / Total Assets
$CCC_{i,t}$	= Cash Conversion Cycle, as ARD + INVD – APD
$LEV_{i,t}$	= financial leverage, Debt-to-Equity Ratio
$SIZE_{i,t}$	= firm size, market capitalization
$AGE_{i,t}$	= firm age
$COVYEAR_{i,t}$	= COVID-19 Years, 2020 & 2021 (1), others (0); and
$\varepsilon_{i,t}$	= error term

4. Empirical results

4.1. Descriptive statistics

The descriptive statistics of ROA, CCC, the independent variable leverage (LEV), and the controls firm size and age are presented in Table 3. The mean value for ROA is -0.023 (or -2.3%) for the total sample. The mean of CCC for all the companies is over 100 days, 191 days specifically. This can be considered to be high, but the median is 94 days. The mean value of LEV is equal to 0.363, in terms of Debt-to-Equity Ratio. As of the controls, the average of firm size is 1.020 billion USD. The

mean age of the firms is 18.8 years. Moreover, the results of the summary statistics show a leptokurtic distribution compared to the normal. The total sample has been treated for outliers, as it contains a winsorization of 5%. Treating the remaining few outliers by eliminating them might affect the significance levels and representation of the data, and they have therefore not been removed.

The descriptive statistics per country are also shown below in Tables 4 and 5 of the APAC companies listed in the US and the UK, respectively. The results for the US sample are somewhat similar to the descriptives of the whole sample, as this includes 460 observations of the US only. However, the mean of ROA in the US is slightly lower than that of the whole sample, at -0.009. The descriptives of the APAC firms listed in the UK are slightly different with a ROA mean of -0.128 and mean LEV of 0.208, compared to 0.383 in the US. Moreover, the firms listed in the UK tend to have a longer CCC as compared to those in the US; 258 days and 181 days respectively.

The sample of firms listed in the UK is rather small, with 50 observations. This could be a reason as to why some results are slightly similar to that of the whole sample and the US, but also some are rather different such as the standard deviations of CCC, LEV and AGE.

Table 3. Descriptive statistics (total sample)

	N	Mean	Min	Max	STD	Kurtosis
ROA	520	-0.023	-0.413	0.182	0.155	3.623
CCC	520	190.787	-79.0884	1110.068	279.085	7.057
LEV	520	0.363	0	2.017	0.552	5.938
SIZE	520	1.020	0	8.713	2.163	9.437
AGE	520	18.817	3	66	10.921	7.409

Source: authors' own research.

Table 4. Descriptive statistics (US sub-sample)

	N	Mean	Min	Max	STD	Kurtosis
ROA	460	-0.009	-0.413	0.182	0.141	4.464
CCC	460	181.907	-79.088	1110.068	267.955	7.381
LEV	460	0.383	0	2.017	0.573	5.411
SIZE	460	1.068	0	8.713	2.247	8.828
AGE	460	18.946	3	66	11.395	6.953

Source: authors' own research.

Table 5. Descriptive statistics (UK sub-sample)

	N	Mean	Min	Max	STD	Kurtosis
ROA	60	-0.128	-0.413	0.182	0.209	1.556
CCC	60	258.864	-26.304	1110.068	348.209	4.676
LEV	60	0.208	0	1.628	0.307	11.746
SIZE	60	0.642	0.003	6.199	1.310	9.812
AGE	60	17.833	6	32	6.146	2.578

Source: authors' own research.

4.2. Correlation analysis

Table 6 presents the correlations between the study variables with ROA of the whole sample. The correlation analysis demonstrates that the variable LEV has a statistically significant negative relationship with the dependent variable ROA, with a value of -0.103. This indicates that firms with lower LEV will enhance profitability as compared to firms with a greater LEV value. The lesser the company uses debt to finance its operations, the greater will be the profitability. SIZE has a statistically significant negative relationship with ROA. The negative correlation might indicate that large companies tend to have a lower return on their assets as compared to smaller companies. AGE does not tend to have a statistically significant relationship with ROA.

Table 7 shows the correlations of the variables with CCC. The table demonstrates that LEV has a statistically significant value of a positive 0.08 with the dependent variable CCC. This would mean, for example, that higher leverage firms would have a longer CCC. This relationship could occur because companies with high levels of debt may have less flexibility in managing their working capital. For example, they may need to maintain higher levels of inventory to ensure they have enough stock on hand to meet their debt obligations. SIZE is strongly positively correlated with CCC as well, implying that the larger the company, the longer CCC. AGE once again is not statistically significant with the dependent variable. Moreover, these tables also indicate that there is no presence of multicollinearity, as all the correlation coefficients are below 0.8. A variance inflation factor (VIF) test was also conducted to test for multicollinearity in Table 8 – this led to same results as the values were slightly above 1, indicating that multicollinearity is not materially present.

Table 6. Correlation matrix

Variables	(1)	(2)	(3)	(4)
(1) ROA	1.000			
(2) LEV	-0.103**	1.000		
(3) SIZE	0.262***	-0.025	1.000	
(4) AGE	0.033	-0.115***	0.156***	1.000

*Notes: *** p<0.01, ** p<0.05, * p<0.1*
Source: authors' own research.

Table 7. Correlation matrix

Variables	(1)	(2)	(3)	(4)
(1) CCC	1.000			
(2) LEV	0.080*	1.000		
(3) SIZE	-0.128***	-0.025	1.000	
(4) AGE	-0.066	-0.115***	0.156***	1.000

*Notes: *** p<0.01, ** p<0.05, * p<0.1*
Source: authors' own research.

Table 8. Variance Inflation Factor test

	VIF	1/VIF
AGE	1.04	0.962386
LEV	1.03	0.975290
SIZE	1.01	0.986518
Mean VIF	1.03	

Source: authors' own research.

4.3. Regression analysis

Tables 9 and 10 present the results of the OLS regression for the entire sample with respect to the impact of LEV, SIZE, and AGE on dependent variables ROA and CCC, respectively. While running the regression on ROA, it can be seen in Table 9 that the coefficient of LEV is statistically significant at 1% and negative for the whole sample in model 1 ($\beta = -0.029$; $p = 0.010$), but also for the APAC companies listed in the US in model 2 ($\beta = -0.043$; $p = 0.000$); the increase or decrease in LEV will thus significantly affect the firm profitability. When the financial leverage of the firm increases, it will adversely affect its ROA. In model 1, one unit of increase in LEV would therefore lead to a -0.029 (-2.9%) decrease in ROA, ceteris paribus. For firms

listed in the UK, however, the LEV coefficient is positive and statistically significant at 10% (β = 0.099; p = 0.100). This would mean a 1 unit increase in LEV leads to a 0.099 increase in ROA, when all other variables remain constant. As for firms in the whole set and firms listed in the US, SIZE is significant at 1% (β = 0.020; p = 0.000). As SIZE is measured in USD in billions, this means that a 1 billion increase in firm size, leads to a 0.020 increase in ROA. The variable AGE has no significant effect, but only has a negative significant effect at 1% uncertainty level for APAC firms in the UK (β = -0.025; p = 0.000). Furthermore, the adjusted R-Squared is a corrected goodness-of-fit measure for linear models. It is the proportion of the variation in the dependent variable that is explained by the independent variables in the model. For models 1, 2, and 3, the adjusted R-squared are 0.074, 0.109, and 0.558, respectively. For the total sample, this would mean that the independent variables explain 7.4% of the variation in the dependent variable.

In Table 10, the impact of the variables on CCC is shown. Leverage should be having a significant effect on WCM, according to the regression results. Regressing the variables on CCC as the dependent variable, it can be deduced that LEV is statistically significant at 10% for the whole sample, at 1% for foreign firms listed in the US, and at 5% in the UK. As for the whole sample, a 1 unit increase in LEV would lead to a 38 day increase in in the firm's CCC (β = 38.134; p = 0.080). For firms in the UK, however, an increase in LEV leads to a decrease in CCC. SIZE has a significant effect on CCC at 1% significance level (β = -15.668; p = 0.006) in the whole sample and at 5% for the APAC firms listed in the US and the UK, which are also all negative. This would mean that the smaller the firm is, the longer the CCC is and vice versa, provided that other variables remain constant (Moss, Stine 1993). AGE, however, as in the regression with ROA, does not seem to have a significant effect on a firm's CCC. The adjusted R-squared is 0.018, 0.024, and 0.102 for the three models respectively. This would imply that the independent variables explain around 2% of the variation in CCC for the whole sample.

Moreover, the COVID-19 pandemic had a remarkable effect on many firms' profitability and WCM around the world. Many firms experienced disruptions in their supply chains, reductions in consumer demand, and increased uncertainty and risk in the business environment. These factors can affect a firm's ability to manage its

working capital, and its profitability. Additionally, the pandemic has also led to changes in interest rates and credit conditions, which can affect a firm's leverage or its use of debt financing. Firms had to adjust their capital structures or seek new sources of financing to cope with the pandemic's economic impacts. While the impact might not have been uniform across all firms, this study includes the dummy variable COVYEAR to test whether on average LEV had a notable effect on ROA and CCC in the years 2020 and 2021, presented in models 4 and 8, respectively. As presented in model 4, it seems to not have much of a different impact on the relationship between leverage and ROA when compared to the other years, relative to model 1. It can be observed that the variable is statistically significant at 10% (β = -0.031; p = 0.060), meaning that firms' ROA in the years of 2020 and 2021, the COVID pandemic years, is on average 3.1% lower than in the other years, ceteris paribus. Model 8 inspects whether the impact of the variables on CCC changes during the pandemic years. The results remain somewhat similar to model 5 with 10% statistical significance (β = 38.879.; p = 0.080).

Furthermore, it should be pointed out that, as mentioned before and as presented in Table 10, the coefficients for leverage on CCC are relatively high. The Debt-to-Equity Ratio is used in this study as a proxy for leverage, meaning that slight changes in this ratio will most likely affect the dependent variable notably. However, it is still important to note this with the data and therefore, this study also performs two additional regressions to observe whether minor changes in data indeed affect the effect of LEV on CCC, represented in Table 11, in models 9 and 10. Models 11 and 12 show two more regressions to test the effect in these circumstances with the pandemic years taken into account.

Model 9 demonstrates the regression of LEV on CCC in which the logarithmic function is taken of CCC. LEV is statistically significant at 10% and still positive (β = 0.177; p = 0.100). This is now a log-level function, meaning that a 1 unit increase in LEV, would therefore lead to an 18% increase in CCC, ceteris paribus. The effect concerning SIZE remains similar (β = -0.0001; p = 0.000) on CCC as in model 5, referring to the fact that firm size tends to have a minor negative impact on the CCC days; larger firms lean towards a shorter CCC, provided that other variables remain stable. It is important to keep in mind that as the logarithmic function has been taken

on CCC, there are now 435 observations. The adjusted R-squared of this model is 0.067; the independent variables explain 6.7% of the variation in CCC for the whole sample. This model is therefore better explained, as compared to model 5, in which CCC is a non-logarithmic function. As for the COVID-19 years, the regression with the dummy variable in model 11 demonstrates that LEV has a statistically significant positive effect on CCC at a 1% uncertainty level. Here, a 1 unit increase in LEV results in a 16% (about 30 days) increase in CCC. Therefore, the concept of an increase in LEV leading to an increase in CCC (by approximately 30 days) still stands. It can be observed that the variable COVYEAR is statistically significant at 10% ($\beta = 0.203$; $p = 0.100$), meaning that the CCC in the years of 2020 and 2021 is on average 2.3% longer than in the other years, ceteris paribus. This model is slightly better explained than model 9, as the adjusted R-squared is 0.069.

Models 10 and 12 present the regressions on CCC in which the three primary outliers have been removed in the dataset to observe if this has any major impact. Two of the outliers eliminated for this test are in the gas and solar energy production. The other focuses on ceramic tile production. Model 10 shows that the LEV coefficient is slightly higher than in model 9, at an increase in 3.6 days of CCC. However, this impact seems to be statistically insignificant. Similar results are obtained in model 12, where a 1 unit increase in LEV would lead to a 3-day increase in CCC, ceteris paribus, however this is insignificant as well.

Table 9. Regression results

Dependent variable: Return on Assets (% of total assets) (ROA)

	(1)	(2)	(3)	(4)
	ROA	ROA	ROA	ROA
LEV	-0.029***	-0.043***	0.099*	-0.028**
	(-2.47)	(3.19)	(1.65)	(-2.34)
SIZE	0.019***	0.017***	0.012	0.019***
	(6.19)	(6.22)	(0.84)	(6.24)
AGE	-0.002	0.001	-0.025***	-0001
	(0.48)	(0.92)	(-8.21)	(-0.21)
Dummy COVYEAR				-0.031*
				(-1.88)
_cons	-0.034*	-0.021	0.281***	-0.023
	(-0.026)	(-1.55)	(4.66)	(-1.62)
Observations	520	460	60	520
R^2	0.080	0.115	0.581	0.086
Adjusted R^2	0.074	0.109	0.558	0.079
F-statistic	14.86	19.77	25.85	12.08

*Notes: t-values are in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Source: author's own research.

Table 10. Regression results

Dependent variable: Cash Conversion Cycle (CCC)

	(5)	(6)	(7)	(8)
	CCC	CCC	CCC	CCC
LEV	38.134*	55.782**	-314.844**	38.878*
	(1.72)	(2.57)	(-2.22)	(1.75)
SIZE	-15.668***	-12.456**	-70.665**	-15.609***
	(-2.76)	(-2.24)	(-2.16)	(-2.75)
AGE	-0.969	-1.086	1.13	-0.891
	(-0.86)	(1.11)	(0.16)	(-0.78)
Dummy COVYEAR				-15.404
				(-0.50)
_cons	211.156***	194.418***	349.491**	212.427***
	(7.98)	(7.37)	(2.44)	(7.99)
Observations	520	460	60	520
R^2	0.024	0.030	0.147	0.024
Adjusted R^2	0.018	0.024	0.102	0.017
F-statistic	4.23	4.76	3.22	3.23

*Notes: t-values are in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Source: authors' own research.

Table 11. Regression results
Dependent variable: Cash Conversion Cycle (CCC)

	(9)	(10)	(11)	(12)
	CCC	CCC	CCC	CCC
LEV	0.177*	3.614	0.162*	2.840
	(1.62)	(0.24)	(1.48)	(0.19)
SIZE	-0.128***	-5.373*	-0.128***	-5.413*
	(-4.98)	(-1.75)	(-4.99)	(-1.76)
AGE	-0.009	-1.130*	-0.010*	-1.203*
	(-1.64)	(-1.76)	(-1.82)	(-1.86)
Dummy COVYEAR			0.202*	15.162
			(1.36)	(0.85)
_cons	5.063***	157.886***	5.048***	156.522***
	(.40.49)	(10.50)	(40.36)	(10.35)
Observations	435	490	435	490
R^2	0.074	0.015	0.078	0.017
Adjusted R^2	0.067	0.009	0.069	0.008
F-statistic	11.43	2.50	9.06	2.06

Notes: t-values are in parentheses
**** p<0.01, ** p<0.05, * p<0.1. (9) and (11) include the logarithmic function of CCC*
Source: authors' own research.

4.4. Case examples

In order to illustrate the effects of leverage on ROA and CCC, four small case examples will be provided by way of a matrix, presented in Table 12. The sample includes the production and technology industries, as these are two prominent, fast-growing industries in the APAC region. It includes both large and small companies as this eliminates bias. This is done by analysing a firms' performance during the COVID-19 years. The first two companies that met with the opposite experiences during the pandemic, while representing the said effects of LEV on ROA and CCC. The two companies examined in the production industry are Steppe Cement Ltd and Sino Agro Food Ltd. The other two companies in the technology industry are Baidu Inc. and Integrated Media Technology.

Table 12. Case example matrix: size-industry

	Production/Manufacturing	*Technology*
Large	Steppe Cement Ltd.	Baidu Inc.
Small	Sino Agro Food Ltd.	Integrated Media Technology Ltd.

Source: authors' own research.

Steppe Cement Ltd. is a cement manufacturer and supplier headquartered in Malaysia, founded in 2004. Its main operations, such as the production plants, are located in Kazakhstan. The company produces cement products for a variety of construction projects in Kazakhstan, but also neighbouring countries. Steppe Cement is publicly listed on the London Stock Exchange (LSE). This was seen as a way to diversify the company's investor base and provide access to a deeper pool of capital. Moreover, it provides the firm with increased visibility and credibility in the global capital markets. The firm's leverage decreased by 11% in 2020, compared to 2019, and their ROA increased by 8.7% and the CCC decreased by 12 days in 2020. As for 2021, the results remained very similar, with an average of 11% ROA and approximately 82 days of CCC. This drop in leverage associated with an increase in ROA and CCC reflects the results of the regressions performed in this study. Interestingly, the performance of the company and the construction sector during the pandemic, relative to other years, was unexpectedly positive, as expressed by the company's chairman of the board calling it "unexpected resilience" (Steppe Cement Ltd 2020: 8). He stated that "the outcome has been better than were initially feared" (Steppe Cement Ltd 2020: 8). As mentioned previously, the leverage of the firm decreased during the pandemic years. This could be due to several reasons. A company's leverage may decrease during the pandemic due to government support. According to Steppe Cement's annual report, "the Government of Kazakhstan had at wherewithal to support and even stimulate construction to avoid harsh social consequences, minimize losses in employment and confront the global recessionary climate" (Steppe Cement Ltd 2020: 9). This not only has an effect on profits, but the firm also entered into a short-term facility agreement with the local bank to ensure repayment of short-term borrowing and secure against inventories (Steppe Cement Ltd 2020: 83).

The second firm analysed is Sino Agro Food Ltd. Sino Agro Food (SIAF) is a diversified agriculture company headquartered in Guangzhou, China and listed in the US. The firm is established in 2007, with primary activities in the agriculture industry focusing on the production of food produces and products whilst utilizing modern technologies transferred from Australia. SIAF's mission includes the sale of protein foods, such as seafood, cattle and sheep, as well as fruits and vegetables. Its main business segments include the operation of agricultural farms, the production and sale of agricultural products and equipment, and the provision of technical consulting services. The company operates in China, Malaysia, and the US and is focused on sustainable development. SIAF had a negative ROA during the pandemic years, one of the reasons being import and export challenges. Leverage decreased by 0.6% in 2020, after which the ROA slightly increased with 3%, but the CCC decreased with nearly 150 days. The data, therefore, also reflect the results of the regression in which LEV is negatively associated with ROA and CCC. SIAF entered into a 10-year long-term loan in 2016 and a 1-year short-term loan agreement in 2019 from a local Chinese bank. According to the management at SIAF, the company focused on a significant increase in the scope and scale of its operations. This has increased its operating expenses and has henceforth impacted the profits (Sino Agro Food Ltd. 2020: 27).

In addition to the production industry, the technology industry is exemplified now. Baidu Inc. is a large Chinese multinational technology company founded in 2000 and headquartered in Beijing, China. Baidu is primarily known as the leading internet search engine provider in China, with a market share of over 70%, and is therefore said to be the Chinese alternative to Google (Vaughan, Chen 2015). Baidu also offers a variety of online services, including online advertising, cloud storage, and content distribution platforms. The company generates most of its revenues from online marketing services derived from pay-for-performance services. The company has been listed on the NASDAQ stock exchange since 2005. Regardless of the COVID years, Baidu overall maintained a stable leverage, with minor fluctuations. However, in the data it can be observed that even during the pandemic years, a slight increase of 1% in leverage resulted in an 8% drop in ROA and approximately 40 days increase in CCC. The slight decrease in revenue could be caused due to the weakness in online advertising demand due to customers facing the impact of the COVID-19 pandemic,

however the revenues of these services have experienced a decline since 2018 (Baidu Inc. 2020: 5). Baidu's recent significant involvement in the development of Artificial Intelligence (AI) in their business segment of AI Cloud (Baidu Inc. 2020: 10) made use of debt financing to fund its operations. The management also mentions that it experienced supply chain disruptions and that it has required additional cash due to changes in business conditions and developments, whilst incurring additional indebtedness (Baidu Inc. 2020: 136), henceforth increasing their CCC.

Furthermore, Integrated Media Technology Ltd. (IMT) is an Australian technology company founded in 2008 that specializes in developing and commercializing advanced solutions for the media and entertainment industry. The company focuses on various aspects of media technology, including providing digital cinema, content distribution, 3D technology development and digital media solutions. IMT offers a range of solutions for digital cinema projection, content delivery networks (CDNs) and video-on-demand (VOD) platform. For IMT, a 2% increase in leverage resulted in a 1% decrease in ROA and approximately 46 days increase in CCC. Due to the pandemic, the company incurred significant delays and expenses. The vast development of their 3D technology displays had to be implemented from home, affecting their research & development activities, and hence slowing down their processes. They incurred a significant loss in 2020, and therefore have relied on additional debt financing to fund its current and future operations (Integrated Media Technology Ltd. 2020: 5). The company thus had limited cash resources to raise additional funds or generate more revenues, and hence, also struggled to pay vendors (Integrated Media Technology Ltd. 2020: 6) and thus delayed the CCC.

4.5 Further tests

4.5.1. Heteroskedasticity test

A Breusch-Pagan test is conducted to test for heteroskedasticity in the total sample, separately for the regression in which ROA is the dependent variable and in which CCC is in the dependent variable. In both cases, the null hypothesis in which a constant variance among the residuals is considered, is rejected, as the p-value that corresponds to the Chi-Square test statistic is below 0.05 – indicating that heteroskedasticity is present in the data.

4.5.2. Reliability test

To conduct a reliability test, Cronbach's alpha was used. To satisfy the required reliability measure, the coefficient must be above 0.7 or 0.8, however in this sample the scale coefficient is 0.402, meaning that this is below the minimum threshold. Therefore, it is crucial to interpret the results with caution. The low Cronbach's alpha coefficient suggests a possible lack of internal consistency among the measurements. Future research should focus on identifying potential sources of measurement error, exploring alternative measurement approaches, or improving the reliability of the measurements. Implementing additional validation procedures, such as conducting factor analysis may aid in pinpointing specific measurement issues and guide improvements for future studies.

5. Discussion

Overall, the empirical results indicate that that the increase in financial leverage negatively influences firm profitability in terms of ROA and WCM in terms of CCC of Asia-Pacific firms listed in the US and the UK market. This would mean that leverage has a negative relationship with ROA, whilst leverage has a positive relationship with CCC. Moreover, based on the case examples outlined in the study, it can be inferred that even during periods of crisis, such as the COVID-19 pandemic impacting various industries, the outcomes for internationally listed APAC firms align with the broader conclusions drawn from this research. Based on the regression results, the first hypothesis is confirmed, and the second hypothesis of this study is rejected. The findings are overall consistent with older studies that financial leverage is adversely associated with firm performance. As for the effect on WCM, contrary to expectations, this paper provides novel findings that can be used for further in-depth research.

Ohman and Yazdanfar (2014) conducted a study to observe the impact of financial leverage on firm performance of Swedish firms. The results of this paper are consistent with the results of their study, referring to a negative relationship between leverage and profits. This topic has been studied for Asian companies as well,

however merely country by country. Even though past research gives mixed results, firms headquartered in developing nations, primarily in Asian markets, a negative relationship between the two variables is often present (Majumdar, Chhibber 1999; Chiang et al. 2002; Abor 2007; Zeitun, Tian 2007; Foong, Idris 2012). This study shows that this relationship remains unchanged nonetheless, whether the Asian firm is listed locally or abroad. The association between leverage and profits of firms in the Asian-Pacific markets could be due to various reasons.

First, in several Asian countries, including China, the reform of corporate taxation in 2008 reduced the corporate tax rate from 33% to 25% (Tang 2020). However, Asian firms listed internationally might not be directly impacted by the local governments' implementation. The American government has also dramatically decreased the corporate tax rate, in 2017 from 35% to 21% (PwC 2023). The decrease in corporate tax rate weakens the tax advantage of debt, hence negatively impacting firm performance (Qiu 2021). The United Kingdom, however, has increased its flat rate from 19% to 25% in 2023 (PwC 2022). For further research, it would therefore be intriguing to observe whether this change will have a major impact on a firm's way of financing and performance accordingly.

Moreover, agency problems could partially account for the presented relationship. The governance structure of Asian firms differs from those in Western markets (Qiu 2021). Especially in China, the main agency problem is among shareholders, as there is a potential conflict of interest between large shareholders and minority shareholders. This "horizontal" agency problem is primarily present in Asian nations, unlike "vertical" agency problem between shareholders and managers that is present in Western countries (Jiang, Kim 2021). This is mainly due to the fact that Chinese owned firms have a large shareholder of at least 30% owning the firm, whilst the ownership in the West is often largely diffused. However, in China primarily, shareholders control the firm instead of the managers. Therefore, enforcement of firm managers to act in the shareholders' interests is low, leading to ineffective monitoring mechanisms (Chen 2004; Chang et al. 2014). In this kind of situational context, managers of firms are not likely to act in their shareholders' interests and to make efforts for maximizing profits. This could, in turn, result in a negative impact of leverage on firm profitability (Dalci 2018).

As for the negative effect of leverage on WCM, the results of this study provide new information, as this topic had not been greatly studied, particularly not for the APAC region. The findings are not consistent with Banos-Caballero et al. (2010), where the relationship has been researched on Spanish SMEs and where it had been concluded that lower leverage would result in higher CCC. This paper, however, observes the opposite, where higher leverage leads to higher CCC. This positive association could be due to companies with higher financial leverage having higher interest expenses arising from debt (Zamri et al. 2013), which could hinder the company's ability to invest in inventory or extend credit to customers.

Additionally, highly leveraged firms could be more vulnerable to macroeconomic changes. Asian firms, primarily Greater Chinese firms, tend to rely on short-term financing and debt (Ding 2020; Cheng 2020) – due to information symmetry encountered in these nations – which also make these companies more sensitive to environmental changes (Michaelas et al. 1999). This could, in turn, make these companies more risk-averse in their approach to managing their working capital, holding larger cash balances, and slowing down the CCC.

6. Conclusion

This study examines how a firm's capital structure affects performance, using the accounting-based measure of Return on Assets for profitability and Cash Conversion Cycle for working capital management. The current study provides empirical evidence on these relationships with regards to Asian-Pacific firms listed in the US and the UK, by using panel data and the OLS method.

The main objective of this paper is to contribute to existing financial management research with an internationalization aspect, and to provide new information on a topic that can be used for future research. The results reveal that a financial leverage can act as a double-edged sword as it has a negative effect on firm profitability and shows a positive relationship with working capital management. The former aligns with the results found in prior research, using other countries or certain Asian countries. This paper, therefore, confirms previous studies by means of researching the case for internationally listed firms from the Asia-Pacific region. The relationship with

working capital levels, however, is not consistent with previous research conducted. This relationship has been scantly researched, and therefore this paper provides novel findings that could be used for further in-depth research. Moreover, the negative effect on profitability could be due to various reasons including changes in corporate tax rates and agency problems, primarily present in East Asian firms. The reason behind the association with working capital management could be attributed to companies with higher financial leverage incurring greater interest expenses from debt which in turn may impede their capacity to invest in inventory or provide credit to customers. Furthermore, from the case examples provided in the study, it can be inferred that even in times of crisis, such as the COVID-19 pandemic disrupting several industries, the results for internationally listed Asia-Pacific firms remain consistent with the overall findings of this study.

Both firm profitability and working capital management are closely interconnected and influenced by the availability and effective utilization of funds. Funding is crucial for firm profitability because it enables companies to invest in productive assets, undertake growth initiatives, and generate higher revenues and profits. Similarly, effective working capital management relies on proper funding to ensure the availability of adequate working capital, enabling businesses to effectively manage their short-term assets and liabilities, optimize cash flow, and enhance operational efficiency. For both profitability and working capital management, efficient funding is key as both aspects heavily rely on access to adequate financial resources to support business activities, drive growth, and maintain liquidity.

Practical implications can also be drawn from this study. First, there are a few firms in sample listed in the United Kingdom. Therefore, a fruitful avenue for future research is to explore the effects of leverage on profitability and working capital management of firms listed in the UK particularly to identify reasons as to why these firms experience opposite effects to those of listed in the US. Additionally, for the purpose of this research, a few countries from the Asia-Pacific region were studied. To better understand the influence of leverage on profits and working capital management of internationally listed firms, this study can be extended to more countries with companies listed in Western nations.

Apart from closely analysing the aforementioned effects on firms listed in the UK when compared to the US, and researching more Asia-Pacific nations, this study can be further extended by means of performing more qualitative research. This could potentially offer more detailed insights on possible effects between leverage and both firm profitability and working capital management. Case studies could be conducted to individually study a firm or country to obtain a deeper understanding of these relationships. By delving deeper into these relationships through qualitative research and conducting case studies at both firm and country levels, researchers can uncover valuable insights that offer a more nuanced understanding of the intricate dynamics at play. Such endeavours would not only contribute to the existing body of knowledge but also provide a solid foundation for informed decision-making by practitioners and policymakers in navigating the complexities of financial management in international and diverse economic contexts.

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