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THE FLOW OF FUNDS IN INDIAN
MANUFACTURING SECTOR

By

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Preliminary Report

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ABSTRACT (within 250 words)

An econometric model portraying the behaviour of flow of funds in manufacturing sector has been developed. Given the balance sheets constraint, decisions to acquire physical assets and other decisions about source and allocation of funds are governed by profitability, liquidity and transaction requirements. Based upon these criteria, a self-contained model for explaining the data sources and uses of funds pertaining to the Indian Manufacturing Sector has been developed. It consists of 12 behavioural equations and several identities. The equations are fitted to annual flows of funds related to data over the period 1954 through 1970.

Main conclusions of this preliminary investigations are as follows:

1. Profits after tax are not sensitive to changes in capacity utilization rate, but are highly sensitive to changes in sales.

2. There is no evidence of direct effect of changes in interest rates or other monetary policy instruments on the components of internal funds. Interest rates, however, are found to exert pressure on the flow of external funds to the manufacturing sector.

3. Inventory and fixed investment are found to be sensitive to variations in the availability of external funds. Monetary policy affects the manufacturing sector through the funds availability (has a quantity effect) rather than through interest rates (price effect).

4. Liquidity as well as interest cost considerations play important role in determining the allocation of funds between financial assets, like marketable securities, accounts receivable and cash and bank balances.

5. (Overleaf)

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Date January 3, 1974

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5. Thus, fiscal policy, as reflected in terms of tax parameters has a direct impact on the cash flow position of the manufacturing sector and thereby affects its decisions to invest and hold inventories. Monetary policy affects the portfolio of financial assets and external funds; its effects on the decisions to invest and hold stocks are only indirect and remote.

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THE FLOW OF FUNDS IN INDIAN MANUFACTURING SECTOR

Dalip S. Swamy*
V.G. Rao

The private manufacturing sector in India generated sales over Rs.6327 crores and made a draft of Rs.1182 crores on bank deposits in 1970-71.[1] The data given in Table 2 reveal that although this sector still relies heavily on internal funds, there has been a gradual shift towards borrowed capital against equity capital. Amongst the external funds bank borrowings dominate and accounts receivable take second place. A comparison of the growth rates of bank borrowings with inventory investment disclose that whole of the inventory formation and even a small portion of fixed investment are financed from bank loans, which are usually considered as short-term sources. This implies, perhaps, that much of the bank credit is automatically renewed and serves, therefore, as a substitute for long-term finance. The substantial growth of trade credit (accounts receivable) is suggestive of the ineffectiveness of monetary policy since trade credit moves closely with business activity and has a very high velocity. Regarding the uses of funds, the companies,

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[1] Facts given here refer to 1501 medium and large public limited companies whose balance sheets are consolidated by the Reserve Bank of India.

as a policy, appear to have maintained a stable and gradually rising dividend policy and postpone their trade payments to the maximum extent possible. These observations, perhaps, indicate that the companies have deliberately adopted these policies to generate a climate conducive to the growth of a healthy trend in share prices. Further, on the average there is a continuous decline in corporate gross capital expenditures (i.e. the sum of inventory and fixed investments). This raises a question as to why the growth of corporate investment is decelerating when there is assured market and growing demand. To answer this and several related issues an integrated model covering various facets of Indian manufacturing sector is required.

Empirical investigations, aiming at this global objective, especially in the Indian situation, are non-existent for all practical purposes. The few attempts (5,7,17,18,29) that have been made, were confined to the analysis of the behaviours of individual corporate activities like dividend policies, fixed and inventory investments (5,17,18,20), etc., rather than aiming at integrated models to draw more useful inferences like the impact of fiscal and monetary policies.[2]

[2] The reason for lack of such integrated studies in the Indian context is quite apparent. Till as recently as fifties, the only data that are available concerning the corporate sector are the number and paid up capital of Joint Stock Companies at work at the end of each fiscal year. Although the Registrar of Joint Stock Companies in each state obtained the balance sheets and income statements regularly from the companies on statutory basis, no attempt was made at their consolidation and publication. This task of compiling the data is first initiated by the Reserve Bank of India in early fifties and since then the data has been published regularly in the *Monthly Bulletin*.

Basing upon the theoretical underpinnings of similar individual functions, Anderson(2), Dhrymes & Kurz(6), Nadiri(25,26), Goldfeld(10), Heston(11) and Lintner(22) have studied the interactions of some corporate financial variables and government policy variables. Swamy & Witherell(31) have developed a simultaneous econometric model encompassing all the sources and uses of funds relevant to the U.S. non-financial corporations. This type of analysis is a useful analytical tool as it presents a comprehensive picture highlighting changes in the distribution of resources between balance sheet items. Hence, this approach is followed here to develop a relatively closed econometric model of the financial aspects of the Indian manufacturing sector.

II

An integrated picture of the activities of an enterprise or a sector can be obtained from its sources and uses of flow of funds tables. This statement, as is wellknown, illuminates the inflow and outflow of funds during a period comprising one or more accounting periods -- data not directly revealed by the income statement and the balance sheet. This information helps the companies in planning expansion and modernization programmes; formulating policies regarding dividend and credit procurement; and deciding priorities for alternative uses. It also implies that a corporation operates within a flow of funds constraint which ensures that all uses of funds are equal to all sources of funds. Hence, a model supposed to analyse the behaviour of corporate sector in complete should satisfy this constraint. This, in turn, requires the specification and estimation of a system of equations, which explain the various items of the flow of funds table.

Table 1 gives the sources and uses of funds. Due to limited annual observations and non-availability of much detailed balance sheet items only major item groups have been considered for the construction of this table.[3] The items considered on sources are: profits, capital consumption allowances, the sale of bonds, bank borrowings and other financial liabilities. The uses of funds are: dividend and tax payments, fixed investment, inventory investment and financial investment. The reasonableness of this format can be observed from Table 2, which gives time series data on individual items.

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[3] There is no prescribed format for a funds flow table. Depending upon the objective of the analysis, it may range from casual observation of the changes in various items summarized in the beginning and ending balance sheets and income statements to the elaborate work sheet reconstructions of funds transactions. The Reserve Bank of India follows a prescribed format for this. It constructs this table by deriving the elements entirely from the balance sheet changes without reconciling for the changes in reserves and accumulated depreciation pertaining to balance sheet with retained income and depreciation pertaining to the income statement. But, the more valid approach for the construction of the flow of funds table is to derive the figures of retained income and depreciation provisions from the income statement and not from the balance sheet changes which might represent pure book-keeping transfers. Such transfers involve no actual flow of funds. Another shortcoming of RBI presentation is that it includes in sources the provisions for taxation also. This means the provisions which are actually the liabilities to outsiders are wrongly treated as sources at par with depreciation.

TABLE 1

INDIAN MANUFACTURING SECTOR
(FLOW OF FUNDS)

Sources			Uses		
Internal					
1.	Profits Before Taxes	PBT	1.	Dividend payments	DIV
2.	Capital consumption allowance	CCA	2.	Profit Tax Payment	TP
			3.	Fixed Investment	IF
			4.	Changes in Inventory Investment	INV
External			5.	Financial Assets	FA
4.	Borrowings				
	a) From Banks	LBUS	a)	Cash & Bank balance	CB
	b) From Others	ODEB	b)	Accounts Receivable	AR
5.	Accounts Payable	AP	c)	Marketable securities	MSEC
	Statistical Discrepancy	DIS	d)	Other Financial Investments	OFI

Within the framework of the balance sheet depicted above, these variables are related as follows:

2.1	Net cash flow	$CF = PBT - TP - DIV + CCA$
2.2	Net saving	$NET = PBT - TP - DIV$
2.3	Gross Capital Expenditure	$IG = IF + INV$
2.4	Net acquisition of financial assets	$FA = CB + AR + MSEC + OFI$
2.5	Net increase in financial liabilities	$FL = LBUS + ODEB + AP$
2.6	Net financial investment	$IFN = FA - FL$
2.7	Gross investment	$GI = IG + IFN$
2.8	Overall balance sheet identity	$CF + FL \pm DIS = GI + FA$

which implies

2.9 Residual : $R = DIS + OFI$

$$= CF - GI + LBUS + ODEB + AP - CB - AR - MSEC$$

FLOW OF FUNDS TABLE

Rs. 100 crores

	1955-56	1956-57	1957-58	1958-59	1959-60	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66	1966-67	1967-68	1968-69	1969-70	1970-71
SOURCES																
Internal	1.1196	1.4157	1.2532	1.4260	1.9098	2.3223	2.9357	3.1824	3.6423	3.8913	4.3352	4.6275	4.1615	4.3915	5.4779	6.3251
Profits Before Tax	0.8373	1.0200	0.8107	0.9485	1.3508	1.5930	2.0296	2.1970	2.4987	2.5749	2.8476	2.9985	2.4557	2.5356	3.4145	4.0312
Depreciation Provisions	0.2823	0.3957	0.4425	0.4775	0.5590	0.7293	0.9061	0.9854	1.1436	1.3164	1.4876	1.6290	1.7058	1.8559	2.0654	2.2939
External	0.3850	1.1514	1.2728	0.5427	0.1911	0.8862	0.9097	1.2455	1.2286	1.6296	1.8324	2.9175	2.4395	1.8969	2.0908	2.4927
1. Borrowings from Banks	0.0858	0.5944	0.4593	0.1224	-0.0493	0.5239	0.4233	0.6054	0.3786	0.6952	1.0489	1.2579	1.2907	0.6174	0.7021	0.9997
2. Other Borrowings	0.1158	0.2501	0.4778	0.2566	0.0435	0.0882	0.1098	0.1868	0.4691	0.3644	0.3128	0.8043	0.6768	0.5780	0.2808	0.3544
3. Accounts payable	0.1834	0.3069	0.3557	0.1637	0.1969	0.2741	0.3776	0.4533	0.3809	0.5700	0.4707	0.8554	0.4721	0.7015	1.1079	1.1386
TOTAL	1.5046	2.5691	2.5260	1.9687	2.1009	3.2085	3.8454	4.4279	4.8709	5.5209	6.1675	7.5451	6.6011	6.2884	7.5687	8.8178
Statistical Discrepancy	0.2772	0.4192	0.3585	0.2324	0.5751	0.4879	0.6643	0.3662	0.4240	0.1324	0.0732	0.2333	0.988	0.3671	0.3959	0.4366
USES																
1. Dividend Payments	0.2339	0.3161	0.3214	0.3614	0.5194	0.5801	0.6981	0.6745	0.7330	0.7655	0.8664	0.9034	0.8789	0.9221	1.0675	1.2127
2. Tax Provisions	0.3365	0.4572	0.3948	0.2398	0.4789	0.5972	0.8711	1.1515	1.2800	1.3022	1.4470	1.4406	1.2740	1.3019	1.4981	1.8470
3. Fixed Investment	0.6295	1.1620	1.5887	1.2701	1.2151	0.9923	1.6664	1.7048	2.0202	1.9284	2.0358	2.8894	2.7735	2.6532	2.6595	2.6321
4. Inventory Investment	0.2687	0.7152	0.4739	-0.0217	0.1466	0.9780	0.8033	0.7017	0.5976	0.8725	1.3240	1.4915	1.2322	0.3637	1.3523	2.3434
5. Financial Assets	0.3132	0.3378	0.1057	0.1327	0.2859	0.5488	0.4708	0.5616	0.6641	0.7647	0.5667	1.0535	0.5413	1.4146	1.3872	1.2192
a) Cash & Bank balances	0.0996	-0.0161	-0.0346	0.0951	0.1627	0.1807	0.0323	-0.0975	0.1326	0.0620	-0.2551	0.0113	-0.0970	0.2439	0.3554	0.1324
b) Accounts Receivable	0.0963	0.3240	0.1394	0.1007	0.0818	0.2624	0.3855	0.5934	0.4581	0.6216	0.5430	0.9655	0.5696	1.1949	0.9928	1.0077
c) Marketable Securities	0.0439	0.0178	-0.0057	-0.0121	0.0341	0.0691	0.0421	0.0523	0.0603	0.0244	0.0450	0.0525	0.0347	0.0482	0.0632	0.0814
d) Other Financial Investments	0.0729	0.0021	0.0066	-0.0316	0.0073	0.0366	0.0109	0.0134	0.0131	0.0567	0.2338	0.0244	0.0340	-0.0724	-0.0222	-0.0023
TOTAL	1.7818	2.9883	2.8845	2.2011	2.6959	3.6964	4.5097	4.7941	5.2949	5.6533	6.2407	7.7784	6.6999	6.6555	7.9646	9.2544

A complete model should satisfy 2.8. This necessitates a system of 12 equations, which explain PBT, CCA, LBGS, ODEB, AP, DIV, TP, IF, INV, CB, AR, and MSEC. The statistical discrepancy can be assumed as exogenous since it is not amenable to behavioural explanation. Then, this balance sheet identity implies one degree of freedom. As is indicated in 2.9, we can assume that "other financial investments", OFI, which comprises of immovable properties, intangible assets and miscellaneous non-current assets, is determined exogenously.

Given the balance sheet constraint, 2.8, decisions to acquire physical assets and other decisions about sources and allocation of funds are governed by profitability, liquidity and transaction requirements. Based upon these criteria we have developed a self-contained model for explaining the different sources and uses of funds pertaining to the Indian manufacturing sector and have fit this model to annual flows of funds and related data over the period 1954 through 1970.[4]

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[4] Some limitation of the RBI data should be mentioned here. First of all different samples do not contain the same companies so that changes in company-mix presents problems of comparison. The use of blow-up factors to solve this problem of structural break is inadequate since paid up capital need not reflect the relative importance of a group of companies. Second, even blow-up factors are not available for the entire period. Further details about data limitations are mentioned in Appendix A.

The variable definitions and relevant stochastic equations which comprise the corporate flow of funds model are given in Table 3. Appendix B gives the results of some important alternative specifications for each equations. Corresponding to each equation, important statistics like $\bar{R}^2$ denoting the coefficient of determination, standard error of estimates, (SEE) and Durbin Watson statistics to test auto-correlation of the residuals are given; t-ratios are given in parenthesis below each coefficient. The first two equations cover profits and tax provision.

Profit Function

The profit function is based on the model suggested by Evans(9) where profits are viewed as an economic residual; for a given output, firms receive (positive or negative) profits only after meeting all fixed and variable costs. Evans's theoretical model has been developed from the usual national income identity:

$$PBT = pX - W - R - T_b - CCA \qquad (3.1)$$

where PBT is corporate profits; pX is GNP originating in current prices (X is GNP in constant prices); W is the wage bill; R refers to rents, royalties and interest; T_b refers to indirect business taxes; and CCA is depreciation. Starting from this identity for profits and assuming $T_b = t\ (pX)$, R and CCA are fixed costs which do not fluctuate cyclically, the profit function that is to be estimated has been derived as:

$$PBT = f(p_mX, (p_mX)_{-1}\ CAP,\ \Delta p_m) \qquad (3.2)$$

TABLE 3

EQUATIONS OF THE INDIAN MANUFACTURING SECTOR

(Sample Period 1955-56 to 1970-71)

1. $$PBT = \underset{(12.9985)}{1.0681}\ SAL + \underset{(8.1373)}{0.0368}\ CAP + \underset{(3.2300)}{0.0356}\ \Delta p_m - \underset{(7.1302)}{0.2713}\ W/GCP$$

$\bar{R}^2 = 0.972$
SEE = 0.113
DW = 2.083

2. $$TP = t_i(PBT - k\ I_p) + t_{sp}\left[PBT(1-t_i) + t_i k\ I_p - A_t (NW)\right] + t_s\left[PBT(1-t_i) + t_i k\ I_p - B_t\ NW\right] + t_b\ (\text{Bonus Equity Div.}) + t_{ed}\left(DIV - C_t\ OREK\right) + \underset{(2.7843)}{0.0842}\ IP - \underset{(1.0177)}{0.0963}\ (PBT - PBT_{-1}) - \underset{(2.3343)}{0.2742}\ DUM + \underset{(2.4198)}{0.1659}$$

$\bar{R}^2 = 0.960$
SEE = 0.109
DW = 1.587

3. $$CCA = \underset{(3.9132)}{-0.18672} + \underset{(32.0577)}{0.0538}\ K + \underset{(2.8901)}{0.0630}\ IF$$

$\bar{R}^2 = 0.989$
SEE = 0.064
DW = 1.142

4. $$DIV = \underset{(3.4938)}{0.06334} + \underset{(7.0341)}{0.2146}\ PAT + \underset{(2.7647)}{0.0025}\ IF + \underset{(11.6373)}{0.6040}\ DIV_{-1} - \underset{(3.0503)}{0.0530}\ EF$$

$\bar{R}^2 = 0.993$
SEE = 0.024
DW = 1.689

5. $$INV = \underset{(1.9175)}{0.3112} + \underset{(7.3498)}{0.1830}\ SAL + \underset{(3.7925)}{0.8114}\ LBUS - \underset{(7.1554)}{0.6316}\ INVK_{-1}$$

$\bar{R}^2 = 0.868$
SEE = 0.270
DW = 2.388

6.

$$IF = \underset{(2.5728)}{0.1853}\,(SAL-SAL_{-1}) + \underset{(2.1553)}{0.0283}\,EFA + \underset{(2.8706)}{0.0912}\,CF_{-1} + \underset{(3.4866)}{1.7768}\left(\frac{CCA}{K}\right)_{-1} - \underset{(2.6960)}{0.0354}\,K_{-1}$$

$\bar{R}^2 = 0.880$
SEE $= 0.387$
DW $= 2.121$

7.

$$LBUS = \underset{(1.9173)}{-1.8784} + \underset{(2.9431)}{0.1951}\,INV + \underset{(0.4431)}{0.0387}\,IF + \underset{(3.5708)}{0.4837}\,r_B + \underset{(1.4613)}{0.3050}\,AR - \underset{(2.1647)}{2.0875}\,Z_{-1} - \underset{(2.4271)}{0.5268}\,LBUSK_{-1}$$

$\bar{R}^2 = 0.792$
SEE $= 0.191$
DW $= 2.951$

8.

$$ODEB = \underset{(3.4790)}{-3.6708} + \underset{(3.7429)}{0.3207}\,IF + \underset{(3.3313)}{0.9919}\,Y_{GS} - \underset{(3.3984)}{0.7336}\,CF$$

$\bar{R}^2 = 0.735$
SEE $= 0.250$
DW $= 2.110$

9.

$$CB = \underset{(1.8724)}{0.5744} + \underset{(2.9153)}{0.0504}\,SAL - \underset{(1.3509)}{0.0319}\,SAL_{-1} - \underset{(2.1729)}{0.1608}\left(Y_{GS} + \Delta r_{GS} - \frac{\Delta P_m}{P_m}\right) - \underset{(3.1474)}{0.6570}\,CBK_{-1}$$

$\bar{R}^2 = 0.604$
SEE $= 0.116$
DW $= 1.639$

10.

$$MSEC = \underset{(4.4698)}{0.3204} + \underset{(3.1173)}{0.0570}\,SAL - \underset{(1.6317)}{0.0378}\,r_{TB} + \underset{(3.3308)}{0.1144}\,TP + \underset{(3.6527)}{0.0668}\,AR - \underset{(3.6236)}{0.5880}\,MSECK_{-1}$$

$\bar{R}^2 = 0.814$
SEE $= 0.020$
DW $= 1.991$

11.

$$AR = \underset{(0.4721)}{-0.3595} + \underset{(6.7928)}{0.1601}\,SAL - \underset{(2.3826)}{0.2957}\,UAR + \underset{(1.5202)}{0.0211}\,NLR - \underset{(6.0611)}{0.8569}\,ARK_{-1}$$

$\bar{R}^2 = 0.831$
SEE $= 0.189$
DW $= 2.434$

12.

$$AP = \underset{(1.4506)}{1.5460} + \underset{(2.7522)}{0.0724}\,(SAL-PBT) - \underset{(1.4567)}{0.200}\,UAR - \underset{(0.6748)}{0.0131}\,NLR - \underset{(3.0688)}{0.3915}\,APK_{-1}$$

$\bar{R}^2 = 0.721$
SEE $= 0.222$
DW $= 2.329$

VARIABLES OF INDIAN MANUFACTURING SECTOR

Data on balance sheet components have been taken from the Reserve Bank of India Bulletin. The data source for other variables used and their specifications, in brief, are given below. All variables are expressed in terms of 100 crores of rupees; other units of variables (not expressed in terms of this unit) are given in their appropriate places.

1.	AP	Flow of accounts payable
2.	APK	Stock of accounts payable
3.	AR	Flow of accounts receivable
4.	ARK	Stock of accounts receivable
5.	CAK	Stock of current assets, defined as, Stock of inventories, accounts receivable, cash and bank balances and investments other than shares of subsidiary companies
6.	CAP	Capacity utilization rate of the manufacturing sector as a whole, Monthly Statistics of the Production of Selected Industries in India.
7.	CB	Flow of cash and bank balances
8.	CBK	Stock of cash and bank balances
9.	CCA	Capital consumption allowances or depreciation provisions
10.	CF	Cash flow, defined as, after tax profits less dividends plus depreciation provisions
11.	CLK	Current liabilities, defined as, stock of provisions for taxation net of advance income tax, other current provisions, bank borrowings, other borrowings and accounts payable
12.	COST	Total cost of production, defined as, total value of production less profits before tax
13.	C_k	Cost of capital, defined as, the weighted mean of equity and debt capital costs, weights being the ratios of equity and debt to total assets
14.	DEB	Flow of total borrowings
15.	DEBK	Stock of total borrowings
16.	DIS	Statistical discrepancy
17.	DIV	Declared dividends
18.	DUM	Dummy, 1 for 1969-70 and 1970-71 and zero elsewhere

19.	EFA	Flow of net outstanding external finances
20.	EFAK	Stock of net outstanding external finances defined as, total borrowings plus accounts payable less accounts receivables and cash and bank balances.
21.	EQUK	Stock of equity capital, defined as, ordinary paid up capital plus preference paid up capital
22.	GCP	Gross corporate product
23.	GFA	Stock of gross fixed assets, in current prices
24.	IF	Fixed investment
25.	IG	Gross capital expenditure, defined as, fixed plus inventory investments
26.	INT	Internally generated funds, defined as, profits after tax ~~less dividends~~ plus depreciation provisions
27.	INV	Flow of inventories
28.	INVK	Stock of inventories
29.	IP	Investment in plant and machinery (flow)
30.	k	Development rebate rate
31.	K	Stock of gross fixed assets
32.	K^*	Stock of gross fixed assets, adjusted for price changes
33.	LBUSK	Stock of bank borrowings
34.	LBUS	Flow of bank borrowings
35.	MEQ	Market value of equity defined as the price of variable dividend securities multiplied by paid up capital
36.	MS	Flow of money supply
37.	MSEC	Flow of marketable securities
38.	MSECK	Stock of marketable securities, defined as, sum of government, semi-government and industrial securities plus shares of subsidiary companies and other current investments.
39.	MSK	Stock of money supply with the public, defined as, currency and demand deposit with the public. Currency and Finance Reports, Reserve Bank of India.
40.	NFA	Net acquisition of financial assets, defined as, the sum of cash and bank balances, accounts receivable, marketable securities and other financial assets (specified below)

41.	NFI	Net financial investment, defined as, NFA less NFL
42.	NFL	Net increase in financial liabilities, defined as, sum of bank loans and other borrowings and accounts payable.
43.	NLR	Net liquidity ratio of commercial banks. All scheduled commercial banks' cash in hand and balances with Reserve Bank plus investment in government securities as a percentage of their aggregate deposits. Currency and Finance Reports, Reserve Bank of India.
44.	NTC	Net trade credit, accounts receivable less accounts payable
45.	NW	Net worth, defined as the sum of equity capital plus reserves
46.	ODEB	Flow of total borrowing less bank borrowings
47.	ODEBK	Stock of total borrowings less bank borrowings
48.	OFI	Flow of other financial investments
49.	OFIK	Stock of other financial investments, defined as, the sum of immovable properties, intangible assets and miscellaneous non-current assets
50.	OREK	Ordinary paid up capital
51.	OUT	Total output, in current prices, defined as, sales plus closing stocks less opening stocks
52.	PAT	Profits after tax, defined as profits before tax less tax provisions
53.	PBT	Profits before tax provisions
54.	PD	Index of debentures of joint stock companies, 1961-62 = 100
55.	PLAK	Stock of assets in plant, equipment and machinery
56.	P_K	Index of machinery prices, 1961-62 = 100
57.	P_M	Index of wholesale prices of manufacturing sector, 1961-62 = 100
58.	P_R	Index of raw material prices, 1961-62 = 100
59.	P_S	Index of variable dividend securities, 1961-62 = 100
60.	r_A	State Bank of India interest rate on advance, in percent
61.	r_B	Average bazaar bill rate of Bombay, Calcutta and Madras centres, in percent

62. r_{CM} — Average call loan rate of the major scheduled commercial banks at Bombay, Calcutta and Madras, in percent

63. r_{SC} — Average call loan rate of the State Bank of India, in percent

64. r_{SD} — Three months deposit rate of commercial banks

65. r_{TB} — Three months treasury bill rate, Currency and Finance Reports, Reserve Bank of India.

66. RESK — Stock of Reserves

67. SAL — Gross corporate sales, in current prices

68. STR — Number of man-days lost per 100 employees because of labour disputes

69. TA — Total assets

70. TEC — Technological development rate, rate of change in fixed investment multiplied by the stock of gross fixed assets

71. TP — Corporate tax provisions

72. TVOP — Total value of production

73. u — Effective tax rate, ratio of tax provisions to profits before tax

74. UAR — User cost of accounts receivable and payable, defined as the sum of carrying cost$(r_A - \Delta r_A + \Delta p_M/p_M)$, the depreciation cost (CCA/K), and the credit standards of the companies given by the quick ratio, (CAK/CLK)

75. UCC — User cost of capital services, defined as

$$\left[p_K/1-u\right]\left[CCA/K + c_K - \Delta p_K/p_K\right]$$

76. UCH — Opportunity cost of cash holdings, defined as,

$$r_{SD} - \Delta r_{SD} + \Delta p_M/p_M$$

62.	r_{CM}	Average call loan rate of the major scheduled commercial banks at Bombay, Calcutta and Madras, in percent
63.	r_{SC}	Average call loan rate of the State Bank of India, in percent
64.	r_{SD}	Three months deposit rate of commercial banks
65.	r_{TB}	Three months treasury bill rate, Currency and Finance Reports, Reserve Bank of India.
66.	RESK	Stock of Reserves
67.	SAL	Gross corporate sales, in current prices
68.	STR	Number of man-days lost per 100 employees because of labour disputes
69.	TA	Total assets
70.	TEC	Technological development rate, rate of change in fixed investment multiplied by the stock of gross fixed assets
71.	TP	Corporate tax provisions
72.	TVOP	Total value of production
73.	u	Effective tax rate, ratio of tax provisions to profits before tax
74.	UAR	User cost of accounts receivable and payable, defined as the sum of carrying cost $(r_A - \Delta r_A + \Delta p_M / p_M)$, the depreciation cost (CCA/K), and the credit standards of the companies given by the quick ratio, (CAK/CLK)
75.	UCC	User cost of capital services, defined as $\left[p_K / 1-u\right] \left[CCA/K + C_k - \Delta p_K / p_K\right]$
76.	UCH	Opportunity cost of cash holdings, defined as, $r_{SD} - \Delta r_{SD} + \Delta p_M / p_M$

77. U_{CK} User cost of capital, defined as,

$$p_K \frac{(1-uD)}{1-u} (\delta + r)(1-k), \text{ where } \delta = 0.0538$$

$$D = CCA/K$$

$$r = W_1 \cdot r_A + W_2 \cdot Y_D + \frac{DIV}{MEQ} \cdot (1-W_1-W_2)$$

$$W_1 = \frac{LBUSK}{TA}, \quad W_2 = \frac{ODEBK}{TA}$$

78. UINV Unintended inventory holdings, defined as

$$INVK - \frac{1}{N} \sum_{i=1}^{N} \left(\frac{INV}{SAL}\right)_i \cdot SAL$$

79. W Unit labour cost, ratio of wages and salaries paid to total value of production

80. Y_D Yield on industrial debentures, in percent (index)

81. Y_e Yield on variable dividend industrial securities, in percent (Index)

82. Y_{GS} Yield on central government securities running yield of 3% conversion loan 1986 or later

83. Z Liquidity ratio, defined as, the ratio of current assets to current liabilities.

One significant aspect to be observed here is that neither unit labour costs nor average productivity is explicitly introduced. Kuh(20) considers that the effects of a change in average productivity is of great importance in explaining profits. But it is difficult to rationalise the productivity effect on profits because purely competitive industries operate at optimum size and oligopolistic industries will have to lower their product prices with increases in productivity so that the effects on profits become ambiguous. Regarding the effects of a change in unit labour costs on profits, we expect it to be a relevant shift factor. As labour unions secure higher wages, it will impose a burden of adjustment on firms. Either product prices will be adjusted or production process will be adjusted. In any case, profits are likely to be negatively related to changes in unit labour cost. Thus, we use the following equation.

$$PBT = f\ (p_m X,\ (p_m X)_{-1},\ \Delta p_m,\ W/X) \qquad (3.3)$$

Evans has included the lagged sales term in (3.3) to reflect the negative effect of lagged wage responses to profits. In such a case, the inclusion of W as an explicit variable may be questioned since it is likely to negate the importance of $\overline{SAL}_{-1}$. However, one can offer two types of reasonings for this simultaneous inclusion of SAL_{-1} and W. One might be the increase in fixed costs that arise from higher capital expenditures due to higher sales; these cannot be passed on.

These costs would occur a year or so after sales (and retained profits) rose, since investment decisions take time to materialise. Another possibility is that there might be an increase in the number of firms entering into the industry mainly in response to higher profits and sales. Although there is no direct way to measure the lag between increased sales and new entrants, it seems reasonable to assume about a year's time for this lag.[5]

An apparent difficulty with the application of (3.3) to the Indian case is the non-availability of data pertaining to capacity utilization rates. The data on actual output and installed capacity output are published only by the Central Statistical Organization in its Monthly Statistics of the Production of Selected Industries of India (MSP). This data, however, has certain distinct disadvantages.

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[5] An important variable missing in this equation perhaps may be the inventory variable which has been considered by most of the earlier studies. Introduction of this variable emphasizes the interaction of economic decisions that emerge from coalisation process also, as usually hypothesized by behavioral theories of the firm. Inventory decumulation can be presumed to effect corporate profits via two routes. Firstly, if much of final sales is out of inventory, sales in intermediate stages of production fall and this will directly affect profits earned in these earlier stages. Therefore, they fall when inventory decumulation supplies an extraordinary share of the goods for final sale. The other effect of inventory change on profits is rather indirect. Inventory change can be considered as an indicator of the state of market. Therefore, when decumulation is large, it may be an indication of worsening business conditions, leading to poor expectations and worst bargains to get rid of inventory. Under these conditions, profit margins shrink, accentuating the decline in total profits. Changes in inventory affect profits but this is an indirect effect and should be taken care of while introducing simultaneity in the model.

The Reserve Bank of India capacity utilization indices (30) also could not be of much help for our study, since it has not given the breakdown of the components to reconcile with its company finance statistics. Further, its coverage is limited to a smaller period, 1960-61 to 1971-72, whereas we require data for the period 1954-55 to 1970-71. In view of these, we analysed the product-wise yearly data of the MSP for the period 1949-50 to 1970-71 and constructed capacity utilization series for sixteen industrial groups as well as for the aggregate manufacturing sector.[6]

Equation 1, in Table 3 is based upon the above consideration. It suggests that profits are inelastic with respect to capacity utilization rate; the elasticity of profits before tax with respect to capacity utilization rate is 0.012. Such a low elasticity implies that in India, where productive capacity has restrained output growth over the sample period, improvement in capacity utilization rate is marginal having negligible influence on profits. However, profits are found to be highly sensitive to changes in sales; the sales elasticity of profits is estimated to be 1.54.

Tax Provision

Tax provision should be estimated in terms of the relevant tax rates and corporate profits; it is primarily an institutional

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6 For details refer Appendix 'A'.

relationship. In this context, two sets of tax rates are relevant: (1) those levied on corporate income (profit) such as income tax, super profits tax and surtax, and (2) those levied on dividends such as excess dividend tax, dividend bonus tax and additional dividend tax. Income tax, super tax and surcharge are levied on profits after due allowance is made on account of development rebate. Table 4 shows the time profile of the three corporate income tax rates combined together in column(1) and typical development rebates allowed on plant and equipment in column(2). Super tax and surtax are imposed on excess profits. For example, super profits tax was introduced in 1963; it was levied on companies whose income after deduction of income and super tax payable by them exceeded 6 percent of their equity capital and reserves. The super profits tax rate was 50 percent if the income was between 6 percent and 10 percent of capital and 60 percent if the income was above 10 percent of capital. Therefore, for calculating super profits tax, one requires first, to find out the ratio of after tax profits to equity and reserves and then, to apply the appropriate tax rate to excess profits (over and above the exemption limit defined in terms of the proportion of equity and reserves). Since companywise information is difficult to obtain (and process) we have applied the statutory tax rates to aggregate profits.

Taxes levied on dividends, but paid by corporations out of their profits, can also be approximated by applying the statutory tax rates

TABLE 4

RELEVANT TAX RATES

Year	Income tax and super tax t_i	Development Rebate k	Excess Dividend Tax t_{ed}	Dividend Tax t_d	Bonus Tax t_b	Surtax t_s	Super Profits Tax t_{sp}
1954-55	0.4687	0	0	0	0	0	0
1955-56	0.5469	0.25	0	0	0	0	0
1956-57	0.4343	0.25	0.125	0	0.125	0	0
1957-58	0.5150	0.25	0.200	0	0.300	0	0
1958-59	0.5150	0.25	0.200	0	0.300	0	0
1959-60	0.4500	0.25	0	0	0.300	0	0
1960-61	0.4500	0.25	0	0	0.300	0	0
1961-62	0.4500	0.20	0	0	0.125	0	0
1962-63	0.5000	0.20	0	0	0.125	0	0
1963-64	0.50	0.20	0	0	0.125	0	0
1964-65	0.50	0.20	0	0	0.125	0	0.6
1965-66	0.50	0.20	0	0.075	0.125	0.4	0
1966-67	0.50	0.20	0	0.075	0.125	NA	0
1967-68	0.50	0.20	0	NA	0	0.3	0.6
1968-69	0.50	0.20	0	NA	0	NA	0.5
1969-70	0.50	0.20	0	NA	0	NA	0.5
1969-70	0.50	0.15	0	0	0	NA	0.5
1970-71	0.50	0.15	0	0	0	0.4	0.6

NA = Not applicable

to dividends. The estimation of bonus (equity) tax is straightforward; it is given by multiplying the appropriate tax rate to the value of bonus shares issued. The calculation of excess dividend tax is somewhat complicated. In 1956 a graduated super tax on dividends was imposed; the tax rate was 0.125 on dividends in excess of 6 percent but not more than 10 percent of paid up capital (including bonus shares but excluding preference shares) and it was 0.1875 on dividends in excess of 10 percent of paid up capital. To calculate excess dividend tax one requires, again, to find out the ratio of dividends to paid up capital and then apply the appropriate tax rate to excess dividends.

$$\text{Income tax} = t_i \, (\text{PBT} - k.\, I_p)$$

$$\text{Super profits tax} = t_{sp} \left[(\text{PBT-Income Tax}) - A_t \, (\text{NW}) \right]$$

$$\text{Sur tax} = t_s \left[(\text{PBT-Income Tax}) - B_t \, (\text{NW}) \right]$$

$$\text{Bonus tax} = t_b \, (\text{Bonus Equity Dividend})$$

$$\text{Excess Dividend tax} = t_{ed} \left[\text{DIV} - C_t \, (\text{Ordinary Capital}) \right]$$

$$\text{Estimated tax} = \text{Income tax} + \text{Super Profits Tax} + \text{Sur tax} + \text{Bonus tax} + \text{Excess dividend tax}$$

where, A_t, B_t and C_t are appropriate statutory exemption limits applicable at different points of time.

Corporate taxes estimated on the basis of income tax, super profits tax, surtax, bonus tax, excess dividend tax, etc. are presented in Table 5. Obviously, the procedure adopted here is imperfect and

TABLE 5

ESTIMATED AND ACTUAL TAX PROVISIONS

(Rs. in crores)

Year	Estimated Income Tax	Super Profits Tax	Surtax	Excess Dividend Tax	Bonus Tax	Estimated Tax(including add. dividend)	Actual Tax	Difference (7) - (6)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1955-56	48.09					48.09	56.04	7.95
1956-57	41.88			6.96	7.76	56.60	57.20	.60
1957-58	40.12			3.88	15.19	59.19	55.15	-4.04
1958-59	44.32			8.59	17.60	70.51	63.89	-6.63
1959-60	63.12			-	25.05	88.17	77.99	-10.18
1960-61	75.22			-	34.95	110.17	82.60	-27.57
1961-62	104.58			-	15.81	120.39	105.48	-14.92
1962-63	104.48			-	17.66	122.14	143.89	21.75
1963-64	136.31	21.56		-	19.48	177.35	171.12	-6.23
1964-65	155.67	-	12.17	8.12*	20.46	196.42	186.48	-9.94
1965-66	167.94	-	-	7.86*	18.95	194.75	175.10	-19.65
1966-67	143.65	10.32	5.41	-	-	159.89	174.36	14.47
1967-68	124.46	25.01	-	-	-	149.47	154.16	4.69
1968-69	129.98	22.23	-	-	-	152.21	157.56	5.35
1969-70	191.99	39.33	-	-	-	231.32	181.32	-50.00
1970-71	218.28	9.40	6.27	-	-	233.94	223.50	-10.44

* Additional dividend tax.

lacks precision as some minor and somewhat detailed tax features are not accounted for. For example, a typical development rebate is used for the entire manufacturing sector while, in actual practice, different industries are allowed different rates of development rebate on new plant and equipment. Similarly, typical super profits tax rate and excess dividend rate are applied uniformly to the entire manufacturing sector while, in actual practice, these are graduated tax rates depending on the slab to which various companies fall. oreover, several other tax features have been deliberately ignored as it is difficult to quantify their incidence at the aggregate level. It is expected, therefore, that the difference between actual tax provision and estimated tax will be related in some way to changes in profits before tax. However, this relationship cannot be unambiguous; it will be positive or negative depending upon whether tax liabilities or tax exemptions (concessions) have been ignored. In any case, the procedure adopted here, equation 2, in Table 3, incorporates the main tax features and accounts for 96 percent variation in actual tax provision. Thus, the tax function is based on institutional tax parameters, which are under the control of the Government.

<u>Depreciation Function:</u>

The depreciation function can be developed on the basis of capital stock and an assumed rate of decline of that stock of capital. Generally, capital stock can be defined as:

$$K_t^* = \sum_{i=0}^{t} (1-a) \ IF_{t-1}^* \qquad 0 < a_1 < 1 \qquad (3.4)$$

where K^* is the estimated capital stock and IF^* is gross capital investment, both in constant prices. This definition leads to the following model for depreciation provisions, CCA.

$$CCA_t = a K^*_t = a \ IF_{t-1} + (1-a) \ CCA_{t-1} \qquad (3.5)$$

Implicit in (3.5) is the assumption that capital stock depreciates geometrically which, in turn, assumes that all prior investment, irrespective of its age, is still included in the capital stock and depreciates at the rate of a . It means that we are not distinguishing the rate of depreciation between new equipment from that of old, which can be questioned since new and old equipment will definitely differ in quality because of technological advancements. New equipment implies greater obsolescence and therefore older equipment will have to be allowed to depreciate at a greater rate. This amounts to saying that rate obsolescence would depend upon the proportion of modern equipment in the capital stock; the higher its proportion the greater will be the rate of obsolescence. This porportion is expected to be indicated by the growth of investment. So, for the time being we assume that the rate of depreciation is a linear function of the growth of investment,[7] that is,

$$a = a_0 + a_1 \ \Delta IF/IF_{-1} \qquad (3.6)$$

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[7] Under Indian tax law, each company is allowed for a fixed amount of development rebate in its tax payments depending upon the type of machinery purchased and the nature of the production of the firm concerned.

where $a_1 > 0$, so that 'a' varies according to the rate at which technological improvement is taking place. Substituting (3.6) in (3.5) the required CCA function can be written as

$$CCA = a_0 K_t + a_1 K_t \frac{\Delta IF}{IF_{-1}} \qquad (3.7)$$

As an alternative to this we also test the function suggested by an earlier study (7) in this regard, which runs as

$$CCA_t = b_0 + b_1 K_{t-1} + b_2 IF_t \qquad (3.8)$$

Equation (3.8) appears to be better specified than (3.7) because in India the initial depreciation allowance and development rebate relate to investment in plant and equipment and not to the rate of growth of such investment. This equation suggests that on an average the book value of capital stock depreciates at the rate of 5.4 percent, while the effective marginal depreciation allowance against new investment is 6.3 percent.

Dividend Function

For analysing dividend behaviour, the model proposed by Lintner(22)(around which empirical work during the last fifteen years is centered and which has been proved to be adequate enough for Indian situation also by number of earlier investigations) has been judged useful for the present analysis also. In crux, Lintner's hypothesis states that corporate financial policy is dividend oriented, dividends taking precedence over all other facets of financial policy while retained earnings are largely a by-product of dividend action taken in terms of well established policies and practices; companies decide to pay out a fixed proportion (target pay-out-ratio) of their net profits as dividends to common stockholders, but in view of their well known preference for stable dividends, may try to achieve this target level only by a fraction of the amount indicated by the target payout ratio whenever profits change. Lintner's model is:

$$DIV_t^* = r\ PAT_t \qquad (3.9)$$

$$\Delta DIV_t = C\ (DIV_t^* - DIV_{t-1}) + a^* \qquad (3.10)$$

where DIV* represent desired dividend; PAT after tax profits; DIV is dividends paid; r is target pay-out-ratio; and C is reaction coefficient bounded between zero and one, reflecting the rapidity of adjustment. The constant term is assumed to be positive reflecting greater reluctance on the part of the companies to reduce rather than to raise dividends and their desire for a gradual growth in dividend payments overtime.[8]

[8] The constant term in (3.10) can be justified on the ground that the entrepreneurial decisions are in terms of rates of dividend and profit per unit of equity capital. In a macro dividend function a positive constant term implies that unprofitable firms tend to maintain dividends in the face of disappointing profits.

Though Lintner's dividend model is on the whole favourably received, there have been persistent criticisms on his main contentions and specification of the model as given in equation (3.9). One point vigorously pursued in this context by various writers is the kind of role played by investment requirements. Lintner argues that investment is only passive to the extent of influencing, initially, the size of 'r'. This is refuted by others holding that it is active enough to warrant an explicit position in the dividend model. The empirical results, however, haven't come with any concrete and definite conclusions regarding this influences. Darling(4) claims that the correlation of his residuals reflects the liquidity requirements : Dhyrmes & Kurz(6) had obtained significant relationship between dividends and investment; Kuh(19) could obtain some influence of investment on dividends through the magnitude of the reaction coefficient; Brittain's(3) results did not reveal any influence of investment on dividends. Turning to Indian studies, the works of Purnanandam and Sastry (28) suggest that investment outlays do have, by and large, a significant impact on dividend disbursals while those of Krishna Murty & Sastry (17) revealed that dividend decisions are largely independent of investment. To account for this diversity of empirical findings, we, too, propose to examine the impact of investment in dividend decisions by explicitly introducing a variable to this account. The main justification for this incorporation stems from the usual financial theory which considers retained earnings as cheaper than the other alternatives; and they will enable the firms to carry out their planned dividend disbursements even when the rate of profit is low and investment programmes are extensive. Another variable tested in this model is the external financing. It has been argued (6) that the availability of external finances could boost dividends in line with planned payments in situations of low profits and extensive investment programmes.

There is some controversy about the relevance of Profit variable as a determinant of dividends. Brittain (3) argues for the use of cash flow variable, i.e. profits net of taxes but gross of depreciation. This argument seems to have a special appeal in the Indian context on the ground that depreciation account, as it stands in the balance sheet, contains an element of profit because of the very liberal allowances granted during the recent years. Accordingly, we have examined whether the coefficients of a dividend model are going to be affected much by replacing PAT_t in (3.9) by CF_t. Darling (4) proposes the model (3.9a) given below as an alternative to Lintner model. His argument is that PAT_{-1} has to be used instead of DIV_{-1} as an explanatory variable.

$$DIV^* = r\, PAT_{t-1} \tag{3.9a}$$

$$DIV_t = r\, PAT_{-1} + C\,(PAT_t - PAT_{t-1}) + a^* \tag{3.9b}$$

$$DIV_t = a^* + C\, PAT_t + (r-C)\, PAT_{t-1} \tag{3.9c}$$

In the absence of sufficient *a priori* information regarding the operational superiority of one model over the other, we feel that *expost facto* evidence would be the best alternative. Hence, we examine all the three models - Lintner, Brittain and Darling - and use $\bar{R}^2$ as a criterion in choosing the best model. The three models in their final estimation forms run as:

$$DIV_t = f_1\ (PAT_t,\ DIV_{t-1},\ IF_t,\ CF_t) \qquad (3.10a)$$

$$DIV_t = f_2\ (DIV_{t-1},\ IF_t,\ CF_t) \qquad (3.10b)$$

$$DIV_t = f_3\ (PAT_t,\ PAT_{t-1},\ IF_t,\ CF_t) \qquad (3.10c)$$

Judged from the values of $\bar{R}^2$, all the three alternative formulations of the dividend function seem (see equation 4 in Appendix B) to explain the manufacturing sector's dividend behaviour very well. In all the cases the regression coefficients are of expected sign and are statistically significant at the 5 percent level. It may be noted that the constant term is positive throughout, though not significant, so that it may be regarded as reflecting greater reluctance to reduce rather than raise the dividends. A close comparison of the three models, however, reveals that the $\bar{R}^2$ is slightly higher for Lintner model and its SEE is almost half of those obtained for the other two. In addition, the test statistic for serial correlation is improved.[9] This has induced us to favour Lintner's specification for further analysis.

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[9] In fact, the customarily used DW statistic, as duly acknowledged by Durbin & Watson is not very much relevant for models having lagged dependent variables (Nerlove (27.). Yet it is used in most of the studies mainly because of the non-existence of an alternative statistic and the same justification can be offered in the present study.

The addition of investment expenditures and the flow of external finance to the basic formulations, in general, led to improvement in the total explanation, as expected. Besides, this incorporation has reduced the serial correlation in the residuals to quite a good extent. In contrast with earlier findings, the coefficients of the investment and external finance variables have turned out to be positive and negative, respectively and are significant. However, the magnitude of the impact of these variables is very small but they are very much in line with the expectation. The reaction coefficients representing the speed of adjustment have shown quite a good amount of decline.[10] The positive sign for investment coefficient could be attributed as the possible inducement the manufacturing sector is giving to the shareholders to increase its equity to have stable returns in future especially when their credit position becomes very tight. The negative sign of external finance variable provides further support to the earlier argument; it implies that when the companies are assured of the generation of outside funds they try to distribute less to their shareholders. This could be possible, if the companies consider the accumulation of internal funds as a precautionary measure to meet unforeseen contingencies. Whatever could be the reasoning for these impacts, their relatively small impacts seem to suggest, as

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[10]The incorporation of these two variables (investment and external finance) has reduced the reaction coefficient from 0.4258 to 0.3960. It means that the adjustment coefficient is likely to be biased if proper attention is not paid to these constraints of dividends.

has been assumed by Lintner, that they have been subsumed in the long run dividend payout ratio and the adjustment parameter.

Inventory Function:

The explanation of inventory changes can be based on the wellknown capital-stock-adjustment or flexible-accelerator principle. Underlying this principle is the assumption that firms have an 'optimum' or 'desired' level of stocks and are believed to obtain that level gradually by making a partial adjustment of the discrepancy between actual stock at the beginning of a planning period and the level desired by the end of the period. This partial adjustment may be due to 1) the time lags involved in replenishment or depletion of stocks, adjustment of storage capacity when an expansion is required and time involved in realising the heterogenous composition of stocks, and 2) economies involved in large ordering so that adjustment of stocks to the required levels is postponed. Higher costs that may have to be paid for fast delivery, market conditions and uncertainties about the permanancy of the anticipated sales may also force only for a partial adjustment (10, 23). If INV_t represents actual stocks existing at the end of period t, INV_t^* the level desired (at the beginning of the period) to have by the end of the period, and k_1 is a reaction coefficient expressing the proportion of the gap between INV_t and INV_t^* to be filled during the period, then the hypothesized inventory relationship can be expressed as:

$$INV_t - INV_{t-1} = k_1 \; (INV_t^* - INV_{t-1}) \qquad (3.11)$$

The expression for desired stocks is hypothesized to represent the target for successive inventory adjustments. If actual sales, order, etc. would remain indefinitely at the anticipated level, INV_t^* represents the long run equilibrium level towards which the firms would eventually adjust their inventories. As there is bound to exist some discrepancy between the actual and expected sales, actual inventory accumulation could be hypothesized to have some unintended component. If SAL_t represents the observed sales for the period t and SAL_t^* be anticipated sales for the period at the beginning of t, expression (3.11) can be written as follows (to account for this latter discrepancy).

$$INV_t = k_1 (INV_t^* - INV_{t-1}) + (SAL_t^* - SAL_t) \qquad (3.12)$$

As neither INV_t^* nor SAL_t^* in (3.12) is observable, its empirical verification requires substitution of some observable variables for these two expressions.

It is possible to make INV_t^* as a function of the anticipated level of sales, cost of holding inventories, capacity utilization rate price anticipations and one or more financial variables. If the anticipated level of sales is increasing the firms may be required to accumulate more raw materials and intermediate products besides adequate stocks of finished products to meet orders regularly and thereby keep the prospects of loosing market at a minimum possible level.

The costs of holding inventories comprise of storage costs and costs of insurance and obsolescences. Short term interest charges can be considered as a good proxy for these costs. The influence of interest rate may be hypothesized as being negative; for an increase in the cost of borrowing funds to finance inventories will lead lowering inventory levels. The influence of capacity utilization is rather indirect; it is used as a proxy for unfilled orders. Unfilled orders are likely to increase as production approaches to capacity and *vice versa*. Hence, this variable could be hypothesized to exert same kind of influence as the unfilled orders do. If increased capacity is expected to continue it may increase desired stock of inventories; therefore, we expect a positive relation with this variable and INV_t^*.

The aim of an enterprise with respect to inventory investment is to minimise its cost structure. Hence, one can assume that the firm will always try to hedge inventories against price anticipations. When a price rise, especially in raw materials, is anticipated they may hoard raw materials to minimise their future output costs.[11] The role

[11] Krishnamurty and Sastry(10) tested this influence in two alternative forms viz., (a) manufacturers change their desired (inventory) levels if the price of raw materials in relation to price of output changes; and (b) manufacturers change their desired levels only with respect to changes in the price of raw materials. If price anticipations are presumed to reflect cost minimisation attitudes of the firms, the former measurement, however, may not have much influence.

of financial variables in an analysis of inventory behaviour has been discussed in literature very extensively. Most of these studies emphasized the importance of quick ratio as an indicator of the liquidity position. This measure is related to inventory behaviour by an accounting necessity; cash and near cash assets are substitute balance sheet entries and therefore are tended to be related with inventories. Other things remaining same, fluctuations in one of these complementary items are bound to be reflected in the other also.[12] Hence, the higher the liquidity position of a firm, the higher could be its desired inventory holdings. Another financial variable which can influence inventories is the credit availability position on which a firm can draw to finance these investments. Accordingly, an expression for desired inventory stocks can be written as:

$$INV_t^* = d_0 + d_1 SAL_t^* + d_2 CAP + d_3 INT_{-1} + d_4 EF_{-1} - d_5 r_{GS} + d_6 P_t^A \qquad (3.13)$$

Anticipated sales, following Lovell's (23) presumption, can be taken as a weighted average of actual sales in period t and t-1, i.e.

$$SAL_t^* = h_1 SAL_t + (1-h_1) SAL_{t-1} \qquad (3.14)$$

where $0 < h_1 < 1$

[12] Quick ratio, defined as the ratio of current assets to current liabilities, however, will not give a full measure of liquidity. A firm's ability to finance inventory investment without going for outside funds will be determined by its internally generated funds which will be given by its retained earnings and depreciation funds.

Therefore,

$$INV_t^* = d_0 + d_1 h_1 SAL_t + d_1 (1-h_1) SAL_{t-1} + d_2 CAP + d_3(5) INT_{-1} + d_4 EF_{-1} - d_5 r_{GS} + d_6 P_t^A \quad (3.15)$$

Substituting (3.15) and (3.14) in (3.12)

$$INV_t = f_0 + f_1 SAL_t + f_2 SAL_{t-1} + f_3 CAP + f_4 INT_{-1} + f_5 EF_{-1} - f_6 r_{GS} + f_7 P_t^A + f_8 INV_{-1} \quad (3.16)$$

Equation 5 provides a reasonable estimate of the behaviour of inventory function. The two capacity variables have correct signs but their coefficients are not statistically different from zero. Interest cost also does not appear to be relevant for stock holding in India since the coefficient of this variable appeared with wrong sign. However, the coefficient of the bank loan variable is positive and statistically significant; bank loan elasticity of inventory is low, 0.55. The short-run sales elasticity of inventories is also low, 0.58. In view of a high numerical value of the stock adjustment coefficient, 0.63, corresponding long-run elasticities are below unity.

Investment in Fixed Assets

The empirical studies on investment in fixed assets are quite varied in their approach reflecting a number of theories of investment behaviour. The theories underlying the recent econometric studies on this specific problem can broadly be divided into four groups, viz., the profit theories, the output or acceleration theories, the liquidity models and the models based on the neo-classical theory of capital accumulation. Since the firms should aim at maximising the present value of its expected future profits through investment, profit theorists contend that the current and past profits and changes in profits have to be considered as the principal determinants of investment outlay. The output theories which go under several names such as acceleration principle, modified acceleration principle, capacity utilization principle, capital requirements theory, etc. postulate that investment is proportional to the difference between the optimal capital stock and the actual capital stock at the beginning of the period, where the desired capital stock is a function of expected change in output.[13] The liquidity theorists emphasize that the desired level of capital outlay is a function of the liquidity and financial transactions; it will be determined by the flow of internal and external funds. The neoclassical theory of capital accumulation asserts that the price or substitution parameters condition the desired capital outlay; it is proportional to the value of output deflated by the price of capital services. The price of capital services depends upon the price of investment goods, the cost of capital

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[13] The acceleration principle, as originally formulated by Clark, asserts that change in capital stock is strictly proportional to the rate of change in output. Clark, J.M: "Business Acceleration and the Law of Demand...". American Economic Review (1944). This proposition has been later modified by replacing the rate of change in output to the level of output and by introducing distributed lags.

and the tax structure.[14]

Based upon their empirical results Meyer and Kuh (24) concluded that the capacity oriented models accurately reflect the entrepreneurial action in the long run and the acceleration sales models are superior to the internal funds flow or profit models. But the attempt made by Ando, et.al (1) led to the conclusion that a choice between a profit theory and an acceleration theory is neither feasible nor desirable since their mutual exclusiveness is very much blurred. In a more recent review article Jorgenson (14) concluded that the neoclassical theory perhaps would explain the investment behaviour better than the theories based on acceleration principle, profits and liquidity model; indeed the liquidity theory came last in his order of preference. However, the consensus regarding the determinants of investment behaviour, precluding the possibility of having a universally accepted model, is still in a fluid state leaving the problem of localizing the relevant variables to empirical results. Accordingly, the empirical studies have combined the main elements of some of these theories and inferred that the flexible accelerator models with financial variables can be considered as reasonably good. Klein (15), while discussing the macro-economic model building

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[14] Although Jorgenson (13) accepts that the demand for capital stock is a function of output produced, he emphasizes that the relative prices of output and capital are more important conditioning variables.

for developing economies, remarked that "in a country where there are so many opportunities for investment, it would seem that the stock adjustment form of investment function is not suitable. The existence of capacity may promote new investment rather than hinder it, other factors making investment behaviour different from that suggested by (stock adjustment behaviour) are the lack of an organized Western-type capital market and the presence of large government supported investment promotions. It seems unlikely that interest rates should be significant in the investment demand function. We might argue that there are so many worthwhile ventures, all economically sound, that close calculation by systematic pattern is unnecessary."[15] This argument appears to be very sound for new industries but its extension to organised wing of the traditional and established industrial units is rather doubtful. The existing government policies, to name the licensing procedures for capacity expansion, sanction of foreign exchange for importing capital goods, etc. are likely to create lags between the desired and actual investments, in the case of established units. These considerations along with market mechanism and supply constraints do suggest the usefulness of an accelerator type functions for Indian case also. Moreover, the investment functions of the stock adjustment type also .. fit the Indian data.[16] Considering these issues, while formulating the investment

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[15] Klein (15), pp 317-318.

[16] This, however, does not mean that the neo-classical models are not useful in the Indian context. We could not proceed much in this direction of examining its empirical validity with Indian data since it is rather a formidable task to formulate the deflator price of capital services with the given data.

function in this study we decided to take into account both the financial variables as well as stock-adjustment. Accordingly, the basic investment function is,

$$IF = f(\Delta SAL, SAL_{-1}, CFA, CF_{-1}) \qquad (3.17)$$

This specification, necessiates further incorporation of a variable to account for the replacement investment since acceleration principle applies to new investment only and it is not possible to separate the new and replacements with the balance sheet data. Following Meyer & Kuh (24) depreciation reserves can be taken to reflect the demand for replacement investments. Incorporating this variable, the basic estimating equation turns out as[17]

$$IF = f(\Delta SAL, SAL_{-1}, EFA, CF_{-1}, \left(\frac{CCA}{K}\right)_{-1} \qquad (3.18)$$

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[17] All variables in this equation will be expressed in terms of current prices rather than in much desired constant prices. This is because we are working with aggregate manufacturing sector as a whole which comprises of diversified industrial groups with capital stock of various vintages and of different product mix that change over time quite considerably. In this case, the only price deflators, in spite of their known biases, that could be used was the machinery and output prices. By resorting to the machinery price deflator for investment outlay one cannot say anything about the valuation of older or retired assets(which is rather a very sticky problem). In addition to this there exists the problem of valuing the investment used for construction activity. Knowing these difficulties, however, an attempt has been made in this study to estimate investment function in real terms, in the lines of the formulation given by Jorgenson. But the empirical performance of those equations is poor, leaving the unanswered questions more than the answered ones. Hence, the formulations of those equations are not presented here.

Equation 6 is an empirical counterpart of (3.18) where SAL_{-1} is dropped because its coefficient is not statistically different from zero. The empirical results of various alternative forms of this equation clearly bring out the usefulness of an accelerator model and establish the importance of financial variables. However, external finance elasticity of fixed investment is estimated to be 0.14. Age of equipment, as measured by capital consumption allowances, indicates a positive significant impact on investment. In this regard our results support the 'echo effect' theories of investment which suggest that older the existing stock of capital, larger will be the investment demand due to replacement. The low reaction coefficient is very much in line with the expectations; as investment in fixed assets is a long run phenomenon and the capital adjustments in a very short period cannot take place, the magnitude of the order of 0.03 need not be suspected as the resultant of plausible mis-specifications in the model.

Borrowing Functions:

External debt can be classified into short-term and long-term debt.[18] Bank borrowings are usually restricted to the financing of seasonal and other temporary financial requirements of self-liquidating nature, while the permanent needs are met from longer-term sources.

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18 The Reserve Bank classifies all bank borrowings as short term and all remaining debts as long-term borrowings. The same classification has been followed in this study also.

Sharp fluctuations, hence, are observed in the year-to-year flow of bank finance to industry since this together with liquid balances acts as a key part of the balancing mechanism rising and falling as the needs and sources fluctuate from year to year.

As regards short-term debt, firms will be mostly concerned with their ability to repay. Hence, the flow of these debts depends on such things as their liquidity position and expected cash flows. The need for these funds arises mainly from inventory investment and fixed investment. Other relevant factors determining the demand for bank loans are the opportunity cost of money reflected by, say, the Bazaar bill rate, the own rate of interest and the liquidity position of the firm, indicated by the ratio of current assets to current liabilities. To some extent firms can be expected to cover their accounts receivable by bank loans.

Equation 7 indicates that business loans are inelastic with respect to inventory and fixed investments and accounts receivable; the elasticities are estimated to be 0.29, 0.13 and 0.26, respectively. However, the interest elasticity of business loans is estimated to be 7.9, implying thereby a sort of hyper sensitive demand for short-term bank loans with respect to the bazaar bill rate. The liquidity position reflected by the ratio of current assets to current liabilities also exerts important influence on the demand for short term bank loans; this elasticity is estimated to be -3.48 at the sample means. The flow of business loans is not found to be meaningfully related to annual tax payments.

Other borrowing is assumed to comprise mostly of debentures, mortgages and the like having more than 12 months maturity period. It is reasonable to believe that the firms will be concerned mainly with their total assets position and long-run profitability of their business operations, while going for additional long-term liabilities. Hence, the demand for such funds is explained in equation 8 in terms of the fixed investment needs of the sector, its internal cash flow, the price of debt and its substitute and yield on variable dividend equity. It is interesting to note that the elasticity of long-term debt with respect to fixed investment is 1.53 and that with respect to cash flow is -2.16. The interest elasticity of long-term loans, like that of short-term loans, is also quite high around 6.0. It should be mentioned that this elasticity relates to alternative cost of borrowing rather than to the own cost of borrowing. A comparison of equation 7 and 8 reveals that the marginal propensity to borrow long with respect to fixed investment is substantially greater than the marginal propensity to borrow short.

The partial adjustment model is not expected to be relevant in this case because the sign of the coefficient of lagged dependent variable cannot be specified unambiguously. If it represents habit persistence behaviour of the firms it should have positive sign; on the other hand, if it represents increasing risk hypothesis[19] or the stock adjustment process it should have negative sign revealing the desire of the companies to minimise their exposure to insolvency.

Cash and Bank Balances Function:

Cash and bank balances held by manufacturing firms satisfy transaction, precautionary and speculative needs. The transaction needs arise due to lack of synchronization of sales and purchases. The precautionary motive relates to future uncertainty and the ability of a firm to borrow additional cash on short-term notice when circumstances warrant. Cash is required to meet emergencies such as strikes, fires, etc. It is also held for speculative purposes, to take advantage of favourable business opportunities that may arise from time to time. Holding adequate cash balance may reduce the unnecessary and unprofitable liquidation of other current assets. In fact, it facilitates the firms in their productive process by providing a hedge against changes in the prices of capital, labour, raw material and the interest rate.

Thus, cash and bank balances may be regarded as a part of the working capital of manufacturing firms; they are akin to productive resources. Therefore, the demand for cash can be derived on the basis of cost minimization (where cost is defined as the sum of payments made to labour and capital and the opportunity cost of money) subject to production function. This would suggest that the demand for cash

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[19]Since borrowing involves an element of risk and this risk increases with the amount of outstanding debt following Kelecki's principle.

balances depend upon the opportunity cost of money(Y_{GS}), the user cost of capital services (UCC), the price of labour services(W), the level of prices(p_M) and the expected level of output(GCP*). The opportunity cost of money has been derived as a sum of three components: (1) the interest cost depicting the interest foregone by holding cash rather than short-term securities; (2) the capital gains (losses) in the securities market to represent the anticipated rise in prices of securities; and (3) a depreciation cost to represent the reduction in the purchasing power of money due to an expected increase in the general price level. As mentioned above, the expected sales (GCP*) may be taken as a weighted average of actual output in periods t and t-1. These considerations determine the desired cash balances, which may not be equal to the actual cash balances due to unexpected changes in the demand conditions, incomplete information about financial markets, etc. Therefore, a partial adjustment process is assumed to operate in linear form.

Equation 9 in Appendix B pertains to the results of corporate demand for cash holdings. The best amongst them, judged on the basis of $\bar{R}^2$, is lifted to Table 3. The overall results of this model are also encouraging. The signs of all the coefficients with the exception of the lagged sales are of expected nature. The wrong sign for this coefficient may be deemed as the resultant of possible high correlation between current and lagged sales. The coefficient of UCH is negative and significant. However, its magnitude is of the order of 0.16 only. This coefficient actually represents the combined effect of three forces - the interest rate, capital gains (losses) and the change in the general purchasing power represented by the rate of change in prices of manufactured output. But the observed result, though not in its full sense, can be taken as an indirect evidence to the proposition, that proportion of cash in transactions balance is inversely related to interest rate since the major component of UCH is the interest rate. The short and long run elasticities of cash balances with respect to UCH are of the sizes of 0.06 and 0.09 respectively. The sign of the coefficient of the relative factor price variable is interesting. Its positive sign suggests that the cash and bank balances are substitutes for capital or labour in the asset structure of the firms. The short run income elasticity, indicated by the sum of the current and lagged sales variables' coefficients, is about 0.02. Leaving aside the possible aggregation problems, this provides an empirical support to the arguments against unit income elasticity hypothesis. However, this question needs further explorations to come out with a concrete answer. The coefficient of CBK_{-1}, representing the speed of adjustment to the desired level of CBK, is of the magnitude of 0.67; this implies a much faster adjustment than in the cases of fixed and inventory investments and business loans. Cash being a highly liquid asset, this finding is not far from reality.

<u>Marketable Securities</u>:

Marketable securities consist of government and semi-government securities, industrial securities and other investments. These securities serve as a precautionary balance or buffer stock of short term assets which provide extra income while providing coverage of possible gaps between current cash inflows and anticipated and unexpected cash outflows. In addition to this precautionary motive of eleiminating risk of running out of liquidity, the absence of short term debts to be retired soon and/or the lack of time to invest in more lucrative assets, too, induces companies to go for these types of securities to maximise their expected returns by all plausible means. It appears, therefore, reasonable to assume that the stock adjustment models will describe the behaviour of corporations with respect to the marketable securities also. The desired level of marketable securities(MSEC) is expected to be determined by sales, Corporate tax liabilities, level of inventories, level of accounts receivable, the difference between the bank loan rate and the treasury bill rate. Accordingly, the corporate holding of marketable securities are explained in terms of the current sales, tax provision and difference between the Treasury bill rate and the advance rate and lagged accounts receivables, changes in inventories and stocks of marketable securities.

It is expected that as sales expand corporations would accumulate marketable securities. The possible income that can be earned from liquidity assets may be viewed as a residual income and the adjustment for other current assets are generally considered as secondary to inventory adjustments. We expect an inverse relationship between MSEC and $INVK_{-1}$. Due to lack of control on their accounts receivable and payable, firms will always try to maximise their liquidity position by converting these accounts to their advantage. In other words, firms will hold more precautionary balances when their trade credit or accounts receivable increases. Thus, sales of marketable securities constitute a reasonable alternative to bank borrowings for expanding inventories and trade credits. The tax liability variable is expected to be positively related to changes in the holding of marketable securities. Rational corporations are likely to increase their portfolio of liquid assets during periods of high anticipated taxes in an effort to earn income through holding interest-bearing securities against tax liability.

As noted above, the flow of marketable securities, other things being the same, should be positively related to the sale variable, tax liabilities and the level of accounts receivable. They should have negative relationship with the previous year's stock of marketable securities, the lagged stock of inventories and the difference between the treasury bill rate and the banks' advance rate. The empirical performance of the proposed model appears to be reasonably good. All variables, with an exception of inventory, have turned out with expected signs. The deletion of this variable has slightly improved the explanatory power of the overall model; and decreased the significance of $(r_{TB}-r_A)$. The negative sign of the $(r_{TB}-r_A)$ variable suggests that marketable securities and bank deposits are close substitutes in manufacturing sector's portfolio. The corporate tax liabilities and accounts receivable appeared the most significant variables. This is quite natural with an unshiftable tax,[20] since the brunt of its burden falls on the companies. The firms which have previously accumulated a large amount for tax purposes, will be relieved if they switch over the borrowings from banks or by allowing their trade payments accumulate. A close examination of the company statistics clearly reveal the existence of this phenomenon of switching over to borrowed funds. Thus, the accumulated tax provisions can be used for working capital requirements and, hence, will exert a positive influence on marketable securities, as has been revealed by the coefficient of TP. The coefficient associated with the accounts receivable variable also shows a correct sign and is significant. As hypothesized above, the firms view the existing level of their receivable as a part of the expected inflow of funds. By reducing the need for liquidity in the form of cash or near cash an increase in accounts receivable induces the firms to invest more in securities which provide them supplemental income. The coefficient of $MSECK_{-1}$ is approximately of the order of 0.65 which indicates that 65 percent of the gap between actual and desired stocks is fixed in a typical year. This does not differ very much with the adjustment coefficient of CB. This suggests that the corporations respond to their cash and marketable security assets' adjustments more or less to a similar order. This finding is in

[20] Whether corporate income tax can be shiftable or not is one of the much discussed problems in recent years. An evidence to the unshiftable nature of this tax in the Indian case has been provided by an earlier investigation of one of the authors (29).

contradiction with the maintained hypothesis of Heston (11) who argues that the securities tend to adjust to their equilibrium position at a slower rate than cash.

Trade Credit:

Accounts receivable and accounts payable are important spontaneous sources of short-term financing for a firm because they arise from ordinary business transactions. It is helpful for a firm if adequate credit is available when it makes purchases of its requirements from other firms. Usually firms selling their products allows short-term credit to their clients because they consider it necessary to maintain permanent business relations which, like capital investment, yield returns over time. This implies that non-financial firms sell a joint product, their particular good and credit. Looked at from this point of view, a firm will determine its sales, purchases, accounts receivable and accounts payable in such a manner as to maximise its objective function.

Profit maximisation behaviour would imply that the optimal level of trade credit (accounts receivable) will be determined by the opportunity or user cost of credit, U, the level of sales and the general economic conditions. To some sellers, a competitive alternative to credit extension is a reduction in the price of his product;

for buyers, an alternative to accounts payable is funds borrowed from banks or other financial institutions. Therefore, user cost of credit is represented by carrying cost (interest rate on loans and advances charged by commercial banks), possible capital gains (reflected by the rate of change of interest rate), the rate of change of product prices and the rate of depreciation of fixed assets. These four factors are combined to construct the user cost variable, U. It is expected that general economic conditions are reflected by changes in monetary policy, which may be indicated by changes in money supply or liquidity position of commercial banks. Quick ratio, defined as the ratio of current assets to current liabilities, may also be relevant as an indication of the easiness or tightness of firms' liquidity positions. Thus, one can determine the desired level of accounts receivable and accounts payable. However, actual levels of receivables and payables may not equal their desired levels. This discrepancy may arise due to uncertainty about sales, unanticipated changes in monetary policy, unexpected default and bad debts, unestimatable collection costs of delinquent accounts, possible disequilibrium in other assets which will also affect trade credit and trade debt, etc. Hence, a partial adjustment model is used to capture the manufacturing sector's behaviour with regard to accounts receivable and accounts payable.

Detailed empirical results of accounts receivable and payable are presented in Appendix B under equation 11 and 12. It can readily be observed from those results that the stock adjustment type models do well in explaining the variations in the flows of both variables. In both cases, the results are fairly good according to the conventional statistical criteria - significant $\bar{R}^2$ and relatively low standard errors of the estimates. There is, however, some evidence of positive serial correlation in the residuals of both of the functions. As can be observed from these results, the elasticities of AR and AP with respect to scale factors, SAL and COST, are substantially different. The elasticity of AR with respect to SAL is of the order of 0.85 while the elasticity of AP with respect to COST is of the order of 0.43. This means, a unit increase in manufacturing sectors' sales to other sectors seems to generate more trade credit than a unit increase in sales of other sectors to the manufacturing sector. This result is very much in line with the finding of Nadiri (25) with U.S. manufacturing sector data.[21] This consistency of corporate behaviour makes one to wonder whether this inference can be treated as of general validity without having any reference to the economic conditions prevailing in a country.

The coefficient of UAR has turned out with expected negative sign and significant too in AR function. In the case of AP function its coefficient is of wrong sign apart from being insignificant. This result reveals that the manufacturing firms seem to reduce or at least

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[21] It should, however, be noted that Nadiri considered the logarithmic forms of AR and AP as more appropriate than the linear forms we have used.

postpone extending receivables when the cost of credit goes up and this cost consciousness does not seem to exist when they wish to receive credit from other sectors of the economy. The monetary policy does not seem to be of any significance on these short-term capital investments. We tried to account for this influence through two alternative variables, via., money supply (MS) and net liquidity ratio (NLR). In both cases, their coefficients are either insignificant or of wrong signs. The unintended inventory accumulations appear to exert some influence on accounts payable rather than on accounts receivable. In the wake of large accumulation of unintended inventories, (VINV), the firms try to extend their credit facilities to the maximum possible extent and as their liquidity position become tight, in such circumstances, postpone their payments to a later date. Accordingly, this variable should show a positive impact in AR function and a negative influence on AP. The insensitivity effect of VINV in AR function may be representing the cost consciousness of the firms, particularly in the presence of likely restrictions on the imports by the government. The adjustment coefficients revealing that the companies, in general, prefer to adjust to their desired levels of AR most rapidly than to their desired levels of AP.

IV

Main conclusions of this study are as follows:

1) Profits after tax are not sensitive to changes in capacity utilization rate, but are highly sensitive to changes in sales.

2) There is no evidence of direct effect of changes in interest rates or other monetary policy instruments on the components of internal funds. Interest rates, however, are found to exert pressure on the flow of external funds to the manufacturing sector.

3) Inventory and fixed investments are found to be sensitive to variations in the availability of external funds. Monetary policy affects the manufacturing sector through the funds availability (has a quantity effect) rather than through interest rates (price effect).

4) Liquidity as well as interest cost considerations play important role in determining the allocation of funds between financial assets, like marketable securities, accounts receivable and cash and bank balances.

5) Thus, fiscal policy, as reflected in terms of tax parameters, has a direct impact on the cash flow position of the manufacturing sector and thereby affects its decisions to invest and hold inventories. Monetary policy affects the portfolio of financial assets and external funds; its effects on the decision to invest and hold stocks are only indirect and remote.

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APPENDIX 'A'

DATA PROBLEMS

The global data on company finance statistics compiled by the Reserve Bank of India (RBI) are used with some revisions in order to smoothen the series. This adjustment is warranted mainly because of sample variations in the data from period to period. For the period 1950-55 the study covers 750 Joint Stock Companies only, whereas it covered for later periods 1955-60, 1960-65 and 1965-75 as many as 1001, 1333 and 1501 companies, respectively. As the sample sizes and their respective coverage had changed from period to period, the much desirable procedure is to estimate each industry-wise data by multiplying with their respective blow-up factors. The blow-up factor used here is the ratio of paid-up capital of all companies to the paid-up capital of selected companies in the respective industries. Industry-wise estimates so obtained have to be combined to generate aggregate pertaining to manufacturing sector. In this process, it has been decided to take the estimates relating to the series covering larger number of selected companies for the common years between the successive series. For the years 1950-51 to 1954-55 and 1966-67 to 1969-70 no firm data on paid-up capital is available (to generate blow-up factors) either at industry level or at total level. So far the later years (1966-70) the industry-wise blow-up factors for the base years 1965-66 are used; while for the former years the industry-wise blow-up factors for the year 1955-56 are used.

To have a quick understanding of the aggregate corporate behavior, instead of adding up industry-wise blow-up estimates, as a priliminary analysis we generated aggregate manufacturing sector data by taking the aggregate blow-up factors of the three major industrial groups into which the RBI has broken the manufacturing and processing sector data. In this priliminary analysis we covered the period 1955-70. Other data problems of this study are that the compositions of all sample periods may not be uniform and that the proportion of paid-up capital may not reflect the relative importance of individual industrial groups. In the wake of these problems, the results of this study can be taken as preliminary one which demand follow-up studies to have better results.

CAPACITY UTILIZATION SERIES FOR INDIAN MANUFACTURING INDUSTRIES : 1950-1970

The Data:

The data used for this study are from the Monthly Statistics of the Production of Selected Industries of India, compiled by Central Statistical Organization. This publication gives data both on installed capacities and actual production figures in two distinct block, which could be conceived as 'Yearly-block' and 'Monthly-block'. It should, however, be noted that monthly data on installed capacities are not provided here; only monthly average production figures are available. For the generation of the capacity utilization series presented below we had taken yearly blocks only. As our specific interest in this generation process is to obtain unutilised capacities in manufacturing sector alone we had taken only 139 products data. The list of the products taken is enclosed at the end. The period covered is from 1950-51 to 1970-71.

The Method:

The rate of utilization of a Production unit in any particular period can be conceived as the ratio of its actual output to the potential (or capacity) output. The numerator of this ratio is merely the numerical value of the physical output series corresponding to each point of time. The published capacity (installed) output series for obvious reasons, explained in April 1970 RBI Bulletin, cannot be taken as the denominator for the utilization rate. This has necessitated to generate a new series to this effect for each product. The method followed for generating these series is the familiar "trend-through-peaks" method developed by Wharton School. The pro edure adopted in this regard can be described as follows:

i) identify periods when an industry was producing as much as it could, for at such times potential output may be deemed equal to actual output; in other words identifying the peak outputs;

ii) during two peak periods, say, potential output is estimated by linear interpolation;

iii) for periods before the first peak potential output for periods after the last peak, potential output is estimated on a feasible extrapolation.

Thus, in effect, a time series for potential output is read from a trend curve drawn through selected ordinates of a graph of actual outputs.

The capacity utilization series so obtained for individual products were grouped into fourteen major blocks to match the financial data published by RBI in its monthly bulletins. For arriving at these series, the weights of 1960-61 were used. Then, the capacity utilization rates of the aggregate manufacturing sector were generated as weighted averages of the fourteen industrial group.

LIST OF THE PRODUCTS COVERED

1. Vegetable oil products
2. Cotton yarn
3. Cloth mill sector
4. Woollen fabrics(total)
5. Woollen yarn
6. Jute (total)
7. Paper & paper boards
8. Hard board
9. Insulation boards
10. Wood screws
11. Hacksaw blades
12. Wire ropes
13. Steel files
14. Enamel ware
15. Razor blades
16. Hurricane lamps
17. Oil pressure lamps
18. Thermos flasks
19. Stoves
20. Expanded metal
21. Tractors
22. Diesel Engines(vehicular type)
23. Diesel Engines(stationary type)
24. Carding engines
25. Power driven pumps
26. Roller & ball bearings
27. Milling cutters
28. Reamers
29. Lathe tools
30. Diamond-drill bits
31. Threading tools
32. Tungston carbide
33. Band saw blades
34. Twist drills
35. Sewing machines
36. Typewriters
37. Duplicators
38. Portable air-conditioners
39. Domestic refrigerators
40. Power transformers
41. Electric motors
42. Conductors (bare-copper)
43. Conductors (Aluminium)
44. Winding wires
45. Rubber & Plastic insulated cables
46. Storage batteries
47. Dry cells
48. Incandescent filament lamps
49. Electric lamps
50. Electric fans
51. Radio receivers
52. Conduit pipes
53. Arc welding electrodes
54. House service meters
55. Motor starters
56. Railway wagons
57. Automobiles (total)
58. Bicycles
59. Motor cycles & scooters
60. Benzene

61. Acetylene
62. Acetic acid
63. Power alcohol
64. Rectified spirit
65. Sulphuric acid
66. Carbic soda
67. Soda ash
68. Chlorine liquid
69. Bleaching powder
70. Bichromates
71. Oxygen (welding gas)
72. Carbon Dioxide gas
73. Hydrochloric acid
74. P.V.C (flexible sheetings)
75. Viscose yarn (Rayon)
76. Acetate yarn (Rayon)
77. Cellophane (Rayon)
78. Staple fibre (synthetic)
79. Vat dyes
80. Stabilized azoics
81. Solubilized vats
82. Sulphur
83. Azo dyes
84. Naphthols
85. Ammonium sulphate
86. Double salt
87. Ammonium chloride
88. Ammonium phosphate
89. Urea
90. Super phosphate
91. Paints & Varnishes
92. Zinc oxide
93. Red lead
94. N.C. Lacquers
95. Liver extract (Injection)
96. Liver extract (oral)
97. Soaps
98. Glycerine
99. Glue
100. Pig iron
101. Semi-finished steel
102. Finished steel
103. Steel ingots & metal forecasting
104. Steel pipes & tubes
105. Castings & forgings
106. Electrical steel sheets
107. Aluminium (virgin metal)
108. Aluminium (sheets & circles)
109. Aluminium foils
110. Cigarettes
111. Sugar (refined)
112. Sugar (confection
113. Matches
114. Cement
115. Footwear
116. Tyres (Automobiles)
117. Tyres (cycles)
118. Tractor tyres
119. Tubes (automobiles)
120. Tubes (cycles)

121. Tractor tubes
122. Fan belts & industrial V - belts
123. Rubber ply transmission & cc
124. Radiator hoses
125. Vacuum brakes
126. Other types of hoses
127. Rubber components of railways
128. Fittings ebonite sheets, rods & tubes
129. Water proofed fabrics
130. Latex foam sponge
131. Camel back
132. Dipped rubber goods
133. Glazed tiles
134. Refractories
135. Stove-wares
136. White-wares
137. Sanitary wares
138. Insulators (H.T)
139. Insulators (L.T)

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S.No.	Industry	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
1.	Vanaspathi	85.8710	79.1209	82.1705	78.0488	88.6836	95.1754	88.9354	100.0000	95.2381	97.6102
2.	Cotton textiles	75.9872	82.3054	90.7128	92.5980	97.0278	98.1071	98.5905	98.4163	91.2426	90.4222
3.	Jute textiles	76.5980	80.1299	87.229	79.6106	84.8640	94.0032	100.0000	91.6737	92.0729	91.6534
4.	Paper & paper products	59.8667	62.2098	57.1494	51.5529	51.5529	55.9544	54.0382	54.2385	60.6455	65.9496
5.	Engineering	49.7698	60.2333	46.6614	40.7502	49.2409	75.7009	86.1967	85.9855	75.4509	71.3543
6.	Chemicals	66.3950	62.9060	63.7907	62.6062	67.0737	71.1529	70.8545	69.2889	66.2113	67.6643
7.	Iron & Steel	94.2999	95.3994	94.6477	83.0861	90.3709	86.1200	85.9203	95.9563	89.3588	121.6160
8.	Aluminium	28.3607	25.2602	20.0169	73.0836	80.5198	96.3627	74.3190	66.4901	69.0132	79.4143
9.	Tobacco	100.0000	85.6459	76.0181	65.8120	67.0732	73.6434	81.1111	119.3070	93.6090	100.7520
10.	Sugar	81.8573	91.6925	98.6524	76.7912	54.5644	78.6903	84.5011	84.9550	80.4745	72.6771
11.	Matches	87.2222	95.3733	100.0000	98.9787	83.7360	96.4317	85.4761	88.8652	95.2683	97.7824
12.	Cement	85.7697	89.2725	85.9891	81.3215	84.8872	78.5080	89.6428	82.5875	82.9701	86.9565
13.	Rubber & rubber products	70.1739	88.6364	71.0549	68.0267	73.1400	73.6950	77.0771	73.7338	70.9899	75.2680
14.	Pottery	93.5131	87.5646	81.5602	69.4902	64.6744	66.1583	72.3223	72.0173	80.5046	93.7948
15.	Agr. Manufacturing	75.0788	80.4186	82.1800	78.4517	81.5409	87.6561	90.1988	87.8931	82.1451	82.8153

S.No.	Industry	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
1.	Vanaspathi	98.4238	95.2832	99.8379	100.000	86.2006	100.0000	79.3103	82.5758	95.1807	92.6267	96.0265
2.	Cotton textiles	90.7514	94.6413	93.0673	93.1226	92.4225	93.9048	87.4393	87.1707	91.5036	88.3260	85.9697
3.	Jute textiles	89.8322	73-9924	95.2469	100.0000	93.9550	93.4973	80.8913	83.5990	80.9780	64.5916	68.9257
4.	Paper & paper products	71.5969	73.0863	72.5140	83.3522	84.0280	87.7377	90.4640	89.9815	91.0025	96.9904	99.2450
5.	Engineering	79.5491	80.5313	84.1234	83.2830	80.4558	90.9692	75.0356	69.0068	64.6031	71.4337	65.5973
6.	Chemicals	69.9572	70.9791	76.0219	76.3703	74.1984	74.0318	72.7561	72.8904	72.8489	76.6664	74.3712
7.	Iron & Steel	89.4042	79.4367	98.5195	93.9921	86.9148	84.1281	81.8781	73.9201	70.1104	69.2872	64.6250
8.	Aluminium	76.4005	71.2569	70.9706	89.0406	79.3521	79.0338	86.7713	93.5055	95.6586	39.3279	99.3056
9.	Tobacco	96.5517	99.3958	100.0000	88.1266	9[illegible].9952	100.0000	100.0000	87.3077	90.4676	83.9527	82.6156
10.	Sugar	86.4195	99.5900	86.6915	67.0646	77.7250	95.5934	99.6269	61.1963	63.8178	98.8139	85.5561
11.	Matches	100.0000	96.9747	91.1728	85.7853	67.0286	92.4161	94.9026	89.1007	97.8035	96.1459	87.8574
12.	Cement	92.1256	90.9813	89.3415	92.2531	90.7152	94.2403	93.9792	91.3835	92.3605	97.9084	100.0000
13.	Rubber & Rubber products	31.5012	83.7717	85.1961	87.8934	8[illegible].2502	93.7335	35.3308	35.0276	91.8597	66.3256	60.5392
14.	Pottery	32.6822	88.2367	91.3935	87.8618	85.9944	30.1547	75.3798	81.9587	63.0455	61.1887	69.1444
15.	Aggr. Manufacturing	87.0540	87.3870	89.4116	89.3741	88.7707	91.4748	85.1308	80.7059	82.0565	82.3590	79.3864

APPENDIX 'B'

1. PROFIT FUNCTION : DEPENDENT VARIABLE IS PBT

	Intercept	SAL	SAL_{-1}	P_m	CAP	W/GCP	$\bar{R}^2$	DW	SEE
1	7.47070 (3.2120)*	1.3697 (3.3768)	-0.8220 (1.8688)	.02214 (1.2302)	.08795 (3.3991)		0.9248	1.1663	.313
2	.94453 (0.3577)	1.1896 (4.3848)	-0.1172 (0.3427)	.03726 (2.9871)	.02779 (1.2104)	-.28555 (3.9150)	0.9673	2.2050	.209
3	1.37383 (0.6169)	1.1041 (10.7184)		.03765 (3.1595)	.02462 (1.2215)	-.29876 (5.0271)	0.9699	2.2074	.200
4		1.0681 (12.9985)		.03500 (3.2300)	.03676 (8.1373)	-.27129 (7.1302)	0.9715	2.0834	.113

* Numbers in parenthesis are t - ratios.

*3. DEPRECIATION FUNCTIONS: DEPENDENT VARIABLE IS CCA

	Intercept	K	K_{-1}	IF	$\left(\frac{IF}{IF}\right)K$	$\bar{R}^2$	DW	SEE
1	-.18672 (3.9131)	0.0538 (32.0577)		0.0630 (2.8901)		0.9926	1.1364	.064
2	-.12826 (2.6750)	0.0578 (37.4775)			0.0221 (1.4754)	0.9895	0.9924	.076
3	-.04456 (0.6799)		0.0605 (26.2467)		0.0320 (1.4941)	0.9789	0.9144	.109
4	-.16245 (2.8431)		0.0540 (26.6719)	0.1041 (4.1384)		0.9893	1.1416	.078

* Equation 2 (tax provision) is given in the text.

4. DIVIDEND FUNCTION : DEPENDENT VARIABLE IS DIV

No.	Variant	Intercept	PAT	PAT_{-1}	CF	DIV_{-1}	IG	EFA	$\bar{R}^2$	DW	SEE
1.	Basic Lintner Model	.05214 (2.1851)	0.2554 (6.9627) 0.4170)			0.5742			0.9882	1.4875	.036
2.	Basic Brittain Model	.10061 (2.5296)			0.1398 (2.5881)	0.4529 (3.1250)			0.9682	1.2959	.060
3.	Basic Darling Model	.07276 (1.6103)	0.3654 (5.9602) (0.5966)	0.2174 (3.3019)					0.9566	1.2026	.069
4.	Extended Lintner Model	.06334 (3.4938)	0.2146 (7.0341) (0.3504)			0.6040 (11.6373)	0.0248 (2.7647)	-0.0503 (3.5007)			
5.	Extended Brittain Model	.06597 (1.7204)			0.1342 (2.3305)	0.6934 (4.116)	0.0275 (1.9703)	-0.0634 (2.7909)	0.9731	1.8210	.050
6.	Extended Darling Model	.08878 (2.1950)	0.2784 (4.1684) (0.4545)	0.2875 (4.2034)			0.0370 (1.7489)	-0.0835 (2.3782)	0.9662	1.1080	.061

* Figures in the first paranthesis give the t - ratio while the figures in the paranthesis indicate elasticities.

5. <u>INVENTORY FUNCTIONS : DEPENDENT VARIABLE IS INV</u>

CON	SAL	$INVK_{-1}$	LBUS	STR	$(CAP-CAP_{-1})$	$(CAP_{-2}-CAP_{-4})$	r_{CM}	$\bar{R}^2$	DW	SEE
0.5432 (2.4787)	0.2024 (5.8300)	-0.6595 (5.2624)						0.7310	1.6291	.38
0.3112 (1.9175)	0.1830 (7.3498)	-0.6316 (7.1554)	0.8114 (3.7925)					0.8675	2.3881	.27
0.3015	0.1686	-0.5825	0.8417		0.0158 (0.6317)	-0.0091 (0.5427)		0.8538	2.6071	.28
-0.4163 (1.4287)	0.1740 (8.3600)	-0.6767 (9.2554)	0.6230 (3.3881)	0.2403 (0.5884)			0.3099 (2.9121)	0.9144	1.9700	.21

6. FIXED INVESTMENT : DEPENDENT VARIABLE IS IF

	CON	K_{-1}	$(SAL-SAL_{-1})$	SAL_{-1}	EFA	CF_{-1}	$(\frac{CCA}{K})_{-1}$	$\bar{R}^2$	DW	SEE
1	-1.5735 (0.9784)	0.2460 (1.4458)	0.2637 (3.0327)	-0.2019 (1.6599)	0.0231 (1.5506)	0.0549 (1.4526)	5.8521 (1.5307)	0.8879	1.7277	0.3742
2		0.1463 (1.0759)	0.2193 (2.9632)	-0.1267 (1.3420)	0.0297 (2.2432)	0.0686 (1.9605)	2.1526 (3.8022)	0.8883	1.6626	0.3734
3		-0.0354 (2.6960)	0.1853 2.5728)		0.0283 (2.1553)	0.0912 (2.8706)	1.7768 (3.4866)	0.8802	2.1206	0.3868
4	0.7827 (3.4039)	-0.0309 (2.3893)	0.1727 (2.3747)		0.0309	0.0919	..	0.8772	1.9883	0.3916
5	0.1056 (0.0780)	-0.0348 (2.2530)	0.1836 (2.3447)		0.0269 (2.1668)	0.0912 (2.3384)	1.5437 (0.5085)	0.8685	2.1065	0.4055

7. BANK BORROWINGS : DEPENDENT VARIABLE IS LBUS

CON	$LBUSK_{-1}$	INV	IF	r_B	r_A	Z_{-1}	AR	$\bar{R}^2$	DW	SEE
-2.8601 (3.1482)	-0.1699 (3.0406)	0.2595 (3.1314)		0.2409 (2.0555)	0.1970 (1.3547)			0.7487	2.7044	0.2097
-2.2008 (2.2873)	-0.2582 (3.7083)	0.2980 (3.9932)		0.4562 (4.5147)		-1.5474 (1.9267)		0.7750	2.6408	0.1959
-1.8784 (1.9173)	-0.5268 (2.4271)	0.1951 (2.9431)	0.0387 (0.4431)	0.4837 (3.5708)		-2.0875 (2.1647)	0.3050 (1.4613)	0.7920	2.9513	0.1908
-1.8539 (1.7902)	-0.4697 (1.6124)	0.2015 (1.8699)	0.0383 (0.4159)	0.4385 (2.1710)	0.0585 (0.3164)	-1.9211 (1.6785)	0.2463 (0.8563)	0.7689	2.9324	0.2011
-1.9640 (2.0584)	-0.4998 (1.8586)	0.2206 (2.3760)		0.4742 (2.7212)	0.0595 (0.3382)	-2.0689 (1.9955)	0.2596 (0.9529)	0.7902	2.9103	0.1916
-1.9901 (2.1920)	-0.5583 (2.8383)	0.2143 (2.4678)		0.5206 (5.0823)		-2.2400 (2.5933)	0.3195 (1.6162)	0.8088	2.9419	0.1829

8. LONG TERM LOANS : DEPENDENT VARIABLE IS ODEB

	CON	IF	$\frac{DIV}{MEQ} - Y_D$	$Yc-Y_D$	Y_{GS}	Y_D	CF	$\bar{R}^2$	DW	SEE
1	-3.6821 (3.3791)	-0.2724 (3.0277)			1.1734 (3.0897)	-0.1482 (0.6733)	-0.6435 (2.6934)	0.7186	2.4119	0.26
2	-4.3133 (3.5786)	0.3313 (3.8272)	0.0594 (1.2045)		1.0990 (3.0099)	-0.1028 (0.4841)	-0.5566 (3.8272)	0.7777	2.4343	0.25
3	-3.6708 (3.4790)	0.3207 (3.7429)			0.9919 (3.3313)		-0.7336 (3.3984)	0.7351	2.1104	0.25
4	-3.6148 (3.0886)	0.2832 (2.8104)		0.2964 (0.2637)	0.9714 (2.6414)		-0.6620 (2.3083)	0.7088	2.3744	0.26

9. CASH AND BANK BALANCES: DEPENDENT VARIABLE IS CB

	CON	CBK_{-1}	UCH	$(UCC/W)_{-1}$	SAL	SAL_{-1}	$\bar{R}^2$	DW	SEE
1	0.4516 (1.3033)	-0.6743 (3.1640)	-0.1708 (2.1620)	0.1393 (0.8113)	0.0508 (2.8906)	-0.0308 (1.2784)	0.5913	1.4691	0.1180
2	0.7381 (2.7147)	-0.7899 (3.9784)	-0.1958 (3.5237)	0.1524 (0.8645)	0.0295 (5.0547)		0.5877	1.2988	0.1214
3	0.8849 (4.2112)	-0.7756 (3.9620)	-0.1916 (3.4984)		0.0282 (5.0551)		0.5768	1.4853	0.1201
4	0.5744 (1.8724)	-0.6570 (3.1474)	-0.1608 (2.1729)		0.0504 (2.9153)	-0.0319 (1.3509)	0.6040	1.6392	0.1162

11. ACCOUNTS RECEIVABLE : DEPENDENT VARIABLE IS AR

CON	UAR	SAL	NIR	MS	(INVK-vSAL)**	ARK_{-1}	$\bar{R}^2$	DW	SEE
0.4930 (0.9085)	-0.2750 (2.1166)	0.1518 (6.2861)				-0.8303 (5.6128)	0.8121	2.1276	0.1994
-0.3595 (0.4721)	-0.2957 (2.3823)	0.1601 (6.7923)	0.0211 (1.5202)			-0.8589 (6.0611)	0.8306	2.4342	0.1894
0.4954 (0.8733)	-0.2749 (2.3410)	0.1576 (6.0263)		-0.0201 (0.2927)		-0.8257 (5.3558)	0.7966	2.0617	0.2075
0.1123 (0.1262)	-0.3165 (2.5215)	0.1525 (6.1799)	0.0146 (0.9561)		-0.1283 (1.2015)	-0.8426 (5.9193)	0.8313	2.6170	0.1889
0.8766 (1.5959)	-0.3238 (2.5937)	0.1462 (6.3140)		-0.0712 (1.0498)	-0.2308 (1.3676)	-0.8002 (5.6995)	0.8341	2.2774	0.1874

** $v = \frac{1}{T} \sum_{t=1}^{T} \left(\frac{INVK}{SAL}\right)_t$

10. MARKETABLE SECURITIES : DEPENDENT VARIABLE IS MSEC

	CON	$MSECK_{-1}$	SAL	r_{TB}	TP	AR	$(r_{TB} - r_A)$	INV	$\bar{R}^2$	DW	SEE
1	0.2881 (3.5989)	-.5672 (3.0140)	0.0742 (3.0164)		.1772 (2.8686)	0.0772 (4.3018)	-0.0825 (1.6624)	.0035 (0.3122)	0.8047	2,2626	0.0207
2	0.2918 (3.6657)	-0.4983 (2.5645)	0.0475 (2.2135)	-0.0414 (1.7402)	0.0992 (2.5553)	0.0606 (3.0539)		0.0097 (0.8731)	0.8091	2.0347	0.0205
3	0.3018 (4.7179)	-0.5983 (3.8117)	0.0780 (3.8316)		0.1850 (0.4326)	0.0798 (4.3644)	-0.0849 (1.8135)		0.8223	2.2640	0.0197
4	0.3204 (4.4698)	-0.588 (3.6236)	0.0570 (3.1173)	-0.0378 (1.6317)	0.1144 (3.3308)	0.0668 (3.6527)			0.8135	1.9914	0.0201

12. ACCOUNTS PAYABLE : DEPENDENT VARIABLE IS AP

	CON	UAR	COST	NIR	MS	APK_{-1}	(INVK-v SAL)**	$\bar{R}^2$	DW	SEE
1	0.6376 (0.9876)	-0.1774 (1.2384)	0.0959 (4.4057)			-0.4487 (3.5459)		0.7641	1.9870	0.2356
2	0.4543 (0.4633)	-0.1840 (1.2156)	0.0984 (4.0060)	0.0048 (0.2567)		-0.4563 (3.3713)		0.6590	2.0057	0.2453
3	0.5924 (0.9380)	-0.1615 (1.1497)	0.0885 (4.0052)		0.0925 (1.2564)	-0.4633 (3.7349)		0.7000	2.3232	0.2301
4	1.5460 (1.4506)	-0.2000 (1.4567)	0.0724 (2.7522)	-0.0131 (0.6748)		-0.3915 (3.0688)	-0.2929 (1.8507)	0.7205	2.3239	0.2221

** $v = \frac{1}{T} \sum_{t=1}^{T} \left(\frac{INVK}{SAL} \right)_t$