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Y. Bekbauov[1], K. Bekbolat[2], U. Choban[3]
[1,2,3]Suleyman Demirel University, Kaskelen, Kazakhstan

WORKING CAPITAL'S IMPACT ON OIL INDUSTRY PROFITABILITY

Abstract. Working capital management (WCM) is an important aspect of financial management to ensure efficient use of current assets and liabilities to balance between profitability and liquidity. Even though there is no absolute perfect answer, financial managers need to formulate a proper strategy for the working capital. WCM in the oil industry is particularly important due to the following reasons; a) There is a huge demand for its products, b) Oil and its products are key inputs for other manufacturing industries, c) Oil prices are too sensitive to political, social and economic factors, d) Crude oil extraction capacity periodically changes. Therefore, firms in this sector need to have flexible production levels so that they keep a balance between the purchase of crude oil and sales of processed oil. A multiple OLS regression method was applied to examine the effect of WCM on profitability in the Oil Industry. The data contained 231 observations from 21 oil companies listed on NYSE and KASE between 2010 and 2020 years. Findings indicated that downstream oil companies need to focus more on the management of credit policies, debt management, and fixed assets management.

Keywords: Working Capital, Oil Firms, Profitability, Cash Conversion Cycle Abstract

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Аңдатпа. Айналым капиталын басқару (АКБ) кірістілік пен өтімділік арасындағы тепе-теңдікті қамтамасыз ету үшін ағымдағы активтер мен міндеттемелерді тиімді пайдалануды қамтамасыз ету үшін қаржылық менеджменттің маңызды аспектісі болып табылады. Абсолютті идеалды жауап болмаса да, қаржы менеджерлері айналым қаражатына қатысты дұрыс стратегияны тұжырымдауы керек. Мұнай өнеркәсібіндегі АКБ әсіресе келесі себептерге байланысты маңызды; а) оның өнімдеріне үлкен сұраныс бар, б) мұнай және оның өнімдері басқа өңдеу салалары үшін негізгі ресурстар болып табылады, в) мұнай бағасы саяси, әлеуметтік және экономикалық факторларға тым сезімтал, г) шикі мұнай өндіру қуаты мезгілмен өзгеріп отырады. Сондықтан сектордағы фирмалар шикі мұнайды сатып алу мен өңделген мұнайды сату арасындағы тепе-теңдікті

сақтау үшін икемді өндіріс деңгейіне ие болуы керек. АКБ-ның мұнай өнеркәсібіндегі кірістілікке әсерін зерттеу үшін OLS бірнеше регрессия әдісі қолданылды. Деректер 2010 жылдан бастап 2020 жылға дейінгі кезеңде NYSE және KASE-де тіркелген 21 мұнай компаниясынан 231 байқауды қамтыды. Нәтижелер мұнай компаниялары несие саясатын басқаруға, қарызды басқаруға және негізгі құралдарды басқаруға көп көңіл бөлуі керек екенін көрсетті.

Түйін сөздер: Айналым Капиталы, Мұнай Компаниялары, Кірістілік, Ақшаны айырбастау циклі

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Аннотация. Управление оборотным капиталом (УОК) является важным аспектом финансового менеджмента для обеспечения эффективного использования текущих активов и обязательств для обеспечения баланса между прибыльностью и ликвидностью. Несмотря на то, что абсолютного идеального ответа не существует, финансовым менеджерам необходимо сформулировать правильную стратегию в отношении оборотного капитала. УОК в нефтяной промышленности особенно важен по следующим причинам; а) Существует огромный спрос на его продукцию, б) Нефть и ее продукты являются ключевыми ресурсами для других отраслей обрабатывающей промышленности, в) Цены на нефть слишком чувствительны к политическим, социальным и экономическим факторам, г) Мощности по добыче сырой нефти периодически меняются. Поэтому фирмам в этом секторе необходимо иметь гибкие уровни производства, чтобы они сохраняли баланс между покупкой сырой нефти и продажей переработанной нефти. Для изучения влияния УОК на прибыльность в нефтяной промышленности был применен метод множественной регрессии OLS.

Данные содержали 231 наблюдении от 21 нефтяной компании, зарегистрированной на NYSE и KASE в период с 2010 по 2020 годы. Результаты показали, что нефтедобывающим компаниям необходимо уделять больше внимания управлению кредитной политикой, управлению долгом и управлению основными средствами.

Ключевые слова: Оборотный Капитал, Нефтяные Компании, Прибыльность, Цикл Конвертации Денежных Средств

Introduction

WCM is an important aspect of financial management, through which optimization leads to a competitive advantage in daily operations and in formulating a strategy for potential growth (Deloof 2003). Pass and Pike (1984) defined that components of working capital such as cash, receivables,

inventories, and payables are used to reach and maintain the optimum balance between profitability and liquidity. Operations with net working capital and the efficient use of them are critical to ensure profitability & liquidity (Peel and Wilson 1996). The importance of working capital is demonstrated in a trade-off between the risk and return regarding the current assets of any company (Dash and Hanuman 2007). Profit maximization is pointed as the first priority for all business entities, but increasing profit is the same as increasing interest expenses probably harms the company by leading to bankruptcy. Eljelly (2004) states that firm managers must understand and control the concept of the cash conversion cycle (CCC), which is the time lag between the purchase of raw materials and collection from sales. The high time lag means that the firm has made a high investment in current assets implying more profitability until the costs outweigh the benefits. Shin and Soenen (1998) noted that CCC should be decreased to create value for shareholders by avoiding risks in debts. Other researchers like Wang (2002), and Anand (2001) maintained the theory of credit period or CCC reduction to reach the optimum level where the profit and liquidity level would probably be balanced.

Starting from the mid-1970, the oil industry has become the largest industry in the world by providing 98% of fuel for the global logistics sector. Economies of many countries have been extensively dependent on oil and its products, of which demand is estimated to increase by 50% by 2035 (Voelcker 2014). Oil consumption has been a significant aspect of economic development, as the most advanced economies demand a high level of oil usage (EIA, IEO 2014). The oil worldwide companies are divided into three categories: upstream, midstream, and downstream, which perform different functions for each other (Scott 2021). While the crude oil is precisely explored and extracted by the upstream, midstream companies successfully ship and deliver to manufacturing companies (IFS 2019). Downstream companies purchase crude oil from other countries or from midstream companies and after that convert crude oil into finished goods or products (Skylar 2021). The profitability of oil manufacturing companies is directly related to the global market of oil. The importance of the oil industry makes the oil price subject to constant fluctuations (M. Stocker 2018). The oil price is fluctuated due to particular black swans and market efficiency, where the main determination of oil price is supply and demand (Lawal 2018). Finally, oil extraction is concentrated in certain regions, which addresses the importance of geopolitics.

Nevertheless, as Gabriel (2015) noted, the oil industry is very volatile and therefore highly regulated by external authorities like OPEC. Most of the global oil suppliers and participants of the oil market mainly consider working capital as available crude oil stocks and their transportation from upstream and midstream oil companies (E. Runyora, 2012). Current research examines only downstream oil manufacturing companies, which use crude oil as working

capital and actively manage them to hedge potential supply loss or surplus from their suppliers (EIA 2021). Potential supply collapse from extraction companies has a negative impact on oil prices in a global market through adverse effects on manufacturing companies' operations (Addison & Roe 2018). Price downsides from lack of sales are not beneficial for oil companies of which working capital is at high levels (J. Chen, M. Johnston 2021). Crude oil production capacity periodically changes because the price and external demand are generally volatile. For example, crude oil prices decreased to 20$ per barrel in spot market and -40$ per barrel in futures market during the COVID-19 crisis (Kelly 2020). Although OPEC imposed some regulations on oil production, the oil price war between Saudi Arabia and Russia resulted in oil prices reaching their minimum. Therefore, massive oil production has a negative influence on the profitability of downstream oil companies (Khedery & Turak 2020).

Some related studies like Nyakundi (2003), Waweru (2011), and Njenga (2011) mostly focused on the effect of WCM on profitability and the efficiency of its components. M. Mary (2008) carried out WCM and financial performance on SME firms. Jeremiah (2006) prescribed the relationship between WCM and NSE-listed firms regarding economic activity. However, studies were less about WCM specifically in the oil industry, which was the unexplored area in the working capital financing literature. Thus, the study intends to appeal to the following research question: Can working capital management policy affect the profitability of firms in the oil industry?

Literature Review

The purpose of WCM is to meet the company's short-term liabilities through efficient use of current assets (Peel and Wilson 1996). The WCM is the most efficient when current assets are financed by interest-free current liabilities, which are more beneficial than long-term debts or equity (Long, Malitz, and Ravid 1993). Current asset operations depend on the nature of the business, growth potentials, and risk pattern of the industry not taking into account the manufacturing type of its entity (Lazaridis & Tryfonidis 2006).

Receivables and inventories build the structure of the operating cycle theory, as the cash flow comes from these important elements of current assets.

An operating cycle theory reflects the statement of firms' operating activities about current assets by focusing on production, collection, and sales (Shin and Soenen 1998). The theory mainly ignores account payables; pointing out that they have no sufficient influence on the usual course of a firm's operations. Richards & Loughlin (1980) suggested using the CCC theory, which is the days that it takes to invest in inventory and convert it to cash. CCC clearly emphasizes all factors related to the cash inflows and outflows of a firm. As an integrated mechanism, CCC refers to the time lag between payment for purchases and collection from sales of finished goods (Brigham and Houston 2004). It heavily relies on ratios: payable deferral period (PDP), inventory conversion period

(ICP), and days sales outstanding (DSO) that will express the final result in days. CCC should be decreased by reducing production and selling periods, and by extending payable days (Ehrhardt and Brigham 2008). It is probably to reach the low required WC and high free cash flow to raise profits without harming sales and rising costs.

Economic order quantity (EOQ) efficiently balances ordering and holding costs to lower the total cost of inventory (Erlenkotter 1989). Under this theory, the demand is always constant and inventory comes on time when it is empty in stock, but it is not applicable to use in reality (Mennell 1961). Worldwide big industries, like oil, delay the transportation of inventories and keep demand flexible for raw materials, which are not constant in extraction. Demand for produced oil is also not constant, as most vehicles use more fuel for heating in winter. While holding cost increases from inventory and order level, the ordering cost declines to lead to a dilemma between two costs (Harris 1990). The working capital cares about the company's policy in minimizing its cost, which will rule the direction of further management of costs.

WCM policy is estimated or maintained by factors and characteristics: market or industry capacity, demand, and supply in particular industries, seasonal and overtime requirements for inventories (Block and Hilt 1992). In addition, a conservative approach is the most expensive and requires more investment in current assets, especially in stocks and cash (Copeland and Weston 1988). The conservative policy provides safety to avoid illiquidity costs by the absence of current liabilities, but decreases returns and assets turnover ratio. On the other hand, Soenen (1993) stated that an aggressive approach is appropriate for managing a tight portion of current assets, which are financed by trade credits and should be minimized as well as CCC in days. Even though having high risk in sales and dependency on current liabilities, Gitman (1997) stated that aggressive one is the most profitable compared to conservative and moderate policies. Similarly, cash conversion theory claims to convert accounts receivables and inventories into cash as much as possible by accelerating the collection of cash inflow and postponing the allocation of cash outflow (Soenen 1993).

Another risk regarding the inventory is foreign exchange risk that highly affects the expense level of oil companies (Njihia 2013). While making purchases of oil, mainly in international oil trading USD currency, importers perhaps face devaluation in their currency and pay more for the initial cost (Reboredo, Rivera 2013). This situation is embarrassing for oil importers who constantly purchase crude oil for manufacturing, as they purchase at a high rate and sell it in domestic currency.

Downstream companies mainly manufacture crude oil, refine oil, deliver and trade, advertise, and retail to customers, which production straightly depends on the availability of crude oil (Chen 2021). Crude oil reservoirs become more

deficit over time due to the high demand in oil production over the last 80 years (R. Janet 2013). Nowadays, heavy crudes are pumped more often than thinner crudes that are manufactured at high efficiency and at a low cost (Targeon 2017). The land and offshore drilling from upstream companies are expensive in requiring massive structure and attachment of the platform to the bottom of the ocean (Morse 2018). After the installation of necessary structure drilling or extraction approaches, the oil rigs will be at the risk of high land pressure and weather disasters (Stratiev, Dinkov 2010). As this raw material is gained from ancient organic materials under tons of sediment and tectonic tiles, they are not recoverable and their formulation will take millions of years (Vasily, Raphael 2003). Therefore, oil reservoirs will be empty after some years of extraction or abandoned due to geopolitics.

The sustainability of working capital level in a global market is sufficient, as the oil influences the growth rate and inflation level of any country leading to the fluctuation of overall transportation and manufacturing costs (Elder, Serletis 2010). Considering the stability of crude oil production volume, downstream companies should examine the availability of crude oil capacity. Crude oil supply uncertainties could harm manufacturing companies and cause deviation in demand, government, and investors (Adelman 1993). The active management of working capital helps to soften the effect of supply loss by geopolitical events and disasters of weather that raise prices (Hamilton 1996). The price increase is costly and takes time to change to another manufacturing type and find new crude oil sources by challenging companies (Lynch 2002). The WCM is sufficient in this situation in controlling the level of inventories depending on the market price level. It also handles the purchases of crude oil from extraction companies regarding the market price level (Miller & Sorrell 2014). The price of oil is highly influenced by the Organization of Petroleum Exporting Countries (OPEC) taking into consideration 71% of worldwide crude oil reservoirs and 36% of total oil production (EIA 2022). Only large changes in prices can influence overall production, as market participants slowly react to the shortterm corrections from OPEC in a global market.

The effect on the oil companies' profitability was demonstrated by several theories and concepts, which are approached by WCM. The current study examined WCM from different aspects and explored the influence on profitability by decreasing costs by EOQ, and WCM policies. Besides, the oil industry and its significance were discovered in order to understand the full process of oil manufacturing companies regarding their working capital. So, the objective of this research refers to the effect of working capital on profitability in the oil industry.

Methodology

The regression models test the existence and magnitude of one or more independent variables' effect on the dependent variable (C. Burja 2011). While

the regression model is used to examine the effects of variables on each other by the general formula (y=a+bx+e), correlation analysis is used to determine the degree of relationship between particular variables (Andersen, Gill 1982). Therefore, the regression model is appropriate for figuring out the exposure of WCM components to profitability. The main model contains three groups of variables as follows: 1) A dependent variable; 2) Independent variables; 3) Control variables (O. Sykes 1993). The world GDP growth rate and net income variability are taken as control variables to receive a closer model of the true population and to avoid synthetic auto-correlation (P. Legendre 1993).

Current research collected data from worldwide oil companies between 2010 and 2020, which were listed on KASE and NYSE stock exchanges. The method of choosing 21 oilmanufacturing companies was proceeded according to the financial data availability and their regulation by audit forms like 20-f for Non-US companies and 10K for US companies. Financial statements were used to collect data, which was then fitted into panel data through separate Excel sheets for each company.

Overall, 26 companies' data were recorded except for companies with extraordinary financial performances to receive precise findings. Filters were set in order to determine exceptional financial results: negative values in owner's equity, unpaid interests, and lack of information borrowing inventories from suppliers. In addition, the net profits of companies were converted to the common currency: 1) to avoid bias and extraordinary standard deviation percentage; 2) as USD is the most commonly used invoicing currency for international crude oil transactions (Reboredo, Rivera 2013).

After converting collections into statistical data, the regression model was built as follows (M. Mathuva 2010):

$$ROA = + \beta 1ACP + \beta 2APP + \beta 3ICP + \beta 4CS + \beta 5LEV + \beta 6FFAR + \beta 7VAR + \beta 8\ GDPg + e$$

Calculation of financial ratios was done by the following formulas:

1) ROA (Return on assets) contains Net Income/Average Total Assets;
2) ACP (Accounts collection period) contains: (Accounts Receivables/Sales)*365;
3) APP (Average payment period) contains (Payment period/Purchase)*365;
4) ICP (Inventory conversion period) contains: (Inventory/COGS)*365;
5) CS (Company size) was obtained from Inventory Turnover;
6) LEV (Leverage) contains: Total Liability/Total Assets;
7) FFAR (Fixed financial asset ratio) contains Fixed financial assets/Total Assets;
8) VAR (Variability) stands for the standard deviation of net income for a particular year;

9) GDPg means the GDP growth rate of the world;

GDP growth rates were obtained from Data World Bank. In order to reach regression results, the worldwide statistical software STATA was used, as it provides all necessary information and visualization regarding the regression model of the oil industry according to its performance (Kohler, Kreuter 2005).

Findings and Discussion

A heteroscedasticity test was conducted to assess the normality of error terms in the regression model. As seen in Table 4.1, the heteroscedasticity problem is not observed as the BreuschPagan test fails to reject the null hypothesis, implying the absence of heteroscedastic ($p>0.05$).

Skewness/Kurtosis tests for Normality

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	joint adj chi2(2)	joint Prob>chi2
resid	231	0.0000	0.0000	.	0.0000

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of ROA

chi2(1) = 0.31
Prob > chi2 = 0.5800

Table 4.1 Heteroscedasticity tests

Table 4.2 represents the summary of regression results of the OLS model. Findings are consistent with Ristanti and Sugiarta (2019), which state that ACP has a negative and significant effect ($p<0.05$) on firm profitability. The constant demand for oil and its derivatives by transportation and petrochemical sectors create a unique ACP as compared to other sectors supplying raw materials (Elder, Serletis 2010). Hence, findings suggest that oil firms can improve their profitability by decreasing the receivable periods, which forces consumers to pay back their debts in fewer days. Hence, higher cash levels would lead financial managers to replan their financial strategies and settle debts to avoid future interest expenses. Ristanti & Sugiarta (2019) noted that ACP should influence profitability for a short time, otherwise it causes the risk of bad debts. It implies that existing consumers of downstream companies would suffer from the payment collections period and probably fail to pay them back. Collection days

have to be carefully determined and only for particular consumer segments to not lose competitiveness and reduce customer base. The high requirements for franchise-owned service stations of oil companies like PetroChina probably raise the overall collection level (Bhasin 2019).

Any increase in ICP would lead to additional expenses for holding and maintenance of that short-term asset (Hadiza & Rabiu 2019). However, study findings revealed a non-significant effect of ICP on ROA, which is in contrast with Akbas and Durer (2010), who found a negative relationship. In fact, maintaining a minimum level of inventory and regular replenishment helps the company avoid price fluctuations (Tryfonidis 2006). In contrast, Mathuva (2010) noted that a high level of inventory softens the effect of possible price fluctuations for oil prices. Hence, the contradiction between establishing high and low crude oil levels causes the nonsignificance of ICP variation on profitability.

Downstream companies have a non-significant positive relationship between profitability and APP. In other words, any increasing average payment period for oil and gas firms increases their potential profit. Any withholding payments by firms give them a potential advantage in cash and that makes economic sense in the short term (Mathuva 2010). However, Deloof (2003) states that a specific negotiation process considers discounts if the company pays its bill earlier. For example, Belgian companies often get an arranged amount of discount for early payments.

So, the controversy of different periods provided by supplier discounts and regression results establish the no significant level of the APP.

Fixed-effects (within) regression — Number of obs = 231
Group variable: ID — Number of groups = 21

R-sq:
within = 0.1826
between = 0.0049
overall = 0.0880

Obs per group:
min = 11
avg = 11.0
max = 11

F(7,203) = 6.48
corr(u_i, Xb) = -0.4739 — Prob > F = 0.0000

ROA	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ACP	-.0190899	.0086189	-2.21	0.028	-.0360839	-.0020959
ICP	-.0045196	.0253796	-0.18	0.859	-.0545611	.0455219
APP	.0082282	.006542	1.26	0.210	-.0046707	.0211271
CS	-.0003787	.0009651	-0.39	0.695	-.0022816	.0015243
LEV	-.1284354	.0463357	-2.77	0.006	-.2197963	-.0370744
FFAR	-.0840377	.0500371	-1.68	0.095	-.1826968	.0146214
GDPgrowth_rate	.0101836	.0020309	5.01	0.000	.0061793	.014188
_cons	.1692742	.1075892	1.57	0.117	-.0428614	.3814099
sigma_u	.03574754					
sigma_e	.05693765					
rho	.28273184	(fraction of variance due to u_i)				

F test that all u_i=0: F(20, 203) = 2.64 — Prob > F = 0.0003

Table 4.2 Regression results

Company size demonstrates no significant effect on profitability ($p>0.05$), which states that incremental additions in terms of financial, physical, and nonphysical assets are no longer beneficial to the oil companies. The efficiency is raised by the filtration of assets according to their relation to the revenue and low expenditures (Luftig 1999). On the other hand, Hieu (2020) stated that companies gain positive influence from high asset size due to competitiveness and low interest from creditors. Therefore, these two opposite statements of keeping high and low total assets make this variable totally non-significant.

The statistical analysis furthermore revealed that leverage is a significant negative effect on profitability ($p<0.01$). It implies that a limited level of total debt restricts the potential excess of interest expenses over future benefits by leading to bankruptcy. In the dataset, long-term debt (LTD) has become larger over time than short-term debts over the research period. The decommissioning and restoration (20% of LTD) cannot be conserved, as it includes installation, modification, and renovation of oil manufacturing facilities. Although bonds and borrowings to banks (60% of LTD) are less risky than short-term debts, most of them mature in 2040 with a high 5% interest rate per year (Shell 2021). Therefore, the financial managers have to measure future earnings and attract more short-term debts to minimize the costs of borrowing.

There is a weak effect of FFAR on ROA ($p<0.10$), implying profitability would decline if the proportion of fixed assets in total assets increases. This negative relationship means that additional assistance of lands, buildings, and

manufacturing equipment to the sales is no longer beneficial (Brown, Loh 1992). Besides generating sales for companies, fixed assets create expenses like depreciation, modification, repair, and restoration (Kenton 2021). It is recommended that oil-manufacturing firms need to operate with durable equipment, as their substitution (usually 5 years) and depreciation sufficiently raise costs. Not so high significance level proves that constant maintenance of equipment can ensure damages from unforeseen defects.

Conclusion

To sum up, financial managers are capable of managing working capital components by deriving key findings from current research. The results from the findings verify the effect of WCM on profitability in the oil industry.

The profitability highly depends on the accounts collection period in which early proceeds are spent on settling debts to avoid additional interest expenses. Conserved collections provide the opportunity to decrease leverage by gradually borrowing more short-term debts. Long-term results from the restructured financial allocations would introduce remains from saved interests of debts. Fixed assets can be financed and efficiently extended after directing the cash flow into business operations. Payment periods can provide a temporary additional source of financing, but contradict favorable discounts from suppliers. The level of total assets and inventory was not determined and considered worthless for further predictions. Even temporary financial sources from the collection periods should be used to cut interest expenses and invest in manufacturing. Therefore, this research points out the efficient use of the time gap between business operations, which can probably be created by some WCM components to earn more profit in the oil industry.

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