How does working capital management affect firm profitability in China's agricultural sector?

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Lujing Liu
Associate Professor in School of Management
Institution: School of Management, Qingdao Agricultural University
Address: No. 700 Changcheng Road, Chengyang District, 266109, Qingdao, China
E-mail: **liulujing@qau.edu.cn**

Jian Xu
PhD in Accounting
Institution: School of Management, Qingdao Agricultural University
Address: No. 700 Changcheng Road, Chengyang District, 266109, Qingdao, China
E-mail: **xujiansword@163.com**
(Corresponding author)

Abstract

Working capital management (WCM) is one of the most important issues in the field of financial management, and plays an important role in increasing firm profitability. The objective of this paper is to evaluate the impact of WCM on the profitability of Chinese agricultural companies. This impact is examined using descriptive and correlation as well as regression analysis for an eight-year period (2012-2019). The empirical results show that after controlling for characteristics of the company and macroeconomic conditions payable deferral cycle has a positive impact on firm profitability measured by return on assets (ROA). The results also confirm a convex quadratic relationship between receivable collection cycle and ROA. In addition, we find a positive relationship between firm size and sales growth and ROA and a negative relationship between debt used by the firm and ROA. This paper determines the requirements for efficient WCM in order to maximize the profitability of analyzed companies.

Keywords: Working capital management. Firm profitability. Agricultural listed companies.

1. Introduction

Working capital as the life blood of a company is the excess of current assets over current liabilities (Collins, 1946). Working capital management (WCM) has acquired a substantial interest in financial management in the last two decades. It is very important for all companies because they invest a large amount of money into current assets and use current liabilities as their financing sources (Deloof, 2003). Furthermore, WCM as a component of overall corporate strategy significantly impacts a company's liquidity (Kim and Chung, 1990; Chiou *et al*., 2006), solvency (Peel and Wilson, 1996), profitability (García-Teruel and Martínez-Solano, 2007; Raheman and Nasr, 2007; Afza and Nazir, 2008; Mathuva, 2010;

Singh and Asress, 2011; Aregbeyen, 2013; Karabay, 2013; Singhania *et al*., 2014; Pais and Gama, 2015; Husain and Alnefaee, 2016; Tahir and Anuar, 2016; Boţoc and Anton, 2017; Tran *et al*., 2017; Vuković *et al*., 2017; Korent and Orsag, 2018; Öztürk and Vergili, 2018; Peter and Nelson, 2019; Wichitsathian and Pestonji, 2019; Fernández-López *et al*., 2020; Kafeel *et al*., 2020; Anton and Nucu, 2021; Khan *et al*., 2021; Rey-Ares *et al*., 2021), and wealth generation (Kieschnick *et al*., 2013).

Managers generally spend considerable time on day-to-day problems including working capital decisions (Raheman and Nasr, 2007). However, many businesses are faced with the problem of getting fund readily available to meet their current needs (Ibrahim *et al*., 2021). An effective policy of WCM should generally strive to achieve optimal levels of working capital components. Its goal is to maximize firm profitability and minimize the risk of a company's failure to meet current liabilities (Raheman and Nasr, 2007; Almomani *et al*., 2021). Higher efficiency of WCM would lead to higher profitability because of quick conversion of receivables and inventories into cash and delays in making payments to suppliers, which increases cash availability (Enqvist *et al*., 2014; Singh *et al*., 2017).

Modern agriculture should be technologically and technically upgraded that needs a large capital investment. Agricultural listed companies provide abundant funds, advanced technology and excellent talents for the development of agricultural economy, which promotes China's agricultural modernization and increases farmers' income (Ma and Liu, 2014; Xu and Wang, 2019). Increasing profitability is one of the most important tasks of corporate managers. Financial performance of agricultural listed companies is generally below the average level in the Chinese stock market. It is reported that 20 percent of agricultural businesses have more accounts payable than their revenue (Samygin *et al*., 2018).

China's economic transformation, characterized by system perfection and innovation encouragement, has renewed the interest in WCM in companies. For agricultural companies, working capital serves as a key indicator of financial health in the short term (Farroñán *et al*., 2020). Agricultural companies are at the forefront of the industrial chain, and their WCM is relatively backward (Chen and Li, 2018). Meanwhile, the production and operation of agricultural companies depends largely on assets, and they have to bear the risks of market and natural environment (Xu and Wang, 2019). Changes in agricultural markets and development of agricultural production impose requirements on WCM (Kyshtymova *et al*., 2018). What's more, the processes in the agriculture last for a longer period of time, and it is necessary for agricultural companies to make a proper planning of WCM. In addition, the poor condition of world economy caused by COVID-19 also highlights the importance of

efficient WCM (Rey-Ares *et al*., 2021), and financial managers need to consider and evaluate the cash-generating power of the company in the crisis period, which necessitates this study.

The question still remains whether or not WCM improves the profitability of agricultural companies. Therefore, this paper empirically examines the impact of WCM on firm profitability in China's agricultural sector during 2012-2019, and the sample includes 37 active companies. The traditional working capital ratios such as current ratio, quick ratio, and cash ratio are considered to lack the ability of a detailed analysis (Karabay, 2013). In this paper, we measure WCM by using inventory conversion cycle (INV), receivable collection cycle (ACR), payable deferral cycle (ACP), and cash conversion cycle (CCC).

The contributions of this paper are as follows. First, little has been done on WCM in the agricultural sector, especially in emerging economies. This paper attempts to fill this void based on the data from agricultural listed companies in the Chinese context. Second, this paper extends the current literature by examining the existence of its non-linearity. Finally, this paper is highly relevant for managers working in agricultural companies, and will provide them with the practical 'know-how' to improve firm profitability from sound WCM.

The paper is organized as follows. In the second section, theoretical framework and an overview on the relationship between WCM and profitability are provided. Section 3 describes the research design. This is followed by Section 4 that presents the empirical results. Finally, this paper closes with some conclusions.

2. Theoretical Background and Literature Review

Smith (1973) noted that the failure of firms can result from the inability of financial managers to properly manage working capital. Excessive investment in working capital means investing in assets that do not result in a profitable business, while insufficient investment may lead to the interruption of corporate daily operation, and even bankruptcy (Filbeck *et al*., 2007; Aregbeyen, 2013).

This study is underpinned by the trade-off theory. It explains that an efficient working capital is achieved when there is a trade-off between liquidity and profitability and shareholders' value (Singhania *et al*., 2014). There are different working capital strategies according to the financing strategy of current assets (see Figure 1). Under aggressive WCM policy, fixed assets are financed by long-term debt and portion of permanent current assets are financed by current liabilities. The conservative WCM uses the permanent capital in order to finance the requirements of the permanent assets to meet some or all of the seasonal needs.

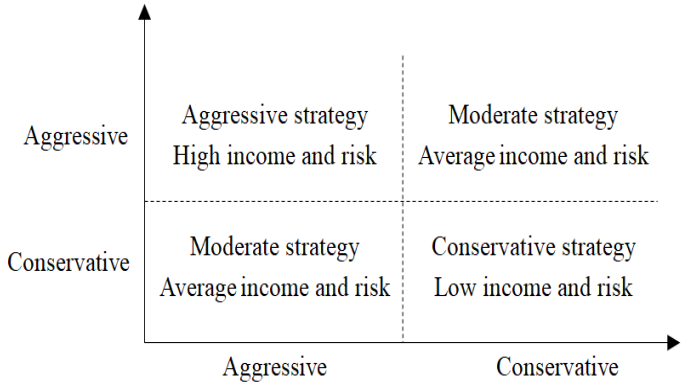

Figure 1: Working capital strategies
Source: Karabay (2013)

Numerous studies have been conducted to evaluate the efficiency of WCM in an effort to determine its impact on corporate profitability and success in different sectors in different countries. However, the findings are varied and inconclusive. Both the positive and negative impacts of working capital on firm profitability depend on whether working capital investments increase or decrease costs (Baños-Caballero *et al*., 2012, 2014).

Table 1 gives an overview on the relationship between WCM and firm profitability. The rendition is ordered by the year.

Table 1: Previous studies on WCM and profitability

Authors	Country	Time span	Sample	Dependent variable	Relationship between WCM and profitability
Deloof (2003)	Belgium	1992-1996	1009 large firms	Gross operating profit (GOP)	Negative
García-Teruel and Martínez-Solano (2007)	Spain	1996-2002	8872 small and medium-sized enterprises (SMEs)	Return on assets (ROA)	Negative
Raheman and Nasr (2007)	Pakistan	1999-2004	94 firms	Net operating profit (NOP)	Negative
Afza and Nazir (2008)	Pakistan	1998-2003	263 firms from 17 industrial sectors	ROA and return on equity (ROE)	Negative
Singh and Asress (2011)	India	1999-2008	449 manufacturing firms	GOP	Positive
Aregbeyen (2013)	Nigeria	1993-2005	48 large manufacturing firms	GOP, NOP, and ROA	Negative
Mun and Jang (2015)	USA	1963-2012	298 restaurant companies	ROA	An inverted U-shaped relationship
Husain and Alnefaee (2016)	Saudi Arabia	2009-2014	3 agriculture and food firms	GOP	No impact
Lyngstadaas and Berg (2016)	Norway	2010-2013	21075 SMEs	ROA and return on invested capital (ROIC)	Negative
Boțoc and Anton (2017)	Emerging Europe	2006-2015	937 high-growth firms	ROA and ROIC	An inverted U-shape relationship

Tran *et al*. (2017)	Vietnam	2010-2012	200 manufacturing SMEs	GOP	Negative
Vuković *et al*. (2017)	Serbia	2014	95 food companies	ROA	Current liquidity and current liabilities ratio have a negative impact, whereas current assets ratio has a positive impact.
Korent and Orsag (2018)	Croatia	2008-2013	442 software companies	ROA	An inverted U-shape relationship
Öztürk and Vergili (2018)	Turkey	2009Q4-2015Q3	6 mining firms	ROA	Inventory period has a positive impact.
Azeez (2020)	Nigeria	2014-2018	5 food and beverage companies	Return on capital employed	No impact
Lyngstadaas (2020)	USA	2012-2019	589 manufacturing firms	ROA	Positive
Alvarez *et al*. (2021)	Argentina	2016-2018	177 manufacturing firms	ROA and ROE	Positive
Anton and Nucu (2021)	Poland	2007-2016	719 firms	ROA and operating return on assets	An inverted U-shaped relationship

Source: Authors' illustration

3. Research Design

3.1. Data

The research sample consists of agricultural companies listed on the Shanghai and Shenzhen stock exchanges during the period of 2012-2019. The sample data begin in 2012 because we try to avoid the influence of financial crisis during 2008-2011. Companies with missing data, companies issuing other kinds of shares, and special treatment (ST) companies are excluded from the analysis. The variables with extreme values (ROA, INV, ACR, ACP, and CCC) are winsorized at the 1% level. China Stock Market & Accounting Research (CSMAR) database provide the data on 37 companies with 238 observations. The software SPSS is used to get results of regression models.

3.2. Variables

In terms of dependent variable, firm profitability is measured by ROA, which is calculated as the ratio of net income to average total assets. This is consistent with García-Teruel and Martínez-Solano (2007), Mun and Jang (2015), Pais and Gama (2015), Lyngstadaas and Berg (2016), Tahir and Anuar (2016), Boţoc and Anton (2017), Vuković *et al*. (2017), Korent and Orsag (2018), Öztürk and Vergili (2018), Kafeel *et al*. (2020), Lyngstadaas (2020), Almomani *et al*. (2021), and Rey-Ares *et al*. (2021).

Guided by Deloof (2003), García-Teruel and Martínez-Solano (2007), Mathuva (2010), Aregbeyen (2013), Karabay (2013), Knauer and Wöhrmann (2013), Singhania *et al*. (2014), Pais and Gama (2015), Husain and Alnefaee (2016), Lyngstadaas and Berg (2016), Tahir and Anuar (2016), Tran *et al*. (2017), Öztürk and Vergili (2018), Peter and Nelson (2019), Wichitsathian and Pestonji (2019), Fernández-López *et al*. (2020), Kafeel *et al*. (2020), Khan *et al*. (2021), and Rey-Ares *et al*. (2021), INV, ACR, ACP, and CCC are chosen as independent variables. INV refers to the time taken to covert inventory held in the firm into sales, which is used as a proxy for the inventory policy. ACR as a proxy for the collection policy is the time taken to collect cash from customers. ACP is the time taken to pay the firm's suppliers. CCC refers to how long it takes to convert accounts receivable, inventories, and accounts payable into cash.

Internal and external control variables are used in this paper. Internal control variables include the size of a company (SIZE), sales growth of a company (GROW), a company's financial leverage (LEV), current assets ratio (CR), and current liabilities ratio (CL). The growth of gross domestic product (GDP) is used as external control variable since macroeconomic conditions can affect WCM.

Table 2 shows the definition of all variables in this study.

Table 2: Variable definition

Variable	Symbol	Measurement
Return on assets	ROA	Net income/Average total assets
Inventory conversion cycle	INV	Inventory/Cost of goods sold×365
Receivable collection cycle	ACR	Accounts receivable/Sales×365
Payable deferral cycle	ACP	Accounts payable/Cost of goods sold×365
Cash conversion cycle	CCC	INV+ACR-ACP
Firm size	SIZE	Natural logarithm of total assets
Sales growth rate	GROW	(Current year's sales/Last year's sales)-1
Financial leverage	LEV	Total liabilities/Total assets
Current assets ratio	CR	Current assets/Total assets
Current liabilities ratio	CL	Current liabilities/Total liabilities
GDP growth rate	GDP	Annual GDP growth

Source: Authors' illustration

3.3. Models

The ordinary least square (OLS) method is applied to analyze the data. We use the following regression models:

$$ROA_{i,t} = \beta_0 + \beta_1 INV_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 GROW_{i,t} + \beta_4 LEV_{i,t} + \beta_5 CR_{i,t} + \beta_6 CL_{i,t} + \beta_7 GDP_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$ROA_{i,t} = \beta_0 + \beta_1 ACR_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 GROW_{i,t} + \beta_4 LEV_{i,t} + \beta_5 CR_{i,t} + \beta_6 CL_{i,t} + \beta_7 GDP_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$ROA_{i,t} = \beta_0 + \beta_1 ACP_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 GROW_{i,t} + \beta_4 LEV_{i,t} + \beta_5 CR_{i,t} + \beta_6 CL_{i,t} + \beta_7 GDP_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$ROA_{i,t} = \beta_0 + \beta_1 CCC_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 GROW_{i,t} + \beta_4 LEV_{i,t} + \beta_5 CR_{i,t} + \beta_6 CL_{i,t} + \beta_7 GDP_{i,t} + \varepsilon_{i,t} \quad (4)$$

where *i* is firm; *t* is time; β stands for the presumed parameter; ε represents the residual error.

4. Results

4.1. Descriptive statistics

Table 3 presents the results of descriptive statistics. The mean value of ROA (0.0212) implies that agricultural listed companies have a very low level of profitability. This is approximately similar to the findings of Lyngstadaas and Berg (2016), Xu and Wang (2019), and Liu *et al*. (2020).

Inventory serves as the main type of working capital in agricultural businesses (Kyshtymova *et al*., 2018). Compared with other industries, the mean INV (310.7342) suggests that inventory turnover period of agricultural listed companies is longer, which is related to the seasonal characteristics of agricultural products. Agricultural products are subject to natural conditions, and it is difficult to shorten the growth cycle of agricultural products under the condition of ensuring their quality, especially in the planting industry (Ma and Liu, 2014). Such result negatively influences firm profitability because inventory requires additional expenses for storage and transportation. The maximum of INV belongs to a forestry company.

ACR on an average takes 35 days, suggesting that agricultural listed companies collect their receivable in one month while as they pay back to their supplier within a period of two months since the average value of ACP is 51.6739. The mean value of CCC is 293.9412 (approximately ten months), implying that on an average agricultural companies take 294 days to complete one cycle of working capital. Longer CCC means more investment in working capital. The high INV leads to the increase in the CCC. García-Teruel and Martínez-Solano (2007) found that agricultural firms take the longest time to generate cash.

Further, the average size of these companies is 21.8851 and the average sales growth rate is 11.47 percent. LEV has a mean value of 0.4253. About 52 percent of total assets of these companies are invested in current assets. Most agricultural enterprises actually have a deficit of current assets (Mann *et al*., 2018). Their current liabilities represent more than 81.86

percent of their liabilities. Another important thing to note is that on an average Chinese economy grows at a very steady rate of 7 percent.

Table 3: Descriptive statistics

Variable	N	Mean	Median	Maximum	Minimum	SD
ROA	238	0.0212	0.0162	0.3300	-0.2345	0.0754
INV	238	310.7342	183.3875	8124.8300	31.7678	778.5891
ACR	238	34.8808	24.4077	242.4020	0.1419	33.2978
ACP	238	51.6739	40.4595	355.6750	4.2457	42.7178
CCC	238	293.9412	183.3715	8029.79	-23.4720	764.0450
SIZE	238	21.8851	21.7740	24.9065	19.4777	0.9236
GROW	238	0.1147	0.0674	2.4844	-0.6106	0.3583
LEV	238	0.4253	0.4007	0.9801	0.0496	0.1855
CR	238	0.5190	0.5170	0.9112	0.1235	0.1690
CL	238	0.8186	0.8870	1	0.1677	0.1730
GDP	238	0.070	0.069	0.078	0.061	0.0054

Source: Authors' calculation

Figure 2 displays that 2016 was the best year in China's agricultural sector in terms of average ROA attained, while it was negative in 2015. In 2015, agricultural supply-side structural reform was implemented, which required agricultural companies to adjust industrial structure and achieve optimal resource allocation.

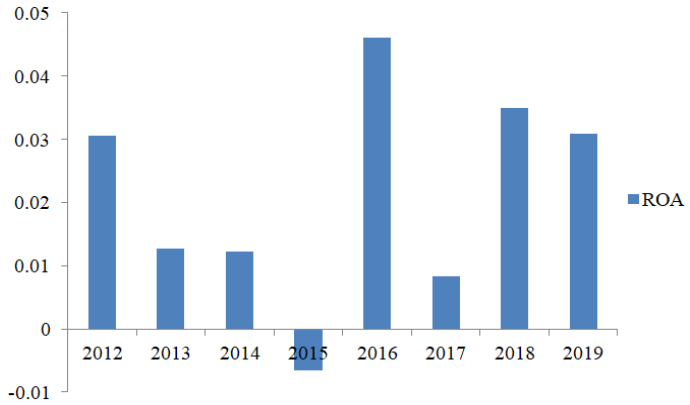

Figure 2: Average ROA for agricultural listed companies (2012-2019)
Source: Authors' illustration

4.2. Correlation analysis

Table 4 presents the results of correlation analysis. The results indicate that ROA is negatively and significantly correlated with ACR. ROA is not found to be related to INV, ACP, and CCC. In addition, SIZE, GROW, and CR are positively correlated with profitability, whereas LEV is negatively correlated. The values of variance inflation factor (VIF) are less than 10, indicating that there is no problem with multi-collinearity.

Table 4: Correlation matrix

Variable	ROA	INV	ACR	ACP	CCC	SIZE	GROW	LEV	CR	CL	GDP
ROA	1										
INV	0.018	1									
ACR	-0.178***	0.103*	1								
ACP	0.007	0.458***	0.080	1							
CCC	0.010	0.998***	0.144**	0.414***	1						
SIZE	0.219***	-0.087*	-0.039	-0.070	-0.086*	1					
GROW	0.250***	-0.051	-0.143**	-0.091*	-0.053	0.015	1				
LEV	-0.398***	0.034	-0.035	0.151**	0.024	0.136**	-0.004	1			
CR	0.117**	0.322***	0.281***	0.121**	0.334***	-0.216***	-0.030	-0.196***	1		
CL	0.054	-0.244***	-0.035	-0.103*	-0.244***	-0.103*	-0.049	-0.079	0.177***	1	
GDP	-0.064	-0.019	-0.024	0.037	-0.023	-0.244***	-0.122**	-0.044	0.084*	0.069	1

Notes: *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively.
Source: Authors' calculation

4.3. Regression results

Table 5 shows the regression results of Models (1)-(4). The coefficient of INV is positive but insignificant. Although a high level of inventory reduces the cost of possible interruptions in the production process, the storage cycle of agricultural production is short and a large amount of storage will result in high costs for agricultural companies.

The coefficient of ACR is negative and significant at the 1% level, which indicates that the more profitable a firm is the shorter the cash collection time will be from their customers. The result can be interpreted as the less the time it takes for customers to pay their bills, the more cash is available to replenish inventory, which leads to higher sales and profitability. In Model (3), the coefficient of ACP is positive and significant at the 5% level. This suggests that an increase in the number of days accounts payable by 1 day leads to an increase in profitability by 0.0002%. This can be explained by the fact that postponing payments to suppliers ensures that the firm has some cash to purchase more inventories for sale thus increasing sales level and boosting profits. The results are in line with the findings of Mathuva (2010). However, it is worth to be mentioned that late payment of invoices can be costly if a discount for early payment is offered.

In Model (4), there exists a positive but non-significant relationship between CCC and ROA. On the contrary, Wichitsathian and Pestonji (2019) suggested that firm profitability and market value increase when firms have a high current ratio and short CCC. Deepa *et al*. (2017) argued that effective cash management reduces the length of CCC, thus improving financial performance of agribusinesses.

Ma and Liu (2014) pointed out that Chinese agricultural companies have a long turnover period of marketing and a short turnover period of production. Chen and Li (2018) stated that the short turnover period of working capital will contribute to corporate

performance in China's agricultural sector. Mann *et al*. (2018) argued that the aggressive strategy of WCM can create a threat of liquidity and solvency loss at Ukrainian agricultural enterprises. Samygin *et al*. (2018) found that agricultural entities tend to adopt an aggressive policy and a conservative policy for managing their current assets and current liabilities, respectively.

Raheman and Nasr (2007) concluded that proper management of cash, accounts receivables, and inventories will help firms to increase their profitability. According to Waithaka (2012), inventory collection period and average payment period positively affect financial performance (measured by ROA) of agricultural companies in Kenya, while CCC exhibits a negative impact. Another study conducted by Usman (2019) showed a positive relationship between ACR and ROE and a negative relationship between CCC and ROE. Taking Nigerian agricultural firms as the sample, Peter and Nelson (2019) found that ACR and CCC have a positive impact on earnings per share while ACP and INC have no impact.

Table 5 also shows that ROA increases with firm size and sales growth. In line with the pecking order theory of capital structure, LEV has a negative and statistically significant relationship with profitability, suggesting that an increase in debt determines a worsening of firm profitability. CR, CL, and GDP have no significant impact on ROA. In addition, Tahir and Anuar (2016) argued that firm size, current assets ratio, and gross domestic product have a positive association with profitability, while debt ratio produces a negative result.

Table 5: Regression results of Models (1)-(4)

Variable	Model (1)	Model (2)	Model (3)	Model (4)
Constant	-0.512*** (-3.839)	-0.481*** (-3.698)	-0.520*** (-3.932)	-0.509*** (-3.813)
INV	6.214×10^{-6} (1.040)			
ACR		-0.0004*** (-3.371)		
ACP			0.0002** (2.025)	
CCC				4.831×10^{-6} (0.788)
SIZE	0.025*** (5.234)	0.025*** (5.300)	0.025*** (5.337)	0.025*** (5.212)
GROW	0.053*** (4.586)	0.047*** (4.063)	0.055*** (4.723)	0.053*** (4.566)
LEV	-0.171*** (-7.434)	-0.167*** (-7.481)	-0.177*** (-7.660)	-0.170*** (-7.401)
CR	0.033 (1.189)	0.070*** (2.654)	0.036 (1.384)	0.035 (1.266)
CL	0.029 (1.115)	0.013 (0.522)	0.027 (1.086)	0.027 (1.035)
GDP	0.186 (0.233)	-0.018 (-0.023)	0.123 (0.154)	0.179 (0.223)

F	14.741***	16.858***	15.362***	14.646***
Adj. R^2	0.289	0.319	0.298	0.287
N	238	238	238	238

Notes: ** and *** indicate significance at the 5% and 1% level, respectively. T-statistics are in parentheses.
Source: Authors' calculation

4.4. Non-linear effects

Since working capital is of dynamic nature, its components keep on changing, which makes it difficult for managers to maintain the desired level (Altaf and Shah, 2018). An optimal level of working capital can balance a company's benefits and costs, thus maximizing profitability (Baños-Caballero *et al*., 2012). Baños-Caballero *et al*. (2012), Mun and Jang (2015), Pais and Gama (2015), Lyngstadaas and Berg (2016), Boţoc and Anton (2017), Altaf and Shah (2018), Korent and Orsag (2018), Ahangar (2021), Anton and Nucu (2021), and Rey-Ares *et al*. (2021) provide evidence for the existence of non-linear relationship between working capital components and firm profitability. To investigate this non-linearity, we use the following regression models:

$$ROA_{i,t} = \beta_0 + \beta_1 INV_{i,t} + \beta_2 INV^2 + \beta_3 SIZE_{i,t} + \beta_4 GOW_{i,t} + \beta_5 LEV_{i,t} + \beta_6 CR_{i,t} + \beta_7 CL_{i,t} + \beta_8 GDP_{i,t} + \varepsilon_{i,t} \quad (5)$$

$$ROA_{i,t} = \beta_0 + \beta_1 ACR_{i,t} + \beta_2 ACR^2 + \beta_3 SIZE_{i,t} + \beta_4 GOW_{i,t} + \beta_5 LEV_{i,t} + \beta_6 CR_{i,t} + \beta_7 CL_{i,t} + \beta_8 GDP_{i,t} + \varepsilon_{i,t} \quad (6)$$

$$ROA_{i,t} = \beta_0 + \beta_1 ACP_{i,t} + \beta_2 ACP^2 + \beta_3 SIZE_{i,t} + \beta_4 GOW_{i,t} + \beta_5 LEV_{i,t} + \beta_6 CR_{i,t} + \beta_7 CL_{i,t} + \beta_8 GDP_{i,t} + \varepsilon_{i,t} \quad (7)$$

$$ROA_{i,t} = \beta_0 + \beta_1 CCC_{i,t} + \beta_2 CCC^2 + \beta_3 SIZE_{i,t} + \beta_4 GOW_{i,t} + \beta_5 LEV_{i,t} + \beta_6 CR_{i,t} + \beta_7 CL_{i,t} + \beta_8 GDP_{i,t} + \varepsilon_{i,t} \quad (8)$$

Results of Models (5)-(8) are shown in Table 6. It is evident in Model (6) that the estimated coefficient of ACR is negative and the estimated coefficient of ACR^2 is positive. These coefficients are statistically significant at the 5% level, implying that profitability decreases with the investment in accounts receivable at low levels, and increases at high level. Specifically, with other things being equal the profitability of agricultural listed companies increases when the company has on average for more than 122 days. This is in line with the findings reported by Lyngstadaas and Berg (2016). The results indicate that a quadratic relationship does not exist between INV, ACP, and CCC and ROA.

However, Altaf and Shah (2018) in a study of Indian companies confirmed an inverted U-shaped relationship between WCM (i.e. INV, ACR, ACP, and CCC) and firm profitability. Rey-Ares *et al*. (2021) confirmed a convex or U-shaped relationship between inventory investment and ROA.

Table 6: Regression results of Models (5)-(8)

Variable	Model (5)	Model (6)	Model (7)	Model (8)
Constant	-0.512*** (-3.830)	-0.481*** (-3.731)	-0.518*** (-3.907)	-0.512*** (-3.833)
INV	6.073×10^{-6} (0.258)			
INV^2	1.869×10^{-11} (0.006)			
ACR		-0.001*** (-3.490)		
ACR^2		4.101×10^{-6}** (2.253)		
ACP			0.0003 (1.255)	
ACP^2			-3.093×10^{-7} (-0.344)	
CCC				-1.487×10^{-5} (-0.609)
CCC^2				2.631×10^{-9} (0.833)
SIZE	0.025*** (5.220)	0.024*** (5.210)	0.025*** (5.312)	0.025*** (5.237)
GROW	0.053*** (4.511)	0.049*** (4.249)	0.055*** (4.725)	0.052*** (4.336)
LEV	-0.171*** (-7.395)	-0.155*** (-6.775)	-0.178*** (-7.637)	-0.172*** (-7.443)
CR	0.033 (1.148)	0.085*** (3.148)	0.037 (1.415)	0.043 (1.463)
CL	0.029 (1.112)	0.014 (0.599)	0.025 (0.974)	0.025 (0.973)
GDP	0.187 (0.232)	0.126 (0.161)	0.105 (0.132)	0.209 (0.260)
F	12.842***	15.647***	13.405***	12.885***
Adj. R^2	0.286	0.331	0.295	0.286
N	238	238	238	238

Notes: ** and *** indicate significance at the 5% and 1% level, respectively. T-statistics are in parentheses.
Source: Authors' calculation

4.5. Robustness check

ROIC (measured by the ratio of operating profit after tax to book value of invested capital) is used as a proxy for ROA. The findings are similar to the results in Tables 5 and 6, which suggests that our conclusion is robust.

5. Conclusions

The paper's aim is to analyze the relationship between WCM and the profitability of agricultural listed companies in China. The study is conducted on a sample of 37 companies from 2012 to 2019. The main conclusions of this paper are twofold. First, ACP has a negative impact on firm profitability. Second, we find a U-shaped relationship between ACR and firm

profitability. At lower levels of ACR, firm profitability reduces and at higher levels, firm profitability increases. Hence, the performance of agricultural listed companies can be enhanced by adopting suitable working capital strategies.

There are some implications of this research that could be important for corporate managers. Firstly, agricultural listed companies should adopt a moderate working capital policy and maintain a reasonable level of current assets and current liabilities. They should also improve the efficiency of working capital turnover.

Secondly, it is necessary for agricultural listed companies to formulate an effective inventory control policy. They should keep reasonable inventory stock and deal with the overstocked products as soon as possible. The coordination management of funds and inventory in financial department and warehouse department can enable enterprises to have a clear understanding of inventory management. Managers should arrange the work reasonably, control the quantity of work-in-process inventories, and make a reasonable sales plan by analyzing the market situation.

Thirdly, managers can use a restrictive credit policy that gives customers less time to make their payments. They should strengthen the management of accounts receivable, improve its turnover rate, and reduce the loss of bad debts. On the basis of industrial chain integration, they can actively broaden financing channels by providing upstream enterprises with financial services such as accounts receivable discount and inventory financing.

Fourthly, managers can reasonably decrease the spending cycle to a possible minimum level and strengthen the management of accounts payable. Such companies should improve their business reputation and make full use of accounts payable and commercial paper, which can enhance their short-term financing ability.

Finally, government should assist agricultural listed companies in terms of training qualified staff to ensure effective WCM.

This paper has some limitations that must be acknowledged. First, we only focus on agricultural companies, and the findings of this study may not be directly applicable to other industries. Second, future research is needed in order to see whether corporate governance influences the relationship between WCM and firm profitability. Furthermore, future studies can analyze the role of working capital in overcoming the crisis generated by the COVID-19 pandemic.

6. References

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