

# The Impact of Supply Chain Finance on the Financial Performance of the Pharmaceutical Industry of Indonesia

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The aim of the current study is to examine the effect of supply chain finance (SCF) on the financial performance (FP) of the pharmaceutical industry of Indonesia. For this purpose, data was collected from 2009 to 2018 when the pharmaceutical industry has made a positive recovery after the global financial crisis. With the objective of examining the non-linear impact of SCF on the performance of the pharmaceutical industry of Indonesia, the model was analysed by employing the Pooled regression (POLS), fixed effects model (FEM) and random effects model (REM). Regression analysis is performed to address potential endogeneity, heteroskedasticity, and autocorrelation issues. The key findings of the study have shown that that SCF exerts a U-shaped non-linear impact on the performance, so the optimal threshold in the impact can be defined by the minimum of CCC\*. In addition, the paper reveals that FP is significantly related to firm-specific variables like firm size (SIZE) and capital structure (CAP) and other macroeconomic (economic growth (EG)) determinants. In short, SCF does not frequently exert a positive impact on how its participants perform. Their restructuring occurred by the lowest threshold (CCC\*) this makes this correlation under go considerably large changes. Therefore, this empirical evidence is essential in giving the management and scholars a comprehensive perspective on the relationship between SCF and FP.

**Key words:** *Supply chain finance, financial performance, pharmaceutical industry, Indonesia.*

## Introduction

Supply chain management (SCM) can be defined as bringing together numerous partners which are associated by the downstream flow of requisite materials, and an upstream cash flow, as well as information flowing both ways (L. Zhang, Hu, & Zhang, 2015). Usually, SCM requires more attention being paid on material flows of physical commodities from producers to end customers. Due to the current global economic recession it was demonstrated that effective administrating of financial flow inside SCM could be as essential as managing flow of physical services and goods. A 2007 survey conducted by Demica Limited found that the majority of the banks were actively developing a range of products of trade finance that analyse the growing demand from Citibank which approximately makes transactions of \$2.1 trillion (USD) every day in terms of trade financing. This trade financing generally consists of loans to the suppliers for the purposes of purchasing raw materials, finished goods and components. This is also evident in the 2013 GDP of U.S. where \$17 trillion (USD), was used primarily to support sourcing processes around the world. Therefore, innovation in trade financing and specifically supply chains of finance (SCF) programs are indicated as controlling, managing and planning all the processes and transaction activities related to cash flow among SC stakeholders in order to enhance working capital performance (Ali, Gongbing, & Mehreen, 2019; Santoso, 2016; Purnomo et al., 2020).

This needs to be undertaken by factoring processes as well as reverse-factoring of receivables and inventories. Mostly speaking, SCF emphasizes on those strategies which have been used in organisations to find out their internal procedures and the solvency of external SC partners. SCF is not only finance and SCM. There is also symbiotic influences that exist inside the combination of SCM and finance, which makes it completely greater than the sum of these parts. In this way attention is gained through banks and also complex dynamics that exist in SCF strategies that substantiate the influences of SCF programs and have substantial future impacts on all the members of SC. For instance, finance is connected to the funding of firms, our comprehensive definition about SCF is:

Despite that fact that literature has explored different features of physical flows of SC (for the purpose overview, see (Asgari, Nikbakhsh, Hill, & Farahani, 2016), at this stage little research has been conducted examining the corresponding financial flows of SC (Li, Mai, Zhang, & Tian, 2019; L. Zhang et al., 2015). One executive has stated that international integration considerably boosts the imports and exports of pharmaceutical businesses in Indonesia. However, this force also brings a number of management challenges which creates a demand to adjust organisation's operation and competitive ability (Santoso, Kristiyana & Farida, 2020). When facing these challenges, the management of supply chains and supply chain finance is a major issue to be given more academic attention. Indonesia has experienced many predicaments caused by the global financial crisis, so it is not easy to

access to credit institutions as well as the stock market. Therefore, pharmaceutical firms frequently aim to have improvement in supply chain finance in order to optimise their working capital. More than that, supply chain finance helps lower capital cost (Ali et al., 2019), and more specifically improves financial performance (Wu, Wang, Xu, & Chen, 2019; T. Zhang, Zhang, & Pei, 2019; Wiyati et al., 2019). Despite its importance in boosting how firm performance, this topic has not been common in empirical research. Only a few scholars, namely, (Um & Kim, 2019) and (C. Zhang, Zhu, Curiel-Sosa, & Bui, 2020) have investigated the impact of supply chain finance on financial performance. Interestingly, all these studies report that supply chain finance helps raise the performance of its participants. However, is supply chain finance always positively correlated to financial performance? Does the optimal threshold really exist in this correlation? This is a big research gap which needs to be filled. Accordingly, this study is conducted with the aim of providing the first empirical evidence on the causal correlation between supply chain finance and pharmaceutical firms financial performance in Indonesia.

### **Literature Review and Hypothesis Development**

The performance of supply chain finance is usually measured by the indicator of the cash conversion cycle (Zhao, Liu, Zhang, & Huang, 2017), which is defined as the period starting from the cash outlay to cash recovery (Buia, 2020; Um & Kim, 2019; Sessu et al., 2020). According to (Ali et al., 2019), the decrease in the cash conversion cycle makes firms speed up the cash conversion through a lower cost of capital. Also, this indicates a robust financial connection in the supply chain (Bahremand & Karimi, 2018), so its participants perform better. Contrarily, a bad performance of supply chain finance brings its participants difficulties in raising their trade credit for suppliers and stabilising supply chains which exert large influences on their performance. It can be stated that supply chain finance plays a vital role in the optimisation of financial flows (Abdollahzade, Shahbazi, & Rajabzadeh Ghatari, 2018), and working capital (Ameen & Shahzadi, 2017) and can lead to the stabilisation of the entire supply chain (Zhan, Li, & Chen, 2018); and can particularly increase firm performance (Ho, Zheng, Yildiz, & Talluri, 2015; Wu et al., 2019).

Although supply chain finance has been increasingly analysed since the beginning of the twenty-first century (R. Zhang, 2015), especially after the global financial crisis (Bendoly, 2016). The impact of supply chain finance on firm performance is only examined by a few researchers, namely (Um & Kim, 2019) and (C. Zhang et al., 2020) who intriguingly reveal a positive correlation. In other words, a short cash conversion cycle stimulates the supply chain participants to perform more effectively. Further, the performance is also influenced by some control variables that include some that are firm-specific and some macroeconomic factors such as capital structure (Buia, 2019, 2020; De Goeij, De Graaf-Muller, & Steeman, 2016; Dehghan & Shorvarzi, 2017; T. Doan, 2020b; Mathivathanan, Govindan, & Haq, 2017;

Pużyńska, Kulig, Halecki, Lepiarczyk, & Pużyński, 2018; Shamout & Elayan, 2018; Soto-Silva, Nadal-Roig, González-Araya, & Pla-Aragones, 2016; T. Zhang et al., 2019), firm size (De Goeij et al., 2016; Mathivathanan et al., 2017; Muhtaseb & Daoud, 2017), and economic growth (Buia, 2020; ROMLI, 2018; Santoso, 2020). Accordingly, a healthy economy and a considerable number of participants facilitate the improvement of performance. Also, increased loans (especially medium- and long-term ones) and their inefficient uses place more financial burden on firms negatively influencing their performance. Based on these, the author has developed a model regarding the non-linear impact of supply chain finance on the performance of Indonesia's pharmaceutical industry.

No studies explicitly investigate the influences of SCF within presenting literature, while multiple academic studies have examined the management of cash flow through other frameworks (Oleghe, 2019). In the extant literature, there are not many studies that clearly examine the effect of SCF on financial performance (He, Wang, & Jiang, 2016). The cash of conversion cycle (CCC) defined as a composite measure that is basically a combination of three measures DSO, DIO, and DPO in a particular matrix which can be representative of firm liquidity (Geunes & Pardalos, 2003; T. Zhang et al., 2019). As a result, an analytical measure of our study being an indicator of an organisational financial performance are Tobin's q that is a ratio of the replacement value of firm assets and its market value (Kroes & Manikas, 2014; T. Zhang et al., 2019). On the other hand, if the value of Tobin's q ratio has been provided in the middle of 0 and 1 it means that cost of replacing organisational assets is greater than the stock value of the firm. Therefore, the may be considered as an undervalued asset within the market. On the contrary, if the Tobin's q ratio is more than 1 it means that market values reflect the organisation to be more valuable than the sum of its own assets. The framework of SC finance is described that assets which remain undertaken through an organisation can reside outside of organisational boundaries can also be owned by its customers and suppliers.

Few empirical pieces of research have explored the association between the performance of financial changes and the organisations' SCF strategies (Paulovich, 2014). Operating on the basis of previous research theories, at it is possible to analyse how changes in an organisations' SCF strategies have influences on financial performance. Analysis allows for recognition of the most impactful strategy of SCF for increasing focal organisational financial performance. Performance of working capital is measured by the CCC that is a linear mixture of three metrics of cash flow like DSO, DIO, and DPO. Individually these measures signify the specific elements of a business 'Balance Sheet' or 'Cash Flow Statement', and these element's association to measure the effect of management strategy on firm's liquidity (Cannella, Bruccoleri, & Framinan, 2016). The earlier research has found the non-linear association between firm performance and inventories (Oleghe, 2019). In this way, it is not surprising that vat analytical and conceptual study on inventory theory recommended that at

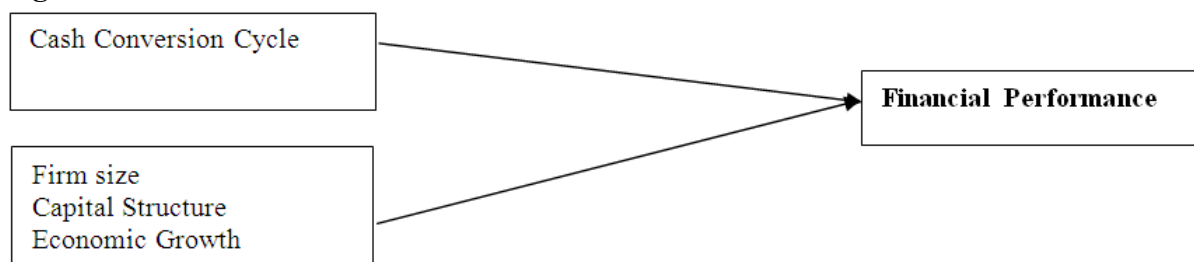
this place provide an optimal inventory level for an organisation. A variation from the optimal level (both decreases and increases) advocates that these variations decrease the firms financial performance (Paulovich, 2014).

**H1:** The cash conversion cycle has a significant relationship with the financial performance of the pharmaceutical industry of Indonesia.

## Research Framework

Based on the previous discussion, the conceptual framework of the study is formulated. In the current framework, financial performance (FP) is the dependent variable. Cash conversion cycle is an exogenous variable. In addition, firm size, capital structure, and economic growth are the control variables of the study. All of these following variables are depicted in Figure 1 below.

**Figure 1.** Research Framework



## Data and Methodology

The paper uses data from the World Bank and financial statements of 20 pharmaceutical industry listed on the Indonesian stock exchange. These data points were collected from 2009 to 2018 when the pharmaceutical industry made a positive recovery after the global financial crisis. This was done with the objective of examining the non-linear impact of supply chain finance on the performance of the pharmaceutical industry in Indonesia. The author analyses the model by employing Pooled regression (POLS), fixed effects model (FEM) and the random effects model (REM). Regression analysis is performed to address potential endogeneity, heteroskedasticity, and autocorrelation issues. Following that, Generalised Method of Moment (GMM) is adopted to repair problems in regression-based hypotheses (if any) and potential endogeneity (L. T. T. Doan, Amer, Lee, Phuc, & Dat, 2019; Mokgokong, 2014; Shu, Qu, & Wu, 2020). Specially for the non-linear impact model, the GMM is superior to other models (Bui, 2020a). Based on the earlier results, it can be seen that financial performance (FP) is measured by return on assets (ROA) while supply chain finance is measured by a cash conversion cycle (CCC) which is defined as the period starting from the cash outlay to cash recovery. Additionally, squares of cash conversion cycle (CCC2) is

included in the paper to consider the non-linear effect of supply chain finance on the performance of Indonesia pharmaceutical firms, which is its novelty. About control variables, firm size (logarithm of total assets - SIZE), capital structure (total debt to total assets - CAP), and economic growth (EG). Consequently, the following model is proposed:"

$$FP_{it} = \beta_0 + \beta_1 CCC_{it} + \beta_2 CCC^2_{it} + \beta_3 SIZE_{it} + \beta_4 CAP_{it} + \beta_5 EG_t + \epsilon_{it}$$

**Dependent Variable:** financial performance (FP).

**Independent Variables:**

Cash conversion cycle (CCC), squares of cash conversion cycle (CCC<sup>2</sup>).

Control variables: Firm size (SIZE), capital structure (CAP), economic growth (EG).

**Empirical Results**

Variable correlations are shown in Table 1 as follows,

**Table 1:** Variable correlations

	FP	CCC	SIZE	CAP	EG
FP	1.000				
CCC	0.086	1.000			
SIZE	0.2292	-0.1700	1.000		
CAP	0.5223	0.3099	0.2331	1.000	
EG	0.0048	0.0534	0.0765	0.0868	1.000

Table 1 reveals that cash conversion cycle (CCC) and capital structure (CAP) are negatively correlated to financial performance (FP) while firm size (SIZE) and economic growth (EG) are positively associated with financial performance (FP). Results of analysis by Pooled regression model (POLS), fixed effects model (FEM), and random effects model (REM) are shown in Table 2 as follows:

**Table 2:** Results of estimating research models using POLS, FEM, REM methods

FP	POLS	FEM	REM
Constant	-0.0558	-0.3456***	-0.1071*
CCC	0.0001	0.0001	0.0001*
CCC <sup>2</sup>	-24.90	-28.90	-23.02
SIZE	0.0049*	0.0294***	0.0092**
CAP	-0.0512***	-0.0499***	-0.0526***
EG	0.4168	-0.1347	0.3257
R2	29.95%	32.34%	28.63%

From Table 2, it can be seen that F-test is significant at the 1% level while Housman test has the 1 per cent level of significance. Consequently, it can be inferred that the result of the fixed effects model (FEM) shows its appropriateness.

**Table 3:** Results of tests on Multicollinearity, Heteroscedasticity and Autocorrelation

Multicollinearity		Heteroscedasticity test	Autocorrelation
Variable	VIF		
CCC	4.47		
CCC <sup>2</sup>	5.16		
SIZE	1.09	chi2 (20) = 19,884.48	F(1, 19) = 3.514
CAP	1.36	Prob>chi2 = 0.000***	Prob>F = 0.0763*
EG	1.03		
	Mean VIF = 2.62		

Table 3 reveals that there are no serious problems of multicollinearity. Meanwhile, heteroscedasticity and autocorrelation issues exist. Accordingly, the GMM is chosen to investigate the non-linear impact of supply chain finance on financial performance. The GMM is superior in controlling heteroscedasticity, autocorrelation and potential endogeneity issues (van den Berg & Huang, 2019).

**Table 4:** Model estimation results by GMM method

	FP	Coef.	P> z
Constant		-0.1863	0.000
CCC		-0.0003	0.009
CCC <sup>2</sup>		1.38*10 <sup>-7</sup>	0.000
SIZE		0.0140	0.001
CAP		-0.0348	0.081
EG		1.2345	0.013

Significance level Wald chi2(4) = 101.42 Prob>chi2 = 0.000\*\*\*  
Arellano-Bond test for AR(2) in first difference z = 1.35 Pr>z = 0.176

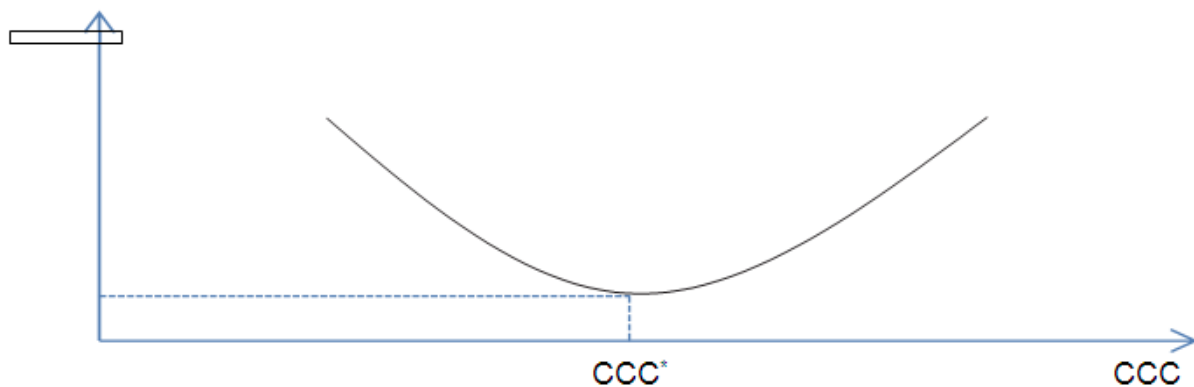
Sargan test chi2(2) = 1.76 Prob>chi2 = 0.416

**Note:** “\*, \*\* and \*\*\* indicate significance at the 10%, 5% and 1% level, respectively.”

Results of the Sargan test indicate that the instrumental variables adopted in the model are appropriate. Also, according to the Arellano-Bond test’s results, autocorrelation does not really exist (Table 4). It can be concluded that the results are valid. As can be seen from the results, financial performance (FP) is negatively influenced by CCC (-0.0002) and positively influenced by CCC<sup>2</sup> (1.39×10<sup>-7</sup>) at the 1% level of significance. These are consistent with what (Ramanathan & Gunasekaran, 2014) and (Shu et al., 2020) stated. These papers have reported the negative association between cash conversion cycle (CCC) and squares of cash

conversion cycle (CCC2) of financial performance (FP). Alternatively, the U-shaped non-linear effect of supply chain finance on financial performance exists, which is a novelty of this study. Thus, the low performance of supply chain finance (cash conversion cycle (CCC)) will lower financial performance (FP). However, when this decrease reaches its minimum (CCC\*), the firm will undergo restructuring for its recovery and improvement (Fig. 2). Accordingly, the initial research question will be explained as follows: the relationship between supply chain finance and financial performance is U-shaped having a non-linear impact, i.e. supply chain finance does not always exert a positive influence on how the financial perform. Concurrently, there is an optimal threshold for this impact, alternatively the minimum of CCC\*.

**Figure 2.** Non-linear impact of SCF on financial performance



Besides, financial performance (FP) is significantly correlated with the control variables of firm-specific and macroeconomic factors (namely economic growth (EG)). Specifically, firm size (SIZE) positively affects (0.0130) financial performance (FP) at the 1% level of significance. This corroborates results of (Buia, 2019; Daud, Norwani, Mansor, & Endut, 2016; Konadu, 2018; Mathivathanan et al., 2017). Meanwhile, capital structure (CAP) is negatively (-0.0358) associated with how the financial performance at the 10% level of significance. This result is intriguingly what (T. Zhang et al., 2019), (Mathivathanan et al., 2017; Pettit, Fiksel, & Croxton, 2010), (Buia, 2019; T. Doan, 2020a; Shibin et al., 2016; Tan, Kannan, Handfield, & Ghosh, 1999) and (De Goeij et al., 2016; Shamout & Elayan, 2018; T. Zhang et al., 2019) have found previously. Moreover, economic growth (EG) positively influences the performance (1.2335) at the significance level of 5 per cent. This contributes to the result of (Bui, 2020).

## Conclusions

The paper has succeeded in giving first empirical evidence on the non-linear impact of supply chain finance on the financial performance. Particularly, the inefficiency of supply chain finance will cause a fall in the firms financial performance. Nevertheless, when this fall





reaches its lowest threshold, firm restructuring will be done in order to recover and improve turnover. Thus, it can be deduced that supply chain finance exerts U-shaped non-linear impacts on performance, so the optimal threshold in the impact can be defined by the minimum of CCC\*. In addition, the paper reveals that financial performance is significantly related to firm-specific size (SIZE) and capital structure (CAP) and macroeconomic (economic growth (EG)) determinants. In short, supply chain finance does not frequently exert a positive impact on how its participants perform. Their restructuring occurred by the lowest threshold (CCC\*) makes this correlation undergo considerable changes. This empirical evidence is essential in giving the management and scholars a comprehensive perspective on the nexus between supply chain finance and financial performance. However, due to the limited dataset, the author is not able to investigate this correlation employing cubic or quartic function for a longer observation on this non-linear impact. This may be an interesting proposal for future research.

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