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The Impacts of Changes in Macro-Economic Data on Net Working Capital: The Case of Turkey's Industrial Sector

Reşit ÇELİK[a*], Bahar BİLEN[b], Ömer BİLEN[c]

[a]Yıldız Technical University, Istanbul, 34363, Turkey
[b]Nişantaşı University, Istanbul, Turkey
[c]Yıldız Technical University, Istanbul, 34363, Turkey

Abstract

Ability to pay of a company's short term liabilities is closely related to its strong liquidity structure. One of the most important factors affecting the liquidity of a company is operating cycle. The main factors that determine the operating cycle of the company is its stock supply term, production stage time and debt payment due. These factors determine the amount of net working capital. Net working capital is calculated by subtracting current liabilities from short term liabilities and the management of net working capital is extremely important for the liquidity of a company. Many businesses may have financial difficulty even go bankrupt tragically due to miscalculation net working capital need or incorrect financial resources to finance to the net working capital need. In this study, it is intended to analyse the effects of changes in macroeconomic data over net working capitals of enterprises. For this purpose it has been calculated net working capital of the industrial market by using its sectoral balance sheet which was issued by Central Bank of the Turkish Republic for period of 1996-2014. The later it has been determined positive and negative trends of sector's net working capital by years and modelled for inflation, exchange rates and interest rates to determine if these macro-economic variables effect on net working capital of the industrial market.

Keywords: Net Working Capital, Macro-economic Variables, Time Series Analysis

1. Introduction

In General, the concept of working capital (WC) means those investments in current assets which mean cash, securities, trade receivables and inventories. On the other hand WC can be used as net working capital (NWC) which

* Reşit Çelik Tel.: +90-2123834426.
E-mail address: resitcelik@gmail.com

is calculated by subtracting short-term liabilities from current assets as more descriptive concept for the purposes of working capital management. The investments in NWC may be interpreted as the capital which is obtained with operating cycle of the enterprise at shorter than one year. Therefore NWC represents the potential of liquidity of the enterprise to supply cash needs that will arise in relation to operating activities (Ramazan Akbulut, 2011, p. 196). According to Michalski (2008), the basic financial purpose of the firm is maximization of its value. An inventory management should also contribute to the realization of this basic aim.

Lending banks or lender commercial companies pay attention to relationship between short-term liabilities and current assets in the balance sheet of the company which they lend. Does the company have enough current assets to pay its short term debts? By calculating the NWC of the company can be answered this question.

NWC = Current Assets (CA) – Short-Term Liabilities (STL)

NWC will be positive when the company has more assets than debts otherwise negative. Positive NWC means that the company can continue its operating activities and growth increasingly. In the other word the company will able to continue making additional production with remaining CA after paying the STL. Negative NWC means the company cannot pay its short-term liabilities on maturity (Uğur Hakan Kılıç, 2014, p. 90) Net working capital increased in the negative trend can be an evidence that the company operates with low productivity so high amounts of negative net working capital may lead to the bankruptcy of the company.

The ability to short-term liabilities of the company closely associated with its healthy liquidity structure. One of the most important factors effected liquidity structure of a company is operating cycle. The basic factors that determine the operating cycle are relationships between supply conditions in the company's stock, the time during the production process, trade payables repayment duration and after sales receivables collection duration. These relationships determine the need for NWC of the company. In determining the company's working capital requirements mainly operating cycle is decisive. The figure 1 shows the production cycle of business.

The first stage of the operating cycle points out the time elapsed for the sale of the product; the second stage signifies the time elapsed for collection of sales. For example, in a production company, production process starts with cash. First component of working capital is cash assets. Company purchases various raw materials and raw materials are used in production and obtained products covert component of WC as inventories. In the final stage Inventories sale to costumers and occurs trade receivables. The trade receivables and the collection of receivables constitute the final stage of the WC. Longness or shortness of this stage is decisive on the working capital requirement. A successful working capital management depends on the sector in which the company, the company's commercial policy and the economic conditions (Büyükşalvarcı, Ahmet; Abdioğlu, Hasan;, 2010, p. 51)
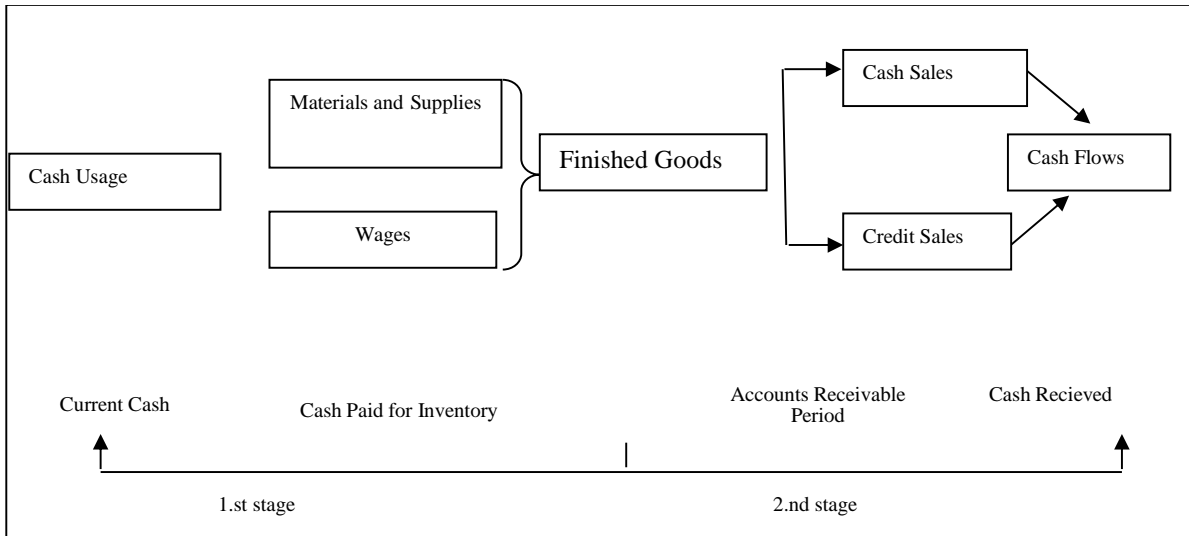
Figure 1 Operating Cycle **(Büyükşalvarcı, Ahmet; Abdioğlu, Hasan;, 2010, p. 50)**

1.2. Literature Survey

There are numerous studies on the identification of factors affecting NWC. These studies are particularly focused on impact of cash flow and cash outflow periods on working capital of the company. As noted in research conducted by Shin and Soenen (1998) Walmart and Kmart had similar capital structures in 1994; however, K mart had a cash conversion cycle of 61 days while Walmart had a cash conversion cycle of 40 days. As a consequence of this difference Kmart faced additional financial costs in order of US$ 200 million per year. Clearly, this situation was not sustainable because poor working capital management eventually contributed to Kmart's bankruptcy (Mongrut, Samuel; Fuenzalida, Darcy; Cubillas, Claudio; Cubillas, Johan;, p. 3).

Vahid, Elham, Mohsen and Mohammadreza (2012) have studied the effect of different variables of working capital management including the average collection period, inventory turnover in days, average payment period, cash conversion cycle, net trade cycle, on the net operating profitability of Iranian Companies and Current ratio, financial leverage, sales growth, current assets to total assets ratio, current liabilities to total Assets Ratio , gross working capital turnover ratio and size of the firm (measured in terms of natural logarithm of sales) have been used as control variables. They have found that operating profitability is negatively associated with measures of working capital management and average collection period, inventory turnover in days, net trading cycle and as average payment period increases it will lead to decreasing profitability of the firm.

Deloof (2003) analyzed a sample of Belgian firms, and Wang (2002) analyzed a sample of Japanese and Taiwanese firms, emphasized that the way the working capital is managed has a significant impact on the e and reducing inventories. Padachi for 58 Mauritian small manufacturing firms during 1998 to 2000, he explained that well designed and implemented working results indicated that high investment in inventories and receivables is associated with low profitability and also showed an increasing trend in the short term component of working capital financing. Sen. M (2009) examined the ISE (Istanbul Stock Exchange) listed firms and checked out the relationship with the working capital. According to them there is negative relationship among variables. His research uncovered the importance of the finance directors who act as moderators or catalysts to increase the productivity of the firm in Dong analysis. Pooled data are selected for carrying out the research for the era of 2006-2008 for assessing the companies listed in stock market of Vietnam. He focused on the variables that include profitability, conversion cycle

and its related elements and the relationship that exists between them. From his research it was found that the relationships among these variables are strongly negative. This denote that decrease in the profitability occur due to increase in cash conversion cycle. It is also found that if the number of days of account receivable and inventories are diminished then the profitability will increase numbers of days of accounts receivable and inventories (Vahid, Elham, Mohsen, & Mohammadreza, Working capital management and corparate performance: evidence from Iranian companies, 2012, p. 1314).

In the study implemented by Öztürk and Demirgüneş (2008), annual financial data for the period of 2002-2006 of 111 production companies which carry out business in metal commodity, machine and tool manufacturing sector processed in Istanbul Stock Exchange Market are reviewed to determine the variables affecting working capital requirement within the frame of integrated regression model. In the study, the variables determining the requirement of working capital have been reviewed by considering activity cash flow, financial leverage, return on assets, the size of company and variables regarding the growth. According to the findings of the study, leverage ratio meaningfully affects return on assets and growth working capital requirement statistically. But however it has been concluded that the activity cash flows and size of company have no meaningful effect on working capital requirement (Başaran, Öztürk; Demirgüneş, Kartal;, 2008)

It is generally suggested that the impact of macroeconomic factors has already been accounted for by financial ratio variables (Liou, 2007). There is no study in literature that is modelled for the effects of the change in Macro-Economic data over working capital or net working capital. For the purpose of reviewing the effect of 2001 February Crisis over working capital of Birgili and Tunahan, trend in net working capital has been determined by analyzing the first six months balance sheets of the year 2001 which is the crisis period and the first six months of the year 2000 of Istanbul Stock Exchange Market Metal Commodity - Machine and Tool Industry Sector. According to this study, it has been determined that net working capital of the sector has decreased 29% in real terms in the crisis period (Birgili & Tunahan, Döviz Krizlerinde İşletme Sermayesi Davranışı, 2002).

2. Study

2.1. The Purpose, Scope and Principle of Study

The main purpose of this study is to investigate the effects of changes in macroeconomic data over net working capitals of enterprises. For this purpose, we have calculated consolidated net working capitals by using consolidated financial tables of companies which carry out business in manufacturing industry in Turkey.

While the effects of changes occurring on macro-economic data over net working capital are being investigated, the reason of choosing manufacturing sector is that the developments occurring in production industry being determinant on trade and service sector developments. Because a change in macro-economic data can alter operating costs of manufacturing industry in short term and constant costs in long term, and at the end of this process, the costs of marketing and service sector will also be affected directly and indirectly. It is natural to have sectors in manufacturing industry that get affected from the change of macro-economic data. This study includes general manufacturing industry, and determining how the different sectors within manufacturing industry are influenced from the changes in macro-economic data is a subject of another study.

Data of manufacturing industry financial tables that we used in our study have been prepared by Central Bank of Turkey (CBT) (TC MB Reel Sektör İstatistikleri, 1996-2014). CBT publishes annually the balance sheet and statement of income of companies which have credit risk in banks and/or included in CBT Balance Sheet Centre database by procuring them and various identification information after gathering these balance sheets and statements of income on sector basis. Sector Balance Sheet studies include three years of period before the publication year and consolidated financial tables of sector is formed by gathering financial tables of companies which have data about the related period. Consolidated financial tables consist of balance and statement of income

items of companies within the data basket being added successively, and no elimination is implemented regarding in-group transactions which may occur between the companies.

For the purpose of determining the companies to be included in Sector Balance Sheet study, each year, within the process of data provision, if balance sheet and statements of income for previous years from database are included, one year financial tables of companies which use credit over 10.000 TL in any bank and carry out business in real sector† regarding the aforementioned year are controlled about that whether their balance sheet and statement of income for previous years are included or not and for the companies of which credit usage is over 1.000.000 TL, it is controlled that whether their balance sheet and statement of income for previous years are included or not, and their one year or retrospective three years data are included in study.

In our study, the companies which carry out business in manufacturing industry are evaluated in 3 classes as small scale, medium-scale and large scale companies. In the determination of measurement intervals, "net sales adopted by BACH (The Bank of Harmonized Data on Company Accounts) Database which was established within the European Union Commission, General Directorate of Economic and Financial Affairs by CBT, and "size of assets" criteria used by European Union are used "size of assets"‡ is used for construction sector and holding companies which show great differences as of net sales, and "net sales" criteria is used for other sectors. Scale criteria are shown in Table 1.

Table 1 Scaling Criteria of Firms Carrying Out Business in Industry Sector

Years	Small-Scale Firms		Medium-Scale Firms		Large-Scale Firms	
	Total Sales (000) EUR	Total Assets (000) EUR	Total Sales (000) EUR	Total Assets (000) EUR	Total Sales (000) EUR	Total Assets (000) EUR
1996-2002	NS ≤ 7.000	-	NS > 7.000 < 40.000	-	NS ≥ 40.000	-
2003-2014	NS ≤ 10.000	AT≤10.000	NS > 10.000 < 50.000	AT > 10.000 < 43.000	NS ≥ 50.000	AT ≥ 43.000

Manufacturing sector balance sheet and statements of income provided by CBT website have been published since 1996. Thus, financial data about 1996-2014 has been used in our study. In Table 2, the number of firms which have been in data bin and included in consolidation as of the years are indicated. As you can see in Table 2, firm number included in consolidation has progressed between the intervals of 300-350 within the period of 10 years in large scale firms, and increased to the level of 500-600 beginning from the year 2006. Sector balance sheet and statement of income of Medium Scale and Small Scale Enterprises has progressed as 1.000 for medium scale firms, and as 2.000 for small scale firms within the period of 119 years.

Table 2 The Number of Firms Included in Consolidated Financial Tables in respect of Years

Years	Number of The Large-Scale Firms	Number of The Medium-Scale Firms	Number of The Small-Scale Firms
2012-2013-2014	571	1,289	1,943
2009-2010-2011	616	1,270	1,535
2006-2007-2008	591	1,248	1,619
2003-2004-2005	388	999	2,280
2000-2001-2002	369	1,117	2,415
1997-1998-1999	326	1,000	2,184
1996	330	949	2,129

One of the criteria of this study is that the number of investigated firms for 19 years not being the same each year. In this context, in what ratio the up or down changes occurring in number of firms in respect of year's impact the firm ratios is not known. In our study, ratios calculated by using consolidated balance sheet and statements of income of the sector and their calculation methods are as follows;

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† This credit lower limit is taken from the report published in 2014. In the older reports, these credit lower and upper limits are in lower amounts.
‡ Total assets criteria has begun to be used for holdings and construction firms since 2006

 Net Working Capital (NWC): Current Assets – Short Term Liabilities
Trade Receivables Collection Duration (In Days) (RCD): (Trade Receivable (short term long term)/Net Sales)x365
Inventory Turnover (In Days) (IT): (Average Inventory/Cost of Sales) x 365
Trade Payables Repayment Duration (In Days) (PRD): (Trade Payables (short term long term /Cost of Sales) x 365
Cash Flows Duration (CFD): Trade Receivables Collection Duration + Inventory Turnover
Cash Outflows Duration (COFD): Trade Payables Repayment Duration

For the purpose of monitoring the changing of NWC and activity cycle in respect of years, first a trend analysis is implemented and the progress of development has been shown over graphics. Then, for the purpose of determining how NWC is affected from general course of events of economy, exchange rate of dollar % change[§,] interest rate[**] and PPI industry index[††] are used as an independent variable. To test our hypothesis about the negative developments affecting and discharging NWC in the used independent variables, a separate modelling has been implemented for each independent variable. Enterprise net sales are also included in model to see how the change in the activity volume of enterprise affects NWC in addition to the change in macro-economic data. Because first firm's volume of activity shall be affected from the aforementioned change in macro-economic data, and then a change may occur according to differentiation in firm's net working capital activity cycle.

Calculated nominal networking capitals and nominal net sales have been calculated by us in real terms by using Private Sector Manufacturing Industry PPI (2003=100) index based on the year 2014 and real amounts have been used in the model.

The reason of taking exchange rate of dollar, interest and PPI as independent variable is that exchange rate and interest rate are being the elements of money policy, and monetary shocks changing production costs, profitability, selling and purchasing conditions of firms by affecting the general level of prices directly.

Monetary transfer mechanism; this is the mechanism that investigates the effect of excess demand or supply (or the opposite) occurring depending on the changes money policy on total expenses while an economy is in balance (Lipsey, An Introduction to Positive Economics, 1983, p. 689). In this context, monetary transfer mechanism means from which channels, with how much delay and in what scale the decisions on money policy affects the real economy and prices level (Cambazoğlu & Karaalp, Parasal Aktarım Mekanizması Döviz Kuru Kanalı: Türkiye Örneği, 2012, p. 54). According to influence levels on manufacturing sector, money transfer channels are exchange rate channel, interest channel, bank loan and balance sheet channels (Birgili & Tunahan, Döviz Krizlerinde İşletme Sermayesi Davranışı, 2002, p. 2).There is little consensus about the relative or related importance of working of monetary transfer channels. That is, the effect of monetary instincts on real economy is not known completely (Örnek, İbrahim, 2009, p. 105).

The most conventional transfer channel interest rate in monetary transfer mechanism affects cash and consumption preferences of economic units by changing differential cost of money and impacts the investment, saving and total demand of the manufacturers (Örnek, İbrahim, 2009, p. 106). Credit channel operates over two main mechanisms. One of these mechanisms is bank credit channel, and the other one is balance sheet channel. Bank credit channel operates as increase/decrease of total loan granting ability of banking system to firms as the result of an expander/reducer money policy. On the other hand, balance sheet channel operates with the change in the capacity of companies, which got loan from banks, related to getting credit as the result of money policy

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[§] CBT Exchange Rates in the capacity of Indication
[**] CBT Weighted Average Interest Rates Applied to Loans Opened by Banks http://evds.tcmb.gov.tr/anaweb/enflasyonTR.html (Access dated 15.12.2015)
[††] TÜİK http://www.tuik.gov.tr/PreTablo.do?alt_id=1076 (Access dated 15.12.2015)

implemented. It is included in our interest model because of these effects of the credit channel and being one of the important factors that affects credit supply and demand.

Exchange risk is identified as a change caused in enterprise's income and expenses or generally cash flows by unexpected change in exchange rates. Enterprises which have foreign exchange credits and liabilities can change their profitability structures because of foreign exchange losses and gains occurring due to the increase and decreases in exchange rate. As such, for the purpose of determining how net working capitals of enterprises are affected depending on the enterprises' status in exchange position exchange rate of dollar % change is included in the model.

Since the changes occurring in general level of prices varying according to monetary policy will affect the cost, profit mark-up, terms of sale and purchasing of the firm, and by considering that this situation will change net working capital level, PPI industry index is also included in our model.

2.2 General Overview on Net Working Capital, Activity Cycle, and Volume of Activity of the Sector

The growth of networking capitals corrected according to the year 2014 index by using Manufacturing Industry PPI (2003 = 100) index is shown in Figure 2.
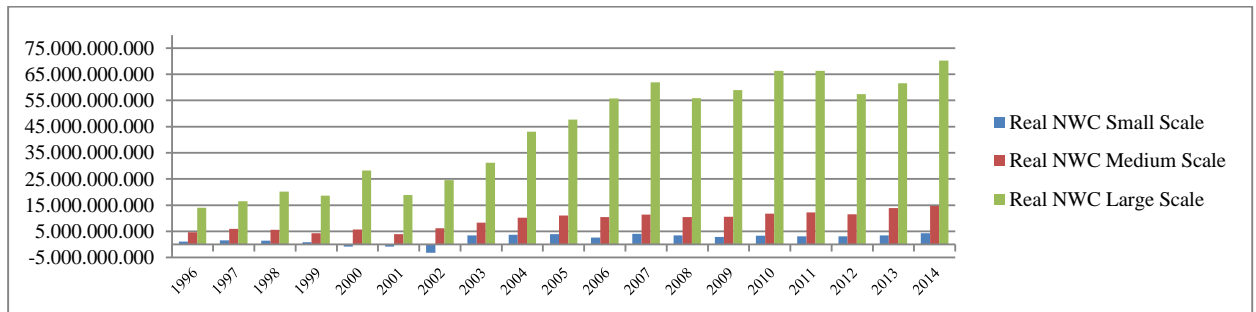

Figure 2 Real Net Working Capital of Sector In Respect Of Years According to Scales (with the prices of 2014)

As you can see from Figure 2, consolidated real NWC of small-scale enterprises has decreased constantly in the period of 1996-2003, and especially in the period of 2000-2001-2002 NWC deficit had to be operated in real terms. In this period it is determined from real NWC decreasing in the amount of 300% in 2002, 4% in 2001, and 191% in 2000 that small-scale firms had experienced serious cash problem. Consolidated real NWC progress of medium-scale firms has shown some increase and decreases on the same period but sector never indicated a NWC deficit in any period, also it seems that they lost NWC in real terms in the rate of 31% in 2001 crisis however in the year 2002, sector has recuperated faster than small-scale firms. In the same period, a structure similar to medium-scale firms is monitored in large-scale firms in respect of real NWC, however real NWC loss of large-scale firms has been a little more compared to medium-scale firms (33%).

After 2001 crisis, when we look at real NWCs of the sector as a scale, we can see that up-and-down progress of small-scale firms continued. In 2008 crisis, the wear in real NWC has been in lower level (14%) relatively compared to 2001 crisis, and this wear has occurred as 8% for medium-scale firms and as 10% for large-scale firms. In addition to that, as in 2001 crisis, NWC of small and large-scale firms shows an increase trend in real terms, and cash flow problem of small-scale firms has continued in the next year.

One of the most important elements that determine the working capital need of enterprises according to volume of activity is certainly cash flow period. In Figure 3, cash flow periods of sector have been shown in respect of the years.

When we look at the cash flow periods of enterprises that carry out business in industry sector as a scale factor, we can see that small and medium-scale firms have nearly implemented production and sale in the same conditions in 1996-2000 period. However beginning from the year 2001, with the fact that small-scale firms' stock waiting period increasing (110-120 days), it is seen that cash flow period has been separated in negative way. Period regarding the stocks of large-scale firms turning into cash generally has progressed in an up-and-down trend and cash flow period has progressed over 130 days due to recession experienced in the markets after 2008 crisis. Since it has a determinant effect on the market, it is clear that cash flow period of large-scale firms shorter than medium and small-scale firms, and especially small-scale firms need more long run loan because their turn into cash period is very high.

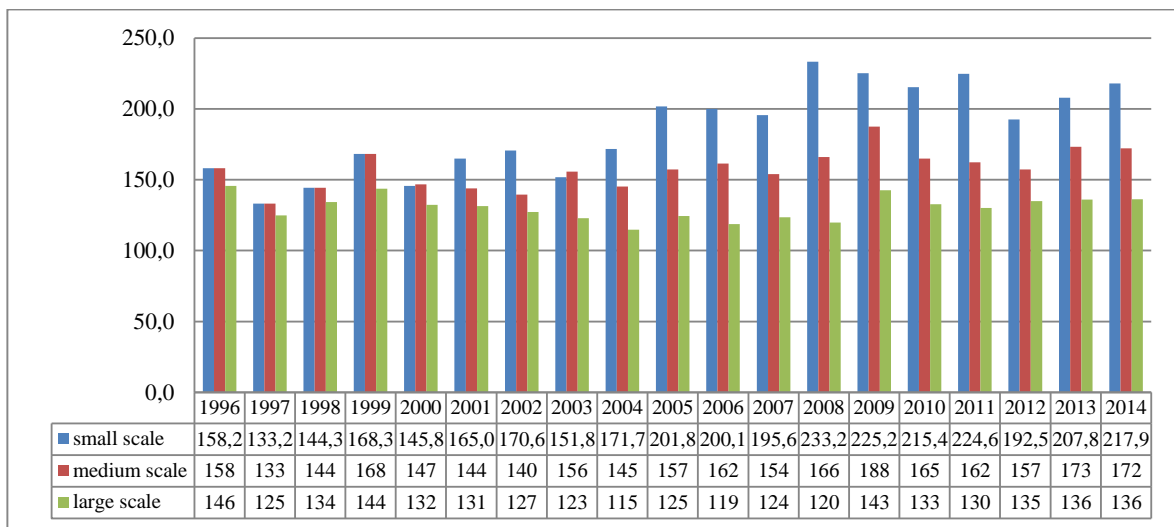|	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
small scale	158,2	133,2	144,3	168,3	145,8	165,0	170,6	151,8	171,7	201,8	200,1	195,6	233,2	225,2	215,4	224,6	192,5	207,8	217,9
medium scale	158	133	144	168	147	144	140	156	145	157	162	154	166	188	165	162	157	173	172
large scale	146	125	134	144	132	131	127	123	115	125	119	124	120	143	133	130	135	136	136

Figure 3 Cash Flow Periods of Sector According to Scale Factors In Respect of Years

Especially in 2008-2014 period, while the fact that stock transfer term progresses in a very high level such as 65-70 days for large-scale firms and 80-90 days for medium-scale firms, and 110-120 days for small-scale firms creates an impression that small-scale firms having difficulty in the sale of their stocks, it is thought that there has been problems in accounting records related to stocks. As seen in Figure 4, while the payment periods of small-scale and medium-scale firms, which carry out business in the sector, related to their commercial debts has almost been in the same maturities up to 2001, it has been monitored that small-scale firms has negatively been separated regarding cash outflow periods and commercial debt payment period has been prolonged beginning from the year 2001. This situation can originate from small-scale firms' demands from sellers regarding additional maturity due to the prolongation in cash flow period as well as some firms' act of hindering their payments.

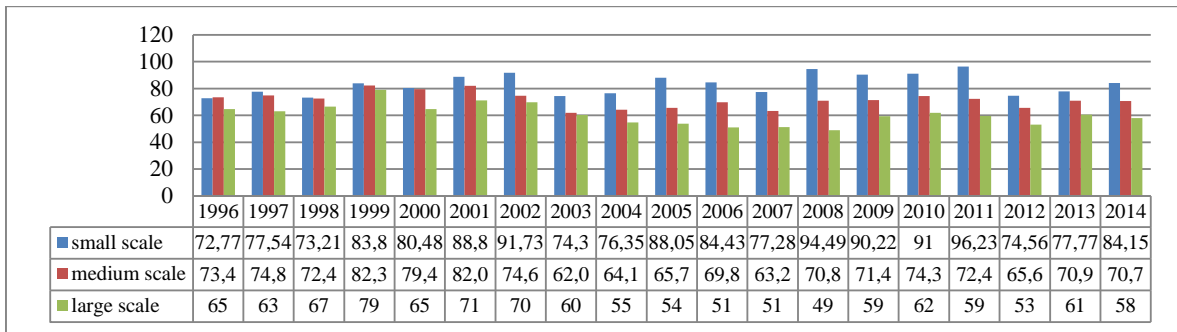|	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
■ small scale	72,77	77,54	73,21	83,8	80,48	88,8	91,73	74,3	76,35	88,05	84,43	77,28	94,49	90,22	91	96,23	74,56	77,77	84,15
■ medium scale	73,4	74,8	72,4	82,3	79,4	82,0	74,6	62,0	64,1	65,7	69,8	63,2	70,8	71,4	74,3	72,4	65,6	70,9	70,7
■ large scale	65	63	67	79	65	71	70	60	55	54	51	51	49	59	62	59	53	61	58

Figure 4. Cash Outflow Periods of Sector According to Scale Factors In Respect of Years

Generally in the sector, medium-scale firms have become indebted with lesser terms than small-scale firms as 15-20 days, and large-scale firms have become indebted with lesser terms such as 15-20 days in 2000s. The most stable debt payment term is monitored in large-scale firms due to the stability in cash flow period. In Figure 5, real sale numbers of sector which is corrected by PPI industry index of year 2014 are indicated. According to this, it is seen that all scale factors of the sector have been measured in real terms in the years 1999 and 2001 when the interest, dollar and PPI has progressed in a very negative trend.
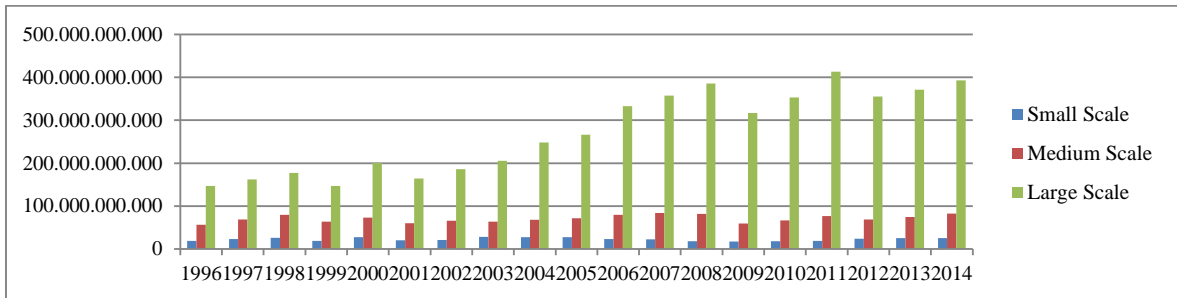

Figure 5 Real Net Sale Amounts of Sector In Respect Of Years According to Scale Factors (with the prices of 2014)

While medium-scale and large-scale firms begins to grow faster after the year 2001, the increase in volume of activity of small-scale firms in real terms has been relatively more delayed. In the period of 2003-2007 small-scale firms could protect volume of activity in real terms and medium and large-scale firms have succeeded to increase their volumes of activity in real terms. In the period of 2008 crisis, volume of activity of the small-scale firms has decreased in the rate of 18% and volume of activity of the medium-scale firms has decreased in the rate of 3%. In addition to that, large-scale firms have increased their volume of activity in the rate of 7,8%. In the year 2009 when financial crisis has been experienced in the most intense way after the year 2008, there has been a narrowing in the volume of activity for all scales, and the year 2009 has been the year that the largest constriction being experienced as sales volume. It is thought that the most important reason of 2009 being the most problematic year in terms of volume of activity is that the crisis being experienced in a global scale and Turkish firms losing some part of their foreign market on that period.

2.3 Application

Real Net Working Capitals of Small, Medium and Large-scale firms have been modelled for Interest, PPI, USD and real net sales amounts by considering Central Bank of Turkey consolidated industry Sector Balance Sheets including the period of 1996-2014. For each Firm scale, Real Net Working Capitals have been modelled as single and in total for Interest, industry PPI and USD percentage change macroeconomic variables with real net sale

amount micro economic variable. When the modelling was implemented, unit root test has been carried out for all dependent and independent variables and stability test has been repeated after non-stable variables' differences from 1st level were taken. Modelling has been implemented with stable state of variables defined below.

Real working capital of small-scale firms has been modelled for Interest, industry PPI and USD percentage change and real net NSTS and the formed models have given meaningless results statistically. This situation can be the result of the fact that financial records of small-scale firms being unhealthy because of their weak corporate structures and the number of firms included in consolidated balance sheet and statement of income each year showing a high variability. Thus, it is deemed unnecessary in the study to include statistical model results of small-scale firms.

Variable Description:

Dependent Variable:
$Y_:$ Real Net Working Capital

Independent Variables:
$X_{1:}$ in USD percentage change
$X_{2:}$ Real Net Sales
$X_{3:}$ Interest Rate
$X_{4:}$ PPI
SE: Standard error of parameter estimator
P: significant level.

Real Net sales variable has been resulted as stable for medium-scale firms. Except Real Net sales variable, variables' differences from 1st level have been used in models included in analysis table for medium-scale firms. Macro-economic variables are individually included while modelling was implemented since Industry PPI, Dollar and Interest have high correlation amongst themselves.

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Table 3 Dependent Variable Real Net Working Capital

		C (SE) p	X1 (SE) p	X2 (SE) P	X3 (SE) p	X4 (SE) P	Prob (F-statistic)	R-quared	Durbin-Watson stat
M E D I U M	Model 1	5.04×10^8 (2.69×10^9) 0.0789	-15189452 (6644571) 0.0362				0.036	0.246	2.02
	Model 2	4.39×10^8 (2.95×109) 0.8834		0.001692 (0.040853) 0.9675			0.967	0.000	2,247
	Model 3	5.59×10^8 (3.36×10^8) 0.11			-36106147 (2.58×10^9) 0.989		0.989	0,000	2.59
	Model 4	4.58×10^8 (2.56×10^8) 0.092				-2.47×10^8 (8.98×41^8) 0.014	0.014	0.322	1.89
L A R G E	Model 1	2.87×10^9 (1.32×10^9) 0.0453	-6.9×10^9 (3.27×10) 0.0508				0.051	0.217	1.84
	Model 2	1.8×10^9 (1.26×10^9) 0.1728		0.097178 (0.03186) 0.0076			0.007	0.367	2.30
	Model 3	3.64×10^9 (1.59×10^9) 0.0360			9.94×10^9 (1.22×10^9) 0.4258		0.428	0,039	2.07
	Model 4	2.72×10^9 (1.33×10^9) 0.0578				-9.98×10^9 (4.66×10^9) 0.0518	0.052	0.216	1.81

In the direction of results given in Table 3, when the behavior of real net working capital is reviewed, upside changes in in USD percentage change, increases in Industry PPI in the models established for medium-scale firms have a negative effect on real net working capital. Another finding as the result of modelling implemented for medium-scale firms is the fact that the net working capital of these firms are not sensitive to real net sales and changes in the interest. Change in real net sales and interest cannot explain the change in real net working capital statistically. The reason of the change in real net sales not being meaningful over real net working capital statistically for medium-scale firms arises from the fact that the increase rate of short-term debts and current assets of the sector not being equal to each other. That is, the increase in the volume of activity of medium-scale firms has been financed by short-term debts, so the increase in the volume of activity of the sector has not changed net working capital.

When the real net working capital behavior of large-scale firms for percentage change in USD percentage change, real net sales, interest and industry PPI are reviewed, it is seen that three variables except the interest affect the change in real networking capitals of large-scale firms. . The effects of increases in USD percentage change and Industry PPI to real net working capital are significant at %95 confidence level. Increases in USD percentage change and Industry PPI for 10% error margin cause a decrease in real net working capital of large-scale firms and increases in real net sales cause an increase in real net working capital of large-scale firms. In this context, in large-scale firms, rise in volume of activity increases real net working capital contrary to medium-scale firms. This means that the increase rate of current assets of the sector is faster than short-term loans short-term loans.

3. Conclusion

There are lots of micro and macro variables that affect net working capital amount, one of the important indicators of short term loan payment power of firms. Essentially equity structure of firms and short term loans total that they use in its active financing is the most important element that determines net working capital. In addition to that, the difference between cash flow and cash outflow period of firms will affect optimum equity amount required for active financing. While the firms with cash flow period lower than cash outflow period can continue their activities with lower working capital, the firms with cash flow period higher than cash outflow period will need more working capital. In addition to that, changes in macro-economic data can positively or negatively affect economic activity and performances of firms. From this viewpoint, in the study implemented for the purpose of determining how net working capital is affected from macro-economic data as an indicator of whether the firms requiring cash flow or not, modelling have been implemented for small, medium and large-scale firms that carry out business in manufacturing sector.

According to the results of modelling, the increase in inflation and exchange rate decreases in real net working capitals of medium and large-scale firms, on the other hand a change in interest rates does not create a negative or positive effect over net working capital. The fact that the increases in inflation and foreign currency wearing net working capital, on the other hand the interest not being effective on net working capital is an interesting result.

Increases in dollar exchange rate decreasing net working capital means that foreign exchange debts of sector are more than its foreign exchange receivables. Predominantly importing manufacturing industry inputs from abroad and having foreign exchange loans cause this result. The fact that increases occur in Industry PPI decreasing net working capital of sector could arise from not being able to simultaneously reflect the increases in producer prices on sales prices.

The fact that net working capital not showing a change despite the change in interest rates means that sector did not/could not change bank loan rate that it used in the financing of current assets in short term. Sector does not have a problem to procure bank loan in current asset financing even in increasing interest rates and continues to finance its current assets with bank loan in a fixed rate. It is thought that one of the most important reasons to this situation is the fact that firms having weak equity savings. The firms could think that it is more advantageous to use bank loan in terms of their profitability by comparing liability cost and equity cost, if we consider the fact that real interest increase is comparatively lower against the increase in interest rates. As a result, it can be concluded that credit rate used in the financing of current assets is independent from interest, and the interest affects the financing of long-term assets more.

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