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The Impact of Monetary Policy and Firm Characteristics on Firms' Short-Term Assets, Liabilities, Term Structure of Debt and Liquidity Ratios: Evidence from U.S. Industrial Firms

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Abstract

In this study, U.S. manufacturing firms' short-term assets, liabilities, term structure of debt and liquidity management ratios are examined over the 1971-2005 period. The impacts of firm size, profitability, tangibility, market-to-book ratio, leverage, as well as Federal Reserve contractionary monetary policy are analyzed from an "insulation hypothesis" viewpoint. We found support for "insulation hypothesis" whereby certain firm characteristics contribute to insulating the firm from the transmission effects of monetary policy. Also, contractionary monetary policy is found to have opposite impacts on high leverage and low leverage firms' holdings of short-term assets. Fed tightening of credit is seen to have a significant effect on account payables and long-term debt figures, and on the term structure of short-term vis-à-vis long-term debt.

Keywords: contractionary policy, insulation hypothesis, current assets, liabilities, term structure of debt, leverage, liquidity ratios.

I. INTRODUCTION AND LITERATURE REVIEW

In this paper, we analyze the effects of monetary policy and firm characteristics on different measures of firms' assets, liabilities, term structure of debt and liquidity measures. More specifically, we use micro level U.S. manufacturing firm data, namely firm size, profitability, tangibility, market-to-book ratios, and leverage in conjunction with aggregate monetary policy to analyze the impacts on firms' current assets and liabilities, debt structure of short-term relative to long-term liabilities, and liquidity ratios.

We attempt to address three main issues, namely: (1) The impact of monetary policy on firms' short-term financial management measures including cash and short-term investments, accounts receivables, inventories, accounts payables, term structures of debt holdings, and liquidity ratios?, (2) The differential impacts, if any, on high leveraged versus low leveraged firms due to monetary policy which affects the financing costs for firms, and (3) Whether firm characteristics like size, profitability, tangibility, market-to-book ratio, and leverage help insulate firms from the impact of monetary policy on the measures mentioned above in the first issue.

Our results will have implications for policymakers as well as managers of firms and investors. We can check the effects of monetary policy on firms' operations including short-term assets, liabilities, debt structure, and liquidity ratios that may be of interest to

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managers. Our findings may shed some light on type of firms that are affected less (insulated more) from changes in monetary policy. We obtain some results to show whether monetary policy could have different effects on firms based on their level of debt leverage. Knowing the answers to these issues could help the Fed gauge its policy effectiveness. Investors could also benefit from knowing the possible effects of Fed's actions on firms' short-term assets, liabilities, debt structure and liquidity management that could affect their market valuation.

A number of papers have looked at the "insulation hypothesis" whereby monetary policy is seen to affect firms' investments and their term structure of debt, but several factors insulate them from the transmission effects of monetary policy. Gander (2012) finds some evidence that U.S. industrial firms insulate themselves from the effects of monetary policy in their borrowing behavior, and the firms' retained earnings have a significant role in the insulation effect. In our paper, we look at possible insulation effects of monetary policy on current assets, liabilities, term structure of debt and liquidity ratios of firms due to factors such as firm size, profitability, tangibility and leverage.

Firms are expected to adopt asset-liability management strategies during the decline phase of the recession. Such strategies could position the firms better in the recovery stage of the business cycle. As discussed by Pearce and Robinson (2002), these success tactics may include tightening credit, maintaining prices, increasing liquidity, reducing debt, deferring capital expenditures, and pursuing selective growth. Firms could also benefit from purging excess inventory and corporate overhead during the recession. Also, businesses need to prepare for the growth phase following the recession. Firms are expected to increase their capital spending towards the end of the recessionary period, and when the business cycle recovery starts and consumer demand rises, firms should have sufficient cash flows to finance growth in their investments. In our paper, we try to find out from the financial statement data of industrial firms in the U.S. if they actually adopted such asset-liability management and liquidity strategies during the recession and the subsequent expansion phases in the economy.

Niskanen and Niskanen (2000) examine the determinants of Finnish firms' accounts receivable and accounts payable numbers. According to their findings, accounts receivable is most likely to be affected by the firms' preference to use trade credit as a means of price discrimination. The paper finds that rise in the interest rate level also increases the amount of accounts receivable through increased demand for trade credit. Rimo and Panbunyuen (2010) use Swedish listed companies to show the effects of companies' solvency and current ratios on their short-term working capital management. Niskanen and Niskanen (2000) show that the most important factors that determine the level of accounts payable are the supply of trade credit, firm size, interest rate level, the ratio of current assets to total assets, and insufficient internal financing. In our paper, we obtain comparative values of current assets and liabilities including accounts receivable and accounts payable for all industrial firms, as well as current ratios during the contractionary and the expansionary stages.

Bernanke (1993) finds that monetary policy has a disproportionate effect on small firms with the implication that the burdens of disinflation are not evenly shared. Oliner and Rudebusch (1996) mention that the heterogeneous effects of small and large firms on use of bank debt versus nonbank debt after a monetary shock, needs to be considered. We include the size of firms in our analysis to check for differential effects of monetary policy on different sized firms.

Ojah and Manrique (2005) used the representative debt market of Spain to extend the research on corporate debt structure. Their paper reveals that the likelihood of using

bank debt is positively related to firm size and information availability but negatively related to firm credit worthiness, while the likelihood of using non-bank private debt is positively related to firm size, growth potential, relative firm size and degree of leverage. In this paper, we examine the effects on the firms' term structure of debt, i.e. usage of accounts payables and short-term liabilities relative to long-term debt due to firm specific characteristics and monetary policy contraction.

Bougheas et al. (2006) examines firms' access to bank and market finance when allowance is made for differences in firm-specific characteristics, such as size, risk and firm debt. They predicted that these characteristics could result in greater (or lesser) tightening of firm credit when interest rates increase. An empirical evaluation of the predictions of the model was conducted on a large panel of UK manufacturing firms. They confirmed that small, young and risky firms were more significantly affected by tight monetary conditions than large, old and secure firms. In this paper, we analyze whether size and leverage of firms could play a role in the transmission of contractionary monetary policy on U.S. manufacturing firms.

Benito (2005) examines the adjustment of inventories by firms in the United Kingdom and Spain. A widely held view is that a key channel for monetary policy is through the influencing of inventory accumulation. Ogawa (2002) analyzed the response of inventories and short-term debts to monetary policy using disaggregated data on Japanese manufacturing firms classified by firm size. The paper finds that monetary contraction decreases the inventories of large firms; however, inventories of small and medium firms increase considerably for the first several quarters. According to the findings, inventory build-ups are financed by increases in accounts payable. Blasio (2005) finds that inventory investment of Italian manufacturing firms is restricted by their availability of trade credit, and the effect on inventory investment more than doubles during monetary contractions. In our paper, we look at the effects on inventory (as % of total assets) of U.S. firms, of varying size and leverage, due to higher borrowing costs arising from tighter monetary policy.

Guariglia and Mateut (2006) used 609 UK firms over the period 1980-2000 to test the presence of trade credit channel of monetary policy transmission, and whether the channel had an offsetting effect on the traditional credit channel. Their results suggested that both trade and credit channels operated in the UK, and the trade credit channel tended to weaken the effect of the traditional credit channel. We look at the effects of the traditional credit channel on firms' current assets and liabilities through monetary policy contractions, and the trade credit channel is analyzed through the effects on term structure of debt, i.e. ratios of accounts payables and short-term liabilities relative to long-term debt of firms.

Pogue et al. (1983) is motivated by the need to integrate the compartmentalized theories of credit policy with that of inventory and receivables management policies. Our paper examines the link between contractionary credit policy and short term financial management measures of firms, including cash and short-term investments, receivables, inventory and current liabilities of firms. Dedola and Lippi (2005) investigated the output effects of monetary policy using disaggregated data at the industry level from five OECD countries. Their analysis documented significant cross-industry heterogeneity of policy effects and a similarity across countries of the cross-industry distribution of policy effects. Some industries showed a systematic above average response to monetary policy shocks. Also, their analysis revealed that the impact of monetary policy was stronger in industries that produced durable goods, had greater financing requirements (working capital) and a smaller borrowing capacity (i.e. smaller firm size and leverage ratio). In our paper we

compare cross-industry effects of firms' responses to monetary policy among heavy, medium and light industry firms.

The paper proceeds as follows: Section 2 explains the data and the methodology. Section 3 discusses the empirical results, and conclusions are presented in section 4.

II. DATA AND METHODOLOGY

2.1. Data

Our sample consists of 265,426 firm-quarter observations downloaded from Compustat for the 1,971-2,005 period. These observations represent 7,537 individual firms. The variables used in our empirical analyses are:

1. Monetary policy variable.
   - *Contractionary*: dummy variable that takes the value "1" if the Fed is tightening (i.e. the effective Fed funds rate is going up), and "0" otherwise. The series for the effective Fed funds rate has been downloaded from St. Louis Fed's website. We differentiate between contractionary and expansionary monetary policy periods using the effective Fed funds rate. The months when the effective Fed funds rate is in an upward (downward) trend is classified as "contractionary" ("expansionary"), hence the "contractionary" variable takes the value "1" ("0").
2. Firm-specific control variables.
   - *Size*: natural logarithm of sales .
   - *Profitability*: ebitda (i.e. earnings before interest, taxes, depreciation and amortization) scaled by assets.
   - *Tangibility*: property, plant and equipment scaled by assets.
   - *Market-to-book:* market value of equity divided by book value of equity.
   - *Leverage*: total liabilities scaled by assets.
3. Assets and liabilities measures.
   - *Cash and ST Investments %*: cash and short-term investments as a % of total assets.
   - *AR %*: accounts receivable as a % of total assets.
   - *Inventory %*: inventory as a % of total assets.
   - *Current Assets %*: current assets as a % of total assets.
   - *AP %*: accounts payable as a % of total assets.
   - *Current Liabilities %*: current liabilities as a % of total assets.
   - *Long-Term Liabilities %*: long-term liabilities as a % of total assets.
4. Term structure measures.
   - *Log(AP/LTD)*: logarithm of "accounts payable scaled by long-term liabilities".
   - *Log(ST/LTD)*: logarithm of "short-term liabilities scaled by long-term liabilities".
5. Liquidity measures.
   - *Current Ratio*: current assets divided by current liabilities.
   - *Quick Ratio*: "current assets minus inventory" divided by current liabilities.

We also control for the time trend as well as the industry of the firm. For this purpose, we create the *time* variable, the *medium industry* and the *heavy industry* variables.

- *Time*: takes the value "1" through "140" for each quarter in our sample period. "1" is the first quarter of the year 1,971, and "140" is the fourth quarter of the year 2,005.
- *Medium Industry*: dummy variable that takes the value "1" when the firm has an SIC code within 2,800-3,299, and "0" otherwise.
- *Heavy Industry*: dummy variable that takes the value "1" when the firm has an SIC code within 3,300-3,999, and "0" otherwise.

2.2. Methodology

We first compare firms' assets and liabilities measures, term structure measures, and liquidity measures across contractionary and expansionary monetary policy periods using the Wilcoxon two-sample test. Then, we proceed with robust regressions.

We use the following regression equation in our analysis for *Cash and ST Investments %*:

$$\textbf{\textit{Cash\_and\_ST\_Investments\%}} = c_0 + c_1 Size + c_2 Profitability + c_3 Tangibility + c_4 Market\_to\_book + c_5 Leverage + c_6 Contractionary + c_7 (Leverage * Contractionary) + c_8 MediumIndustry + c_9 HeavyIndustry + c_{10} Time + \epsilon \quad \text{..... 1}$$

Here, we explain the firms' *Cash and ST Investments %* by the firm characteristics, the monetary policy variable "contractionary", the "leverage*contractionary" interaction term, the "medium industry" and the "heavy industry" dummies, and the time trend variable "time". We do similar analyses for *AR %* and *Inventory %*.

In order to explain *AP %*, we use the following regression equation:

$$\textbf{\textit{AP\%}} = c_0 + c_1 Size + c_2 Profitability + c_3 Tangibility + c_4 Market\_to\_book + c_5 Contractionary + c_6 Medium\ Industry + c_7 HeavyIndustry + c_8 Time + \epsilon \quad \text{..... 2}$$

Here, we explain the firms' *AP%* by the firm characteristics, the monetary policy variable "contractionary", the "medium industry" and the "heavy industry" dummies, and the time trend variable "time". We run similar analyses for *Current Liabilities %* and *Long-Term Liabilities %*.

Then, we use the following regression equation in our analysis for *Log(AP/LTD)*:

$$\textbf{\textit{Log(AP/LTD)\%}} = c_0 + c_1 Size + c_2 Profitability + c_3 Tangibility + c_4 Market\_to\_book + c_5 Contractionary + c_6 Medium\ Industry + c_7 HeavyIndustry + c_8 Time + \epsilon \quad \text{..... 3}$$

We run the same analysis for *Log(ST/LTD)*. Finally, in order to explain *Current Ratio*, we use the following equation:

$$\textbf{\textit{Current\_Ratio}} = c_0 + c_1 Size + c_2 Profitability + c_3 Tangibility + c_4 Market\_to\_book + c_5 Leverage + c_6 Contractionary + c_7 (Leverage * Contractionary) + c_8 MediumIndustry + c_9 HeavyIndustry + c_{10} Time + \epsilon \quad \text{..... 4}$$

We do the same analysis for *Quick Ratio*.

III. EMPIRICAL RESULTS

Table 1 shows the summary statistics for our sample firms. The median of the natural logarithm of firm size in terms of revenues for our sample firms is 3.18. The medians of profitability and tangibility are 0.03 and 0.24, respectively, meaning that for the median firm, the EBITDA is three percent of assets and the property, plant and equipment is twenty-four percent of assets. The median market-to-book ratio is 1.34, and the median leverage is 0.20 (i.e. 20% of assets).

For the median firm, cash and short-term investments is 6.85% of assets. The median values of accounts receivables and inventory are 19.06% and 19.49% of assets, respectively. The median firm has accounts payables, current liabilities, and long-term liabilities of 8.30%, 22.96%, and 12.09% respectively. The median values of term structure in terms of the logarithm of accounts payables to long-term debt, and logarithm of short-term to long-term liabilities are -0.51 and -1.26, respectively. Median values for current ratios and quick ratios for firms are 2.36 and 1.37 in our sample.

Table 1
Summary Statistics

	Mean	Median	St. dev.
Control Variables			
Size	3.20	3.18	2.36
Profitability	0.02	0.03	0.09
Tangibility	0.26	0.24	0.17
Market-to-Book	1.84	1.34	1.42
Leverage	0.22	0.20	0.19
Assets & Liabilities			
Cash and ST Investments %	16.30	6.85	21.41
AR %	19.62	19.06	10.83
Inventory %	21.12	19.49	13.71
Current Assets %	60.07	61.30	20.15
AP %	10.05	8.30	7.42
Current Liabilities %	26.06	22.96	15.21
Long-Term Liabilities %	15.73	12.09	15.99
Term Structure			
Log(AP/LTD)	-0.23	-0.51	1.58
Log(ST/LTD)	-1.23	-1.26	1.96
Liquidity Ratios			
Current Ratio	3.76	2.36	14.46
Quick Ratio	2.79	1.37	14.15
N	265,426		

Table 2 compares the median values of firm assets and liabilities, term structure of debt and liquidity ratios across the expansionary and the contractionary monetary policy periods. Our sample firms' current assets, including cash, accounts receivables and inventory median values as a percentage of its assets are all higher in the contractionary monetary policy period compared to their values in an expansionary policy period. This could arise due to Fed's tightening to stabilize inflationary pressures during periods when U.S. manufacturing firms were experiencing increasing demand for their products.

Table 2
Comparison of Firms Across Monetary Policy Periods

	Expansionary	Contractionary	Wilcoxon 2-Sample Test
	Median	Median	p-value
Assets & Liabilities			
Cash and ST Investments %	6.80	6.89	<0.0001
AR %	18.83	19.29	<0.0001
Inventory %	19.34	19.66	<0.0001
Current Assets %	60.97	61.65	<0.0001
AP %	8.19	8.42	<0.0001
Current Liabilities %	22.93	22.99	0.1985
Long-Term Liabilities %	11.76	12.44	<0.0001
Term Structure			
Log(AP/LTD)	-0.5176	-0.5112	0.2234
Log(ST/LTD)	-1.2184	-1.3087	<0.0001
Liquidity Ratios			
Current Ratio	2.3427	2.3707	<0.0001
Quick Ratio	1.3599	1.3774	<0.0001
N	136,868	128,558	

In the contractionary policy periods, the median current assets % is significantly higher compared to the median value in the expansionary periods (61.65% versus 60.97%, p-value<0.0001). The components of current assets, namely cash, accounts receivables, and inventory % are also significantly higher in the contractionary period compared to the expansionary period (p-value<0.0001). Firms' accounts payables are also significantly higher in the contractionary period, but the overall current liabilities are not significantly different between the expansionary and contractionary periods. This may suggest that components of current liabilities, other than accounts payables, are not significantly different between the two policy periods. Long-term liabilities are seen to be significantly higher for firms during the contractionary policy period. Firms seem to be inclined towards more long-term debt financing during periods of high growth in the economy when the Fed conducted contractionary policies. The term structure ratios show that long-term debt is significantly higher compared to short-term debt in the contractionary period. This could happen due to less short-term loans and more long-term loans taken by firms during contractionary periods. However, the accounts payables component of current liabilities is not significantly different from long-term debt of firms in the expansionary and contractionary periods. The liquidity ratios show that firms maintained higher current ratios and quick ratios during contractionary policy periods. This could arise as firms can afford to hold more liquidity during the growth phase in the economy, and be better prepared to meet liquidity shortfalls in the recessionary phase of the economy, i.e. during subsequent expansionary policy periods.

Table 3 shows the results of the robust regressions that explain cash balances, accounts receivables, and inventory (as % of assets) of firms by firm characteristics, the medium and the heavy industry dummies, the time variable, the "contractionary" dummy, and the leverage*contractionary interaction term. Firms with higher revenues (size) and profitability are found to hold lower cash and short-term investments (at 1% level). Also, firms with more tangible assets (property, plant and equipment) tend to have less cash balances. Firms' cash and short-term investments are not affected by contractionary policy, and are therefore insulated from monetary policy. Increased leverage is seen to have a negative effect on cash balances, but higher leverage during contractionary policy periods (leverage*contractionary interaction term) does not seem to have any significant effect on cash and short-term investments. Medium and heavy industry firms tend to have higher cash and short-term investments compared to light industry firms, and over time during our sample period, firms are seen to increase cash balances. All of the coefficients are significant at 1% level.

As firm size and profitability increase, accounts receivables are seen to increase for firms (at 1% level). However, as firms' tangible assets and market valuations increase, the accounts receivables are reduced. Higher leverage levels are found to have a positive effect on accounts receivables. Also, firms' accounts receivables are significantly increased during contractionary periods, but firms with higher leverage during contractionary periods tend to reduce accounts receivables according to our findings. Medium industries have lower receivables while heavy industries have higher accounts receivables compared to light industry firms. Firms tend to have lowered accounts receivables over time in our sample.

Table 3 also shows the impacts on firm inventories when Fed is conducting tight monetary policies. Larger firms are seen to significantly lower inventory balances during contractionary periods. Firms having more tangible assets and higher market valuations are also observed to hold lower inventory. Contractionary policy is seen to have a significant positive effect on inventories, but high leverage firms during contractionary

periods lower inventory balances, as seen from the negative co-efficient on the leverage*contractionary interaction term. However, firm leverage (without contractionary interaction) is seen to have a positive effect on inventories. In other words, monetary policy has opposite impacts on high leverage and low leverage firms' inventories. Medium industries have lower inventories while heavy industries have higher inventory balances (as % of assets). Also, firms tend to have lowered inventories over time in our sample.

Table 3

Firms' Current Assets when the Fed is "Tightening"

Regression Analysis			
IVs	**Cash & ST Inv.%**	**AR%**	**Inventory%**
Intercept	0.1390	0.2541	0.3488
	<0.0001	<0.0001	<0.0001
Size	-0.0042	0.0028	-0.0031
	<0.0001	<0.0001	<0.0001
Profitability	-0.0846	0.3729	0.2223
	<0.0001	<0.0001	<0.0001
Tangibility	-0.0966	-0.1531	-0.1881
	<0.0001	<0.0001	<0.0001
Market-to-book	0.0260	-0.0083	-0.0186
	<0.0001	<0.0001	<0.0001
Leverage	-0.2296	0.0380	0.1179
	<0.0001	<0.0001	<0.0001
Contractionary	0.0003	0.0019	0.0032
	0.7185	0.0022	<0.0001
Leverage*Contractionary	-0.0031	-0.0030	-0.0146
	0.2036	0.1562	<0.0001
Medium Industry	0.0145	-0.0070	-0.0299
	<0.0001	<0.0001	<0.0001
Heavy Industry	0.0074	0.0262	0.0250
	<0.0001	<0.0001	<0.0001
Time	0.0001	-0.0006	-0.0011
	<0.0001	<0.0001	<0.0001
N	212,947	212,947	212,947
R-Square	0.1387	0.1823	0.2009

Table 4 shows the results of the robust regressions that explain accounts payables, current liabilities, and long-term liabilities (as % of assets) of firms by firm characteristics, the "contractionary" period dummy term, the medium and the heavy industry dummies, and the time variable.

Firms with higher revenues (size) are found to significantly (at 1% level) increase accounts payables, current liabilities, and long-term liabilities. On the other hand, increased firm profitability is seen to significantly decrease accounts payables, current liabilities, and long-term liabilities. This could be explained by reduced costs of profitable firms that require lower debt financing. Also, firms with more tangible assets (property, plant and equipment) tend to have lower accounts payables and current liabilities, but higher long-term liabilities. Tangible assets are financed with more long-term debt and less short-term debt. . Firms with higher market-to-book values tend to have lower levels of current and long-term liabilities. Higher market valuations of firms may be associated with increased levels of equity financing . Contractionary policy periods are seen to increase accounts payables and long-term liabilities. During periods when Fed tightened monetary policy, firms were increasing production levels with increased use of leverage, both trade credits and long-term debt. Medium industry firms are seen to use lower levels of

payables and long-term debt, while heavy industry firms are observed to increase use of accounts payables and long-term debt financing. Over time, firms are seen to reduce short-term and long-term liabilities.

Table 4
Firms' Liabilities when the Fed is "Tightening"

Regression Analysis			
IVs	**AP%**	**Current Liabilities %**	**Long-Term Liabilities %**
Intercept	0.0944	0.2645	0.0880
	<0.0001	<0.0001	<0.0001
Size	0.0035	0.0124	0.0111
	<0.0001	<0.0001	<0.0001
Profitability	-0.0522	-0.1299	-0.1021
	<0.0001	<0.0001	<0.0001
Tangibility	-0.0005	-0.1026	0.2388
	0.4673	<0.0001	<0.0001
Market-to-book	-0.0029	-0.0064	-0.0124
	<0.0001	<0.0001	<0.0001
Contractionary	0.0020	-0.0004	0.0020
	<0.0001	0.3978	0.0002
Medium Industry	-0.0049	-0.0127	-0.0156
	<0.0001	<0.0001	<0.0001
Heavy Industry	0.0000	0.0146	-0.0176
	0.8821	<0.0001	<0.0001
Time	-0.0002	-0.0005	-0.0003
	<0.0001	<0.0001	<0.0001
N	212,947	212,947	212,947
R-Square	0.0287	0.0536	0.1700

Table 5 shows the results of the robust regressions that explain firms' term structure of debt explained by firm characteristics, the medium and the heavy industry dummies, the time variable, and the "contractionary" period dummy term. As firm size and profitability increased, firms are seen to hold more long-term debt compared to accounts payables and short-term debt. Firms having more tangibility, in terms of property, plant and equipment (as % of assets) also maintain a debt structure that includes more long-term debt compared to short-term debt. Firms having higher market valuations (i.e. higher market-to-book ratios) tend to have more accounts payables and short-term debt compared to long-term debt. Firms are also seen to maintain more long-term debt during contractionary periods.

Insert table 5 here.

Table 6 shows the results of the robust regressions that explain liquidity ratios, namely current and quick ratios of firms by firm characteristics, the medium and the heavy industry dummies, the time variable, the "contractionary" dummy, and the leverage* contractionary interaction term. Current ratios and quick ratios of firms are seen to be negatively impacted by larger firm sizes. Also, firms having more tangible fixed assets are seen to be maintaining lower levels of liquidity. Liquidity ratios are positively impacted by firm profitability and market valuations of firms. Contractionary policy is seen to have a significant negative effect on current ratios (at 5% level) and on quick ratios (at 10% level), but high leverage firms during contractionary periods increase current and quick ratios (at 1% level), as seen from the positive co-efficient on the leverage*contractionary interaction term. However, firm leverage (without contractionary interaction) is seen to have a negative effect on the liquidity ratios. In other words, monetary policy has opposite

impacts on high leverage and low leverage firms' liquidity ratios. Medium industries and heavy industries have higher current and quick ratios compared to light industry firms. Also, firms tend to have lowered liquidity over time in our sample.

Table 5
Term Structure when the Fed is "Tightening"

Regression Analysis		
IVs	**Log(AP/LTD)**	**Log(ST/LTD)**
Intercept	-0.0404	-0.3359
	0.0039	<0.0001
Size	-0.0365	-0.1154
	<0.0001	<0.0001
Profitability	-0.0326	-0.7286
	0.5301	<0.0001
Tangibility	-1.6329	-1.9452
	<0.0001	<0.0001
Market-to-book	0.1563	0.0483
	<0.0001	<0.0001
Contractionary	-0.0155	-0.0970
	0.0120	<0.0001
Medium Industry	0.0934	0.0668
	<0.0001	<0.0001
Heavy Industry	0.1367	0.1093
	<0.0001	<0.0001
Time	-0.0020	-0.0005
	<0.0001	<0.0001
N	177,373	168,756
R-Square	0.0567	0.0645

Table 6
Firms' Liquidity Ratios when the Fed is "Tightening"

Regression Analysis				
	Current Ratio		**Quick Ratio**	
IVs	**Model 1**	**Model 2**	**Model 1**	**Model 2**
Intercept	3.7338	3.7435	1.9999	2.0131
	<0.0001	<0.0001	<0.0001	<0.0001
Size	-0.1049	-0.1043	-0.0493	-0.0497
	<0.0001	<0.0001	<0.0001	<0.0001
Profitability	2.2276	2.2282	1.3538	1.3527
	<0.0001	<0.0001	<0.0001	<0.0001
Tangibility	-1.1346	-1.1290	-0.6127	-0.6153
	<0.0001	<0.0001	<0.0001	<0.0001
Market-to-book	0.0100	0.0097	0.0672	0.0675
	<0.0001	<0.0001	<0.0001	<0.0001
Leverage	-2.6656	-2.7226	-1.9843	-2.0267
	<0.0001	<0.0001	<0.0001	<0.0001
Contractionary	0.0186	-0.0177	0.0119	-0.0091
	0.0002	0.0302	0.0004	0.1093
Leverage*Contractionary	-	0.1405	-	0.0791
	-	<0.0001	-	<0.0001
Medium Industry	0.0564	0.0552	0.0864	0.0869
	<0.0001	<0.0001	<0.0001	<0.0001
Heavy Industry	0.0380	0.0382	0.0286	0.0287
	<0.0001	<0.0001	<0.0001	<0.0001
Time	-0.0014	-0.0014	0.0009	0.0009
	<0.0001	<0.0001	<0.0001	<0.0001
N	212,947	212,947	212,947	212,947
R-Square	0.1345	0.1341	0.1210	0.1213

IV. CONCLUSIONS

U.S. manufacturing firm data were used to test the effects of monetary policy on short-term assets and liabilities, term structure of firm debt and firms' liquidity ratios. In our analyses, we examined whether firms insulate themselves from Fed's contractionary monetary policy environment due to their individual characteristics like size, profitability, tangibility, market valuations and leverage. We found support for "insulation hypothesis" whereby certain firm characteristics contribute to insulating the firm from the transmission effects of monetary policy. Also, contractionary monetary policy is found to have opposite impacts on high leverage and low leverage firms' holdings of short-term assets.

Current Assets, namely cash and short-term investments, accounts receivables, and inventories are significantly higher during the contractionary policy periods when compared to the expansionary policy periods. This may be attributed to the timing of contractionary monetary policy coinciding with an overheated economy, and the Fed's attempts to stabilize inflationary pressures during periods when U.S. manufacturing firms were experiencing increased demand for their products.

Firms' accounts payables are found to be significantly higher in the contractionary policy period implying increased use of trade credit by firms during high growth periods. The overall current liabilities are not significantly different between the expansionary and contractionary policy periods. This may suggest that components of current liabilities, other than accounts payables, are not significantly different between the two policy periods, and are therefore insulated from monetary policy. Firms seem to be inclined towards more long-term debt financing during periods of high growth in the economy when the Fed conducted contractionary policies.

The term structure ratios suggest that firms took fewer short-term loans and more long-term loans during contractionary policy periods. Firms maintained higher current and quick ratios during periods when Fed was tightening credit. This could arise as firms can afford to hold more liquidity during the growth phase in the economy, and be better prepared to meet liquidity shortfalls in the recessionary phase of the economy, i.e. during subsequent expansionary policy periods.

Firms' cash and short-term investments are negatively impacted by firm size, profitability, tangibility and leverage. However, we find that contractionary monetary policy has no significant effect on cash and short-term investment balances of firms, and are therefore seen to be insulated from Fed's tightening policies.

Larger firms (in terms of revenues) or more profitable firms are found to have a positive impact on accounts receivables. As may be expected, higher sales revenues are associated with increased levels of receivables. On the other hand, firms having more tangible assets (property, plant, and equipment) and higher market valuations (market-to-book values) tend to reduce accounts receivables. Higher leverage firms also have a positive effect on its receivables, but the effects of leverage are insignificant in combination with a contractionary policy. Contractionary policy, on its own, has a significant positive effect on accounts receivables. This may arise as contractionary policy period coincides with periods during which firms were experiencing increased demand for their products. Heavy industry firms are seen to have a preference for higher liquidity levels, and have higher levels of cash balances, accounts receivables and inventory balances compared to light industry firms.

Firms' inventory balances are negatively impacted by size, i.e. firms with higher revenues are seen to maintain lower inventory levels. Higher leverage firms have a positive

impact on inventory, which implies that higher inventory balances are financed with increased debt financing. Also, contractionary policy period is seen to have a significant positive effect on inventories, but during contractionary periods, high leverage firms lower inventory balances. Thus, contractionary policy may be having opposite effects on inventories for high leverage and low leverage firms. High leveraged firms may attempt to lower debt financing for its inventories as interest rates rise following a tightening of credit by the Fed during the contractionary periods.

Larger firms, i.e. firms with higher revenues are found to significantly increase accounts payables, current liabilities, and long-term liabilities. It appears that higher sales revenues of manufacturing firms in our sample were supported by increased short-term and long-term debt financing. Increased firm profitability, on the other hand, is seen to significantly decrease accounts payables, current liabilities, and long-term liabilities. This could be explained by reduced costs of profitable firms that require lower debt financing. Firm tangibility is seen to have a negative effect on payables and current liabilities and a significant positive effect on long-term liabilities. Tangible assets are financed with more long-term debt and less short-term debt. Firms with higher market-to-book values tend to hold lower levels of current and long-term liabilities. Higher market valuations of firms may be associated with increased levels of equity financing.

Contractionary policy periods are seen to positively impact firms' accounts payables and long-term liabilities. During periods when Fed tightened monetary policy, firms were increasing production levels with increased use of leverage, both trade credits and long-term debt. Also, we find that debt financing including current liabilities and long-term debt increased for heavy industry manufacturing firms compared to medium and light industry firms.

On analyzing the firms' term structure of debt, we find that firms are seen to hold more long-term debt compared to accounts payables and short-term debt as firm size and profitability increased. Also, firms having more tangible assets maintain a debt structure that includes more long-term debt compared to short-term debt. Firms are also seen to maintain more long-term debt during contractionary periods when Fed started tightening credit. Firms may have an incentive to lock into long-term debt rates before Fed continued to raise interest rates during the contractionary policy period.

Examining the liquidity ratios of firms, we find that current ratios and quick ratios decrease as firm sizes increase. Also, lower levels of liquidity are held by firms having more tangible fixed assets. Contractionary policy is seen to have a significant negative effect on current ratios and on quick ratios, but high leverage firms during contractionary periods increase current and quick ratios. However, firm leverage (without contractionary interaction term) is seen to have a negative effect on the liquidity ratios. In other words, contractionary monetary policy is found to be having opposite impacts on high leverage and low leverage firms' liquidity ratios.

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