CHAPTER 5

THE EFFECTS OF DEMAND DEPOSITS (*DD*) ON THE ECONOMY

5.1 The Effects of Changes of Demand Deposits on Inflation Rate

This section will analyse the relationship between changes in demand deposits and the changes in price level of individual component of *CPI*. Demand deposits are chequeing accounts held by the private sector. Just like the previous two chapters, the model for this analysis will be the same but the variable of money aggregates is the demand deposits:

$$\dot{P}_t = \beta_0 + \beta_1 \dot{DD}_t + \varepsilon_t \qquad (5.1)$$

where $\dot{P}_t$ = change in price level (inflation rate)

$\dot{DD}_t$ = change in Demand Deposit

ε_t = white noise error term

The results in Table 5.1 show that at 5% level of significance, only inflation rate of Total *CPI*, Food *CPI* and Beverage *CPI* have significant relationship with changes in demand deposit. At 10% level of significance, inflation rate of Transport *CPI* shows significant relationship with changes in demand deposit. The rest of the components do not show any significant result.

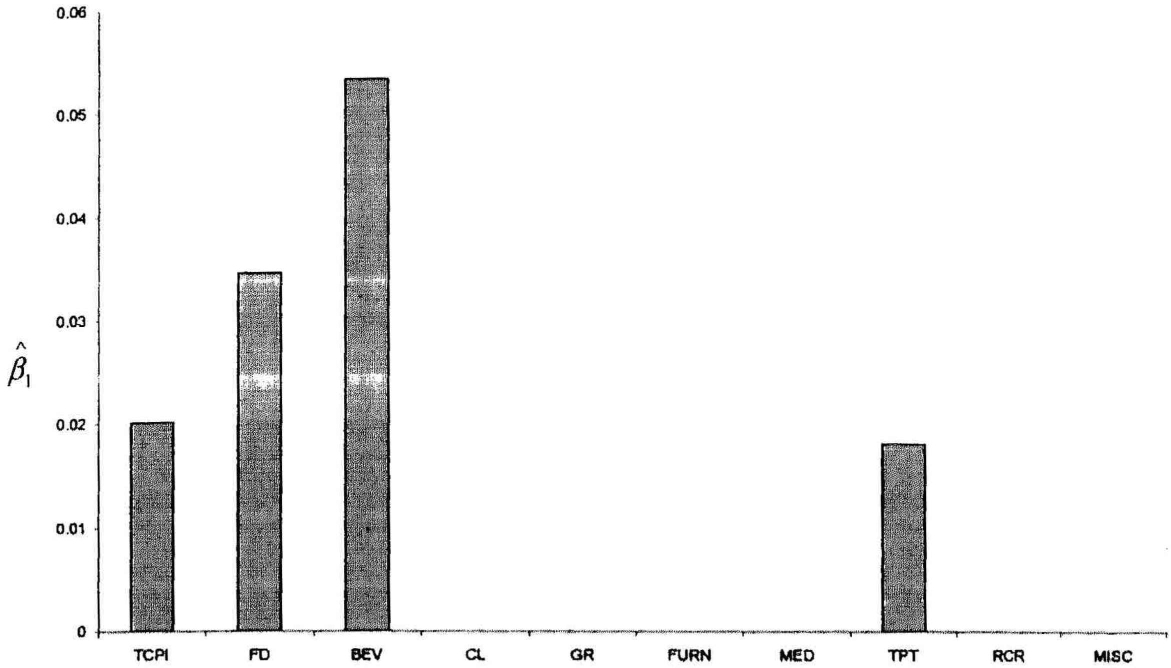
A diagram of the rate of change of each *CPI* component with respect to a change in demand deposits is as shown in Figure 5.1 below. Comparing the magnitude of coefficients of change in demand deposits of the components of *CPI* which are significant, a 1% increase in demand deposits, causes 0.05% increase in beverages price, 0.03% increase in food price, 0.02% increase in total *CPI* and 0.02% of transport price.

Table 5.1 Regression of $\dot{P}$ on $\dot{DD}$

Component of *CPI*	Coefficient $\hat{\beta}_0$	Coefficient $\hat{\beta}_1$
Total *CPI* (*TCPI*)	0.2669*	0.0201*
	(0.0000)	(0.0020)
Food (*FD*)	0.2733*	0.0345*
	(0.0000)	(0.0091)
Beverage (*BEV*)	0.3959*	0.0531*
	(0.0001)	(0.0298)
Clothing (*CL*)	0.1732*	− 0.002
	(0.0000)	(0.7325)
Gross Rent (*GR*)	0.3155*	− 0.0060
	(0.0000)	(0.5666)
Furniture (*FURN*)	0.2042*	− 0.002
	(0.0000)	(0.6218)
Medical Care (*MED*)	0.3370*	0.0159
	(0.0000)	(0.2164)
Transport (*TPT*)	0.2840*	0.0180^{+}
	(0.0000)	(0.0587)
Recreation (*RCR*)	0.1300*	0.0002
	(0.0000)	(0.9711)
Miscellaneous (*MISC*)	0.3690*	0.0013
	(0.0000)	(0.9499)

Note: The *p-values* are in parentheses.
*Denotes statistical significance at 5% level
$^{+}$Denotes statistical significance at 10% level.

Figure 5.1 Comparisons of the Effects of $\dot{DD}$ on $\dot{P}$ of *CPI* Components



The above Figure 5.1 shows the estimated coefficients of those components, which have a significant relationship between inflation rate and growth in *DD*.

5.1.1 Rolling Regression of $\dot{P}$ on $\dot{DD}$

Rolling regression will be used here to analyse the effect of growth in demand deposits to inflation rate of various components of *CPI* (this analysis will only be tested on the *CPI* components which have significant relationship with *DD*). The model of equation 5.1 will be used here.

$$\dot{P}_t = \beta_0 + \beta_1 \dot{DD}_t + \varepsilon_t \qquad (5.1)$$

Figure 5.2 Rolling Regression – Total *CPI*

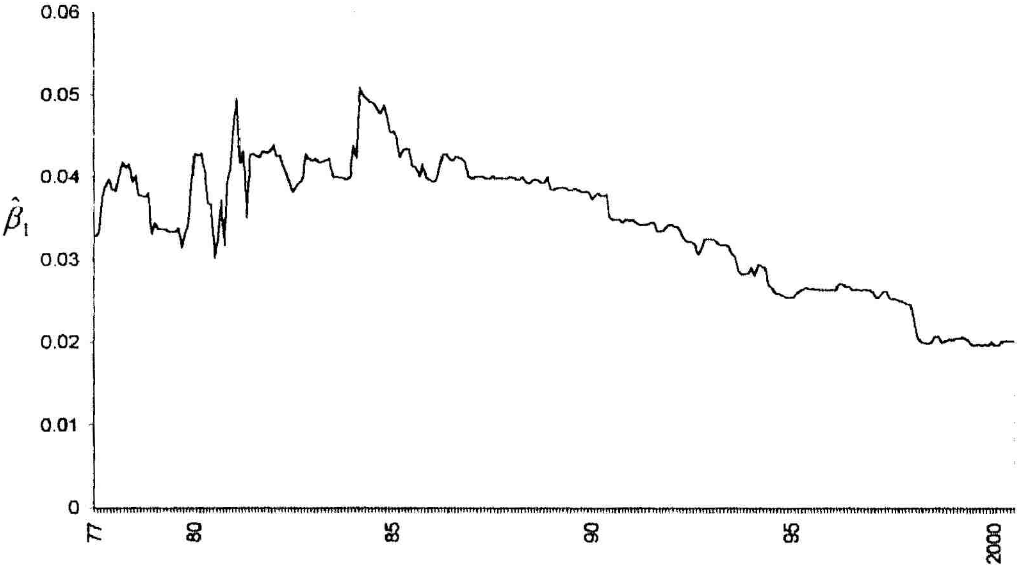


Figure 5.3 Rolling Regression – Food

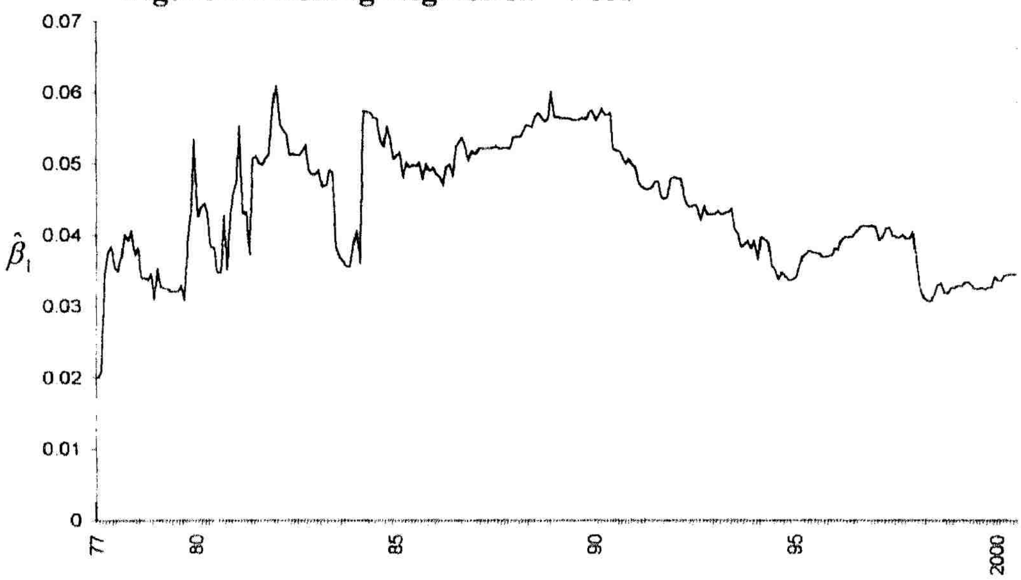


Figure 5.4 Rolling Regression – Beverages

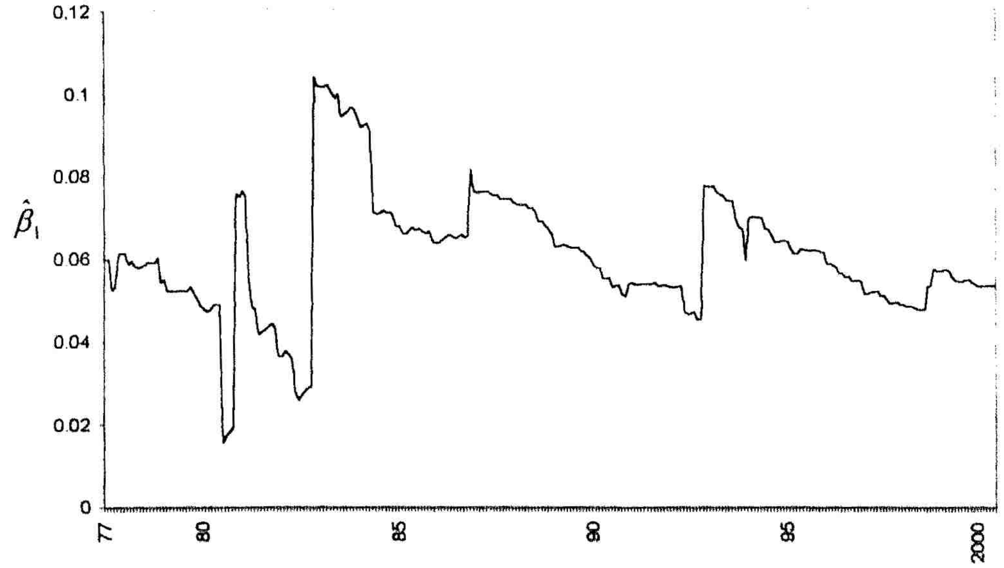
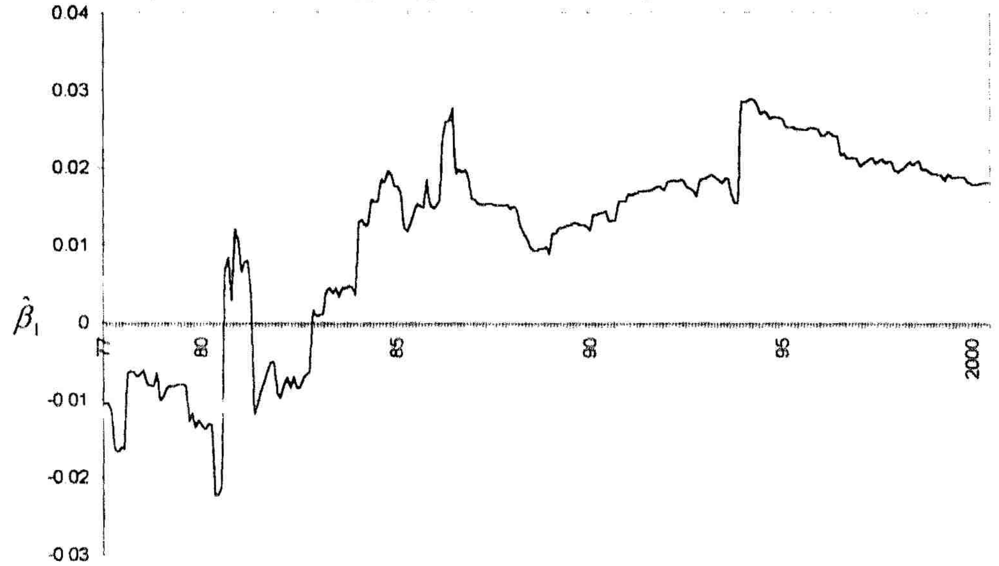


Figure 5.5 Rolling Regression – Transport



For demand deposits, the rolling regression for the various components did not show significant decline of the role of demand deposits.

5.1.2 Regression of $\dot{P}$ on Sum of Lags of $\dot{DD}$

A further analysis will be done to see if changes in demand deposits take a few lag periods to affect the change in price level. The model for this analysis will be as follows taking lag periods of 1 year to 5 years:

$$\dot{P}_t = \alpha + \sum_{i=0}^{n} \beta_i \, \dot{DD}_{t-i} + \varepsilon_t \qquad (5.2)$$

From the result in Table 5.2, at 5% level of significance, the lags of change in demand deposits are significant for inflation rate of Total *CPI* (2-years to 5-years), Food *CPI* (2-years to 5-years), Clothing *CPI* (2-years to 3-years), Gross Rent *CPI* (3-years to 5-years), Furniture *CPI* (2-years to 3-years), Medical Care *CPI* (3-years to 5-years) and Transport *CPI* (1-year to 2-years). With the maximum lag period, a 1% change in demand deposits, Food *CPI* changes 0.38%, Gross Rent *CPI* changes 0.37%, Medical *CPI* changes 0.29%, Total *CPI* changes 0.24%, Clothing *CPI* changes 0.15%, Transport *CPI* changes by 0.12% and Furniture *CPI* changes by 0.08%. Food *CPI* is the most responsive to changes in demand deposits followed by Gross Rent *CPI*, Medical *CPI* and the other components. The elasticity of Food *CPI* towards changes in demand deposit is the highest. These significant results also prove that demand deposit is a leading variable in the relationship with inflation.

Table 5.2 Regression of $\dot{P}$ on Sum of Lags of $\dot{DD}$

$\dot{P}$ of Components of *CPI*	Coefficients of Sum of lags						
	1 year	2 years	3 years	4 years	5 years	Minimum[1] Lag Period	Maximum[2] Lag Period
Total *CPI* (*TCPI*)	0.0436 (1.7173)	0.1117* (3.1883)	0.1716* (3.9439)	0.1900* (3.7693)	0.2365* (4.0083)	2 years	5 years or >
Food (*FD*)	0.0678 (1.2939)	0.1494* (2.0207)	0.2508* (2.714)	0.2615* (2.4125)	0.3826* (3.05)	2 years	5 years or >
Beverages (*BEV*)	0.0144 (0.1445)	0.0277 (0.1924)	0.0705 (0.3883)	0.2037 (0.9313)	0.2399 (0.8964)	Not significant	Not significant
Clothing (*CL*)	0.0176 (0.5881)	0.1113* (2.6385)	0.1496* (2.7885)	0.1279 (1.9743)	0.0851 (1.1646)	2 years	3 years
Gross Rent (*GR*)	0.0005 (0.0109)	0.0887 (1.4965)	0.1891* (2.5951)	0.2748* (3.2933)	0.3690* (3.8448)	3 years	5 years or >
Furniture (*FURN*)	− 0.0115 (− 0.6472)	0.0678* (2.7279)	0.0804* (2.5222)	0.0502 (1.3121)	0.0589 (1.3066)	2 years	3 years
Medical Care (*MED*)	0.0344 (0.7417)	0.0959 (1.4411)	0.1660* (1.9554)	0.2331* (2.2885)	0.2893* (2.3487)	3 years	5 years or >
Transport (*TPT*)	0.08757* (2.2506)	0.12294* (2.2278)	0.0953 (1.36)	0.0252 (0.3044)	− 0.0570 (− 0.5709)	1 year or <	2 years
Recreation (*RCR*)	− 0.0221 (− 0.8711)	0.01254 (0.3418)	0.0518 (1.1163)	0.0452 (0.8274)	0.0580 (0.8853)	Not significant	Not significant
Miscellaneous (*MISC*)	0.05 (0.5823)	0.1713 (1.4024)	0.2303 (1.4791)	0.31 (1.6601)	0.1874 (1.5617)	Not significant	Not significant

Note: The *t-statistics* are in parentheses.

*Denotes statistical significance at 5% level

[1]The minimum lag period for the relationship of change in *M1* and inflation rate to be significant.

[2]This sequential procedure of continuously adding lag periods stops when the regression coefficients of the lagged variables start becoming statistically insignificant and/or the coefficient drops as the lag period increases and/or the coefficient of the lags changes signs from positive to negative or vice versa (see Gujarati, 1995).

Figure 5.6 The Effects of Sum of Lags of $\dot{DD}$ on $\dot{P}$ (1 year)

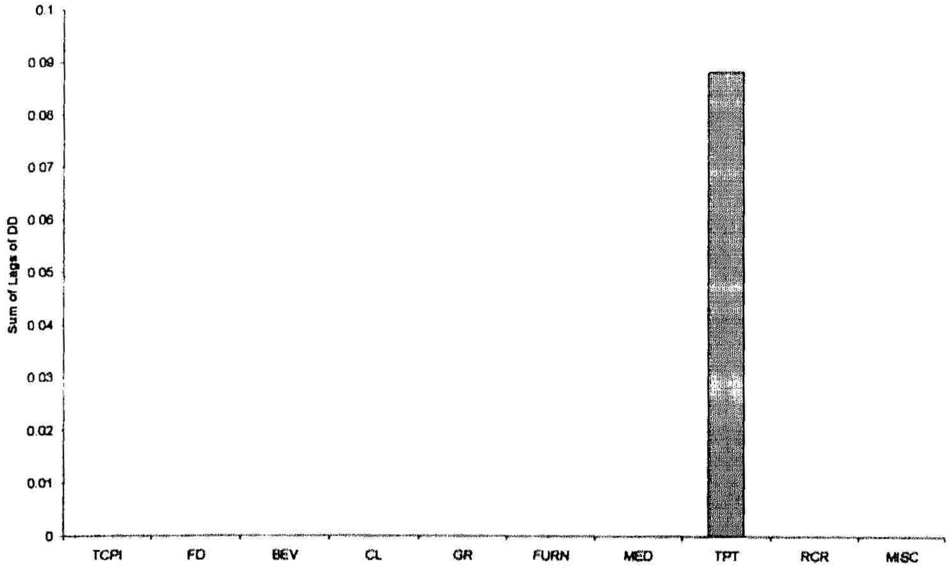


Figure 5.7 The Effects of Sum of Lags of $\dot{DD}$ on $\dot{P}$ (2 years)

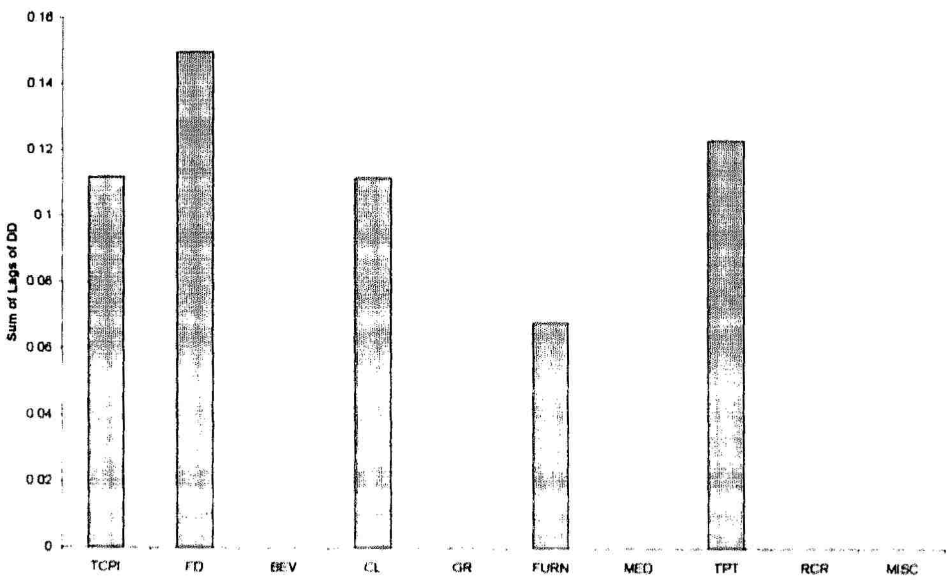


Figure 5.8 The Effects of Sum of Lags of $\dot{DD}$ on $\dot{P}$ (3 years)

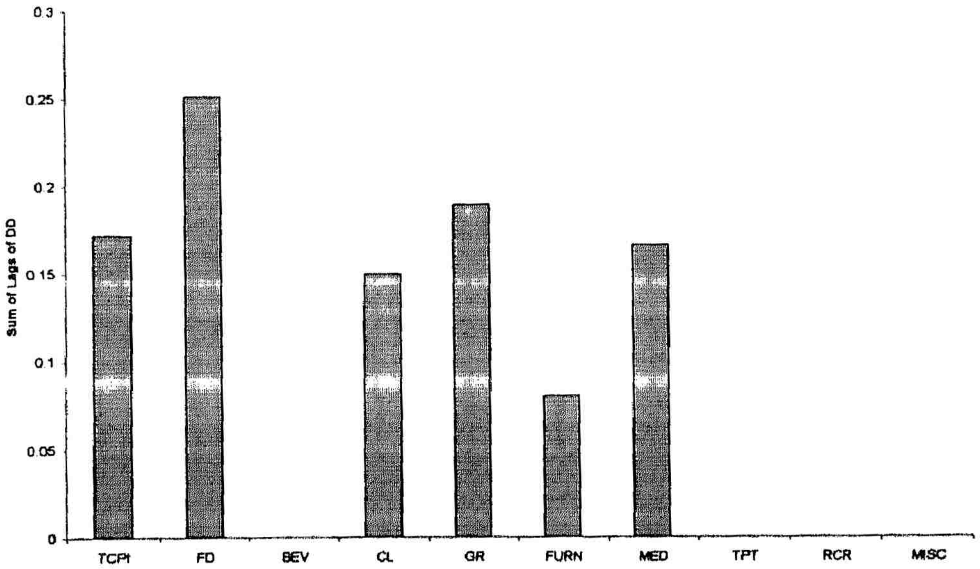


Figure 5.9 The Effects of Sum of Lags of $\dot{DD}$ on $\dot{P}$ (4 years)

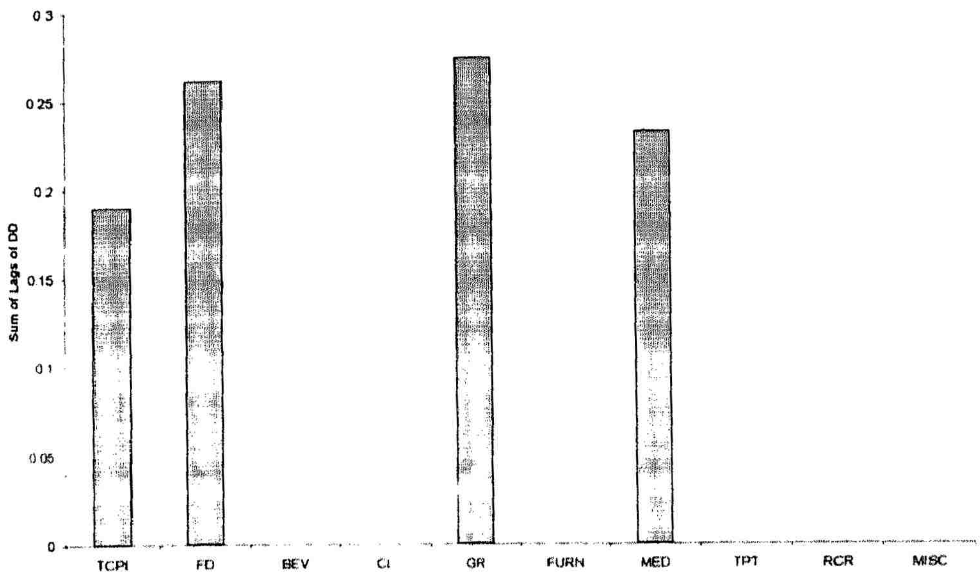
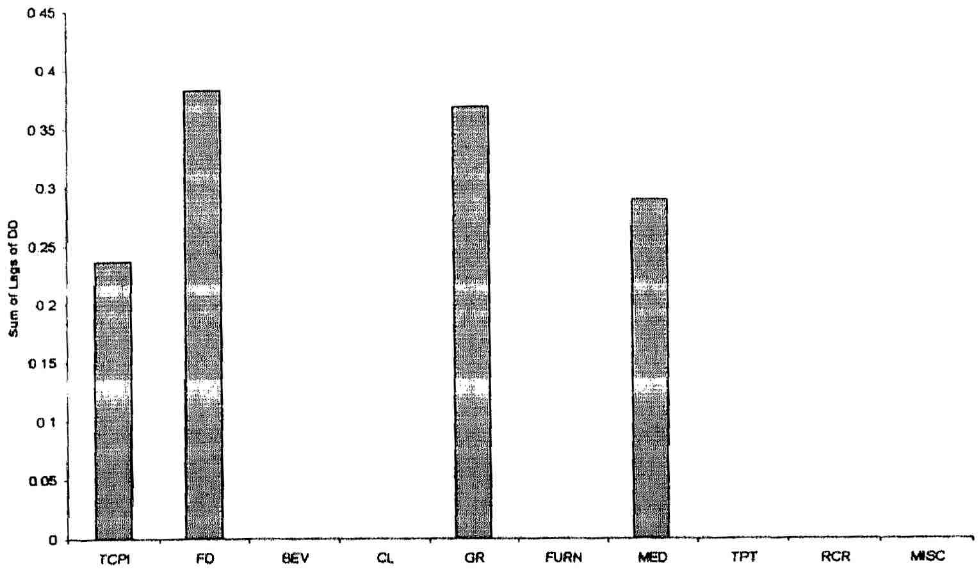


Figure 5.10 The Effects of Sum of Lags of $\dot{DD}$ on $\dot{P}$ (5 years)



For the above two analysis, changes in *DD* has a greater influence on inflation rate of Food *CPI* as compared to other components of *CPI*.

5.1.3 Granger Causality Test between $\dot{DD}$ and $\dot{P}$

This section uses the Granger-Causality test to see if there is a bi-directional relationship between demand deposits and the price level of the individual component of *CPI*.

The model is as follows:

$$\dot{P}_t = \sum_{i=1}^{n} \lambda_i \dot{DD}_{t-i} + \sum_{j=1}^{n} \delta_j \dot{P}_{t-j} + u_{1t} \tag{5.3}$$

$$\dot{DD}_t = \sum_{i=1}^{m} \alpha_i \dot{DD}_{t-i} + \sum_{j=1}^{m} \beta_j \dot{P}_{t-j} + u_{2t} \tag{5.4}$$

where it is assumed that u_{1t} and u_{2t} are uncorrelated.

Table 5.3 Granger Causality Test between $\dot{DD}$ and $\dot{P}$

Sample: 1975:01 2000:06 Lag:2 Obs:303	Demand Deposits		
Null Hypothesis	F-Statistic	Probability	Outcome
$\dot{DD}$ does not Granger Cause $\dot{TCPI}$	1.12155	0.32715	**Unidirectional**
$\dot{TCPI}$ does not Granger Cause $\dot{DD}$	2.41619	0.09101⁺	
$\dot{DD}$ does not Granger Cause $\dot{BEV}$	1.04126	0.35429	Unidirectional √
$\dot{BEV}$ Does not Granger Cause $\dot{DD}$	3.25378	0.04000*	
$\dot{DD}$ Does not Granger Cause $\dot{GR}$	2.77133	0.06419*	Bi-directional
$\dot{GR}$ Does not Granger Cause $\dot{DD}$	3.12364	0.04544*	

Note: * There's Granger Causality relationship at the 5% level
⁺ There's Granger Causality relationship at the 10% level
√ Those components that has the same Granger Causality relationship with the growth of *CU* as the Total *CPI*
Those components that show insignificant Granger Causality relationship are not reported.

The Granger-Causality test has shown that only Total *CPI* and Beverage *CPI* have a unidirectional relationship with demand deposits. For Total *CPI* and Beverage *CPI*, the relationship is from inflation rate to changes in demand deposits. The only bi-directional relationship exists in Gross Rent *CPI*. There is an unclear direction of relationship between *DD* and *CPI*.

5.2 The Effects of Changes of Demand Deposits on Output

This section analyses the relationship between changes in demand deposits and the changes of various components of *IIP*. The relationship between a change in *DD* and changes in output are expressed in the model below.

$$\dot{IIP}_t = \beta_0 + \beta_1 \dot{DD}_t + \varepsilon_t \qquad (5.5)$$

where $\dot{IIP}_t$ = change in index of industrial production (output)

$\dot{DD}_t$ = change in demand deposits

ε_t = white noise error term

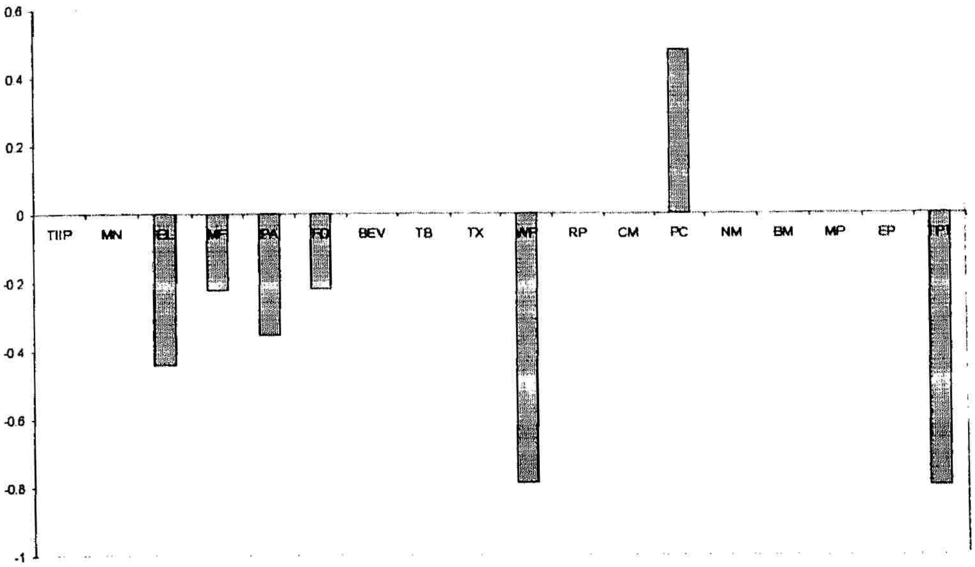
From the analysis above the results in Table 5.4 suggest that there is a significant relationship at 5% between changes in *DD* and changes in the individual components of *IIP* such as Electricity *IIP*, Product Agriculture *IIP*, Wood Product *IIP*, Petrol and Coal *IIP*, and Transport *IIP*. At 10% significant level, the relationship is significant for Manufacturing *IIP* and Food *IIP*. The relationship that exists between changes in *IIP* components and *DD* appears the same as the relationship between changes in *IIP* component with changes in *M1* and changes in *CU* that is a negative relationship except Petrol and Coal *IIP*. Overall, there are much fewer components (7 components out of 17) of *IIP* that have a significant relationship with growth in demand deposits.

Table 5.4 Regression of $\dot{IIP}$ on $\dot{DD}$

omponent of *IIP*	Coefficient $\hat{\beta}_0$	Coefficient $\hat{\beta}_1$	Component of *IIP*	Coefficient $\hat{\beta}_0$	Coefficient $\hat{\beta}_1$
otal *IIP* (*TIIP*)	1.1023*	−0.1261	Wood Product (*WP*)	2.7507*	−0.7880*
	(0.0040)	(0.1697)		(0.0040)	(0.0007)
lining (*MN*)	1.0133	−0.0455	Rubber Product (*RP*)	1.9027*	−0.2072
	(0.1974)	(0.81)		(0.0085)	(0.2325)
elctricity (*EL*)	1.5154*	−0.4410*	Chemical (*CM*)	1.5005*	−0.1113
	(0.0001)	(5.23E-06)		(0.0333)	(0.5115)
lanufacturing (*MF*)	1.4489*	−0.2238^{+}	Petrol and Coal (*PC*)	1.2750	0.4788*
	(0.0041)	(0.0652)		(0.1573)	(0.0281)
roduct Agriculture (*PA*)	1.8761*	−0.3556*	Non-Metallic Product (*NM*)	1.3550*	−0.06
	(0.0095)	(0.0410)		(0.0495)	(0.7176)
ood (*FD*)	1.1074*	−0.2208^{+}	Basic Metal (*BM*)	1.8292*	−0.0334
	(0.0462)	(0.0990)		(0.0399)	(0.8760)
everages (*BEV*)	1.4128	0.2168	Metal Product (*MP*)	2.2959*	−0.1037
	(0.1488)	(0.3579)		(0.0204)	(0.6627)
obacco (*TB*)	2.4538*	−0.4237	Electrical Product (*EP*)	1.9648*	−0.0454
	(0.0436)	(0.1480)		(0.0033)	(0.7771)
extiles (*TX*)	1.3827*	−0.1379	Transport (*TPT*)	3.3959*	−0.7955*
	(0.0299)	(0.3676)		(0.0019)	(0.0025)

Note: The *p-values* are in parentheses.
*Denotes statistical significance at 5% level
$^{+}$Denotes statistical significance at 10% level.

Figure 5.11 Comparisons of the Effects of $\dot{DD}$ on $\dot{IIP}$ of *IIP* Components



The above Figure 5.11 shows those components' changes in output that has significant relationship with growth in *DD*.

5.2.1 Rolling Regression of $\dot{IIP}$ on $\dot{DD}$

Figure 5.12 Rolling Regression – Electricity

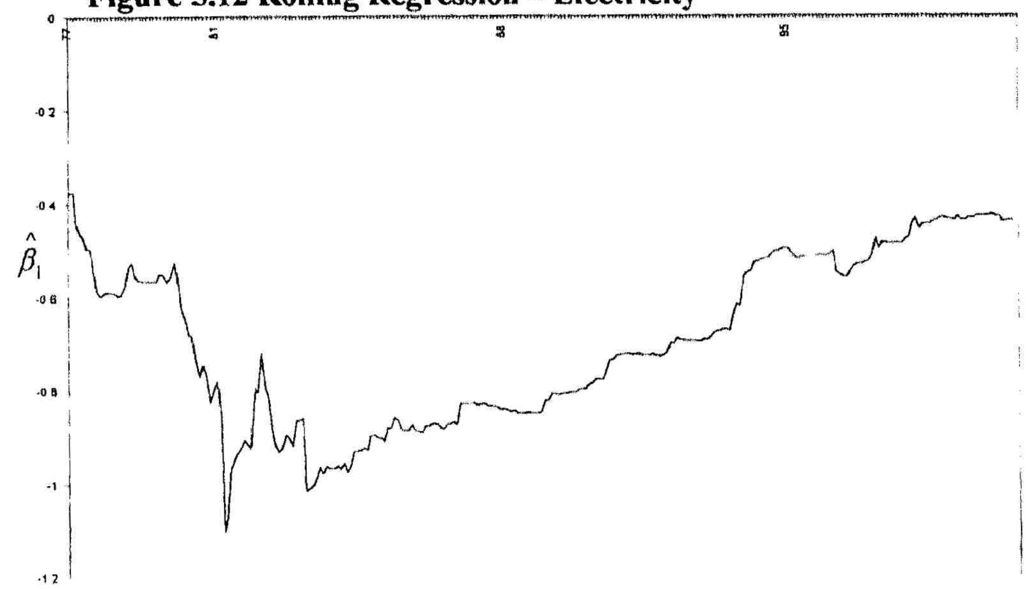


Figure 5.15 Rolling Regression – Food

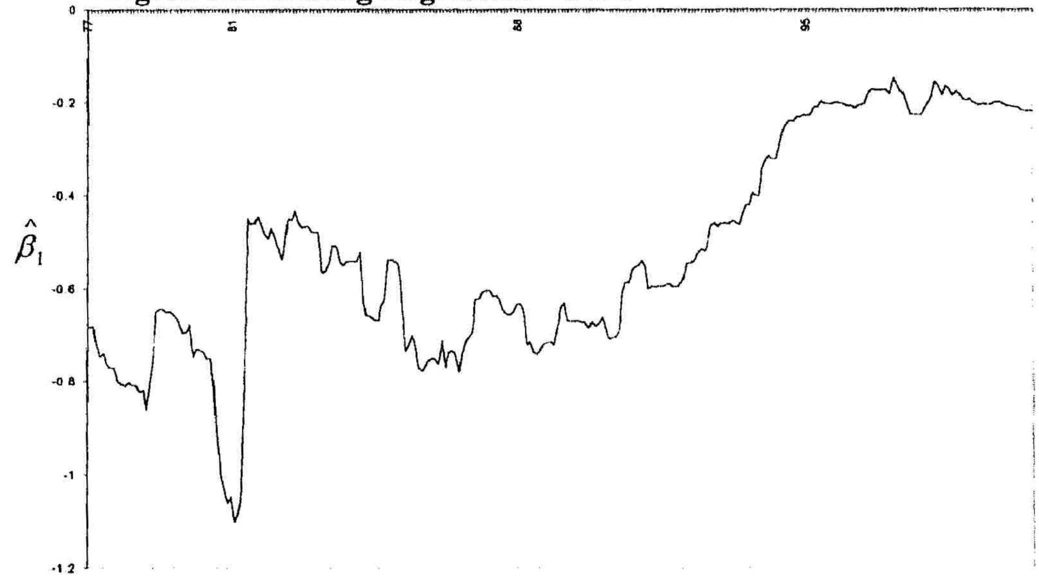


Figure 5.16 Rolling Regression – Wood Product

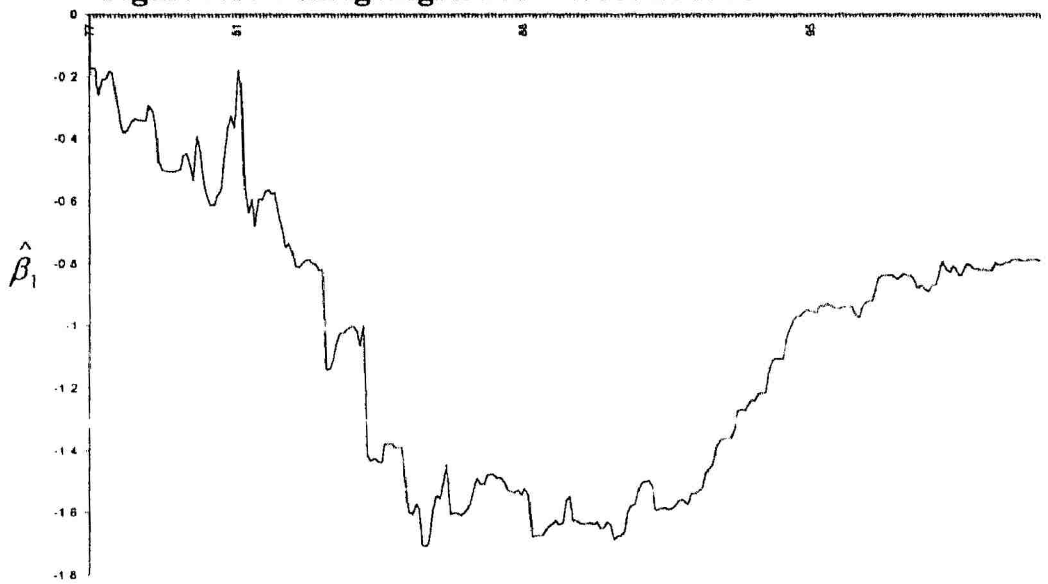


Figure 5.17 Rolling Regression – Petrol and Coal

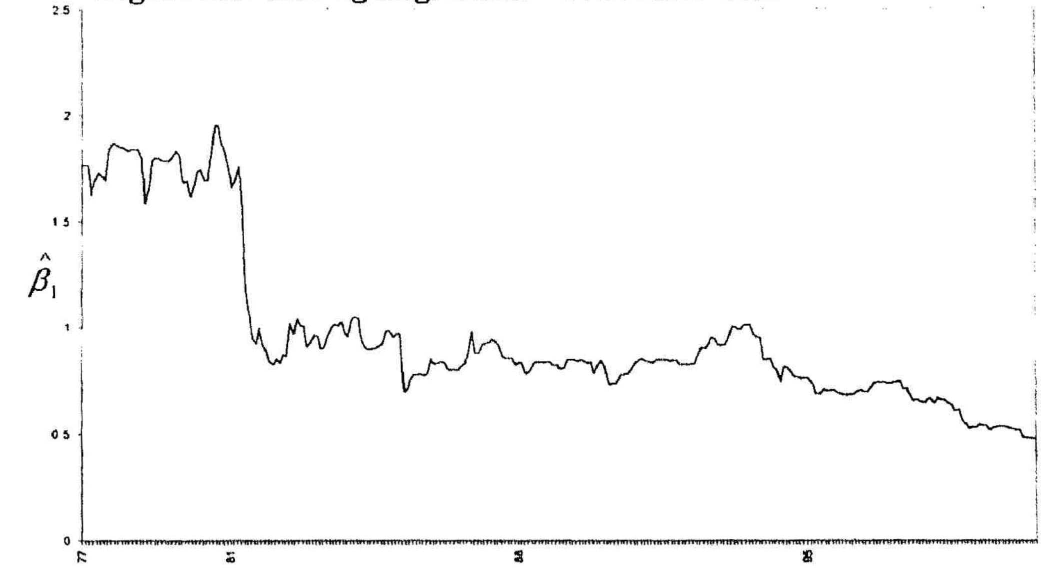
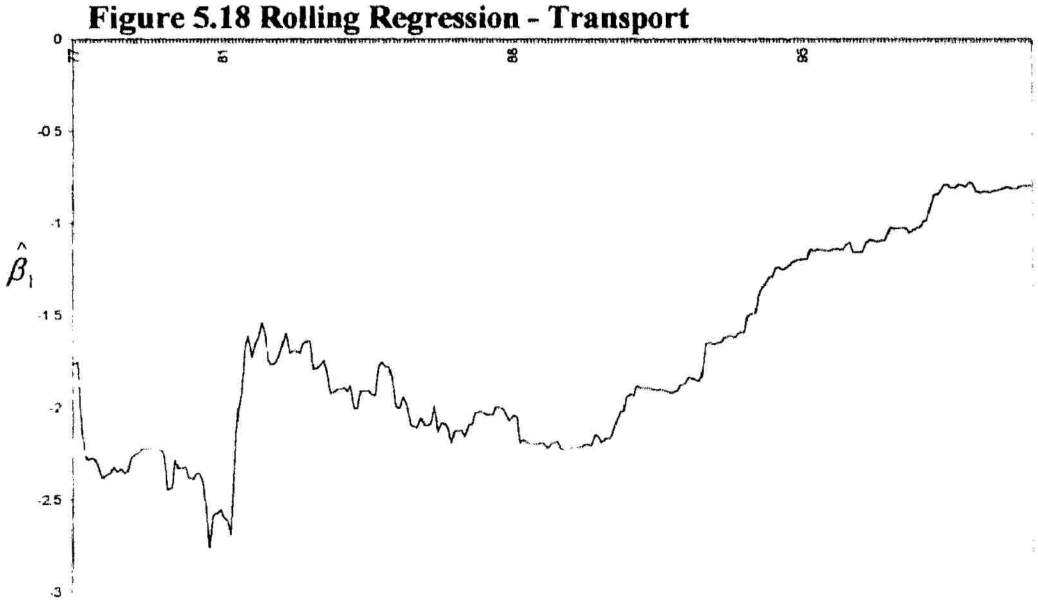


Figure 5.18 Rolling Regression - Transport



The negative coefficient of demand deposits has also decline over the years except for the Petroleum and Coal Product *IIP*.

5.2.2 Regression of $\dot{IIP}$ on Sum of Lags of $\dot{DD}$

The following model will be used to analyse the lag effect of change in *DD* on changes in *IIP*. A lag of 1-year, 2-years, 3-years, 4-years, and 5-years will be tested.

$$\dot{IIP}_t = \alpha + \sum_{i=0}^{n} \beta_i \dot{DD}_{t-i} + \varepsilon_t \qquad (5.6)$$

The results show in Table 5.5 for the coefficients of sum of lag model for changes in *DD* and changes in *IIP* components is just the same as for *M1* and CU. There are no significant results for all the components of *IIP*. This suggests that *DD* might not be the leading variable in the relationship with output.

Table 5.5 Regression of $\dot{IIP}$ on Sum of Lags of $\dot{DD}$

Component of *IIP*	Coefficients of Sum of lags				
	1 year	2 years	3 years	4 years	5 years
Total *IIP* (*TIIP*)	0.0979 (0.2604)	– 0.1314 (– 0.2450)	– 0.3059 (– 0.4506)	– 0.3981 (– 0.4892)	– 0.5404 (– 0.5478)
Mining (*MN*)	– 0.1833 (– 0.2361)	– 0.3070 (– 0.2759)	– 0.2929 (– 0.207)	– 0.6108 (– 0.3584)	– 0.3067 (– 0.1481)
Electricity (*EL*)	– 0.4884 (– 1.2146)	– 0.3527 (– 0.6097)	– 0.1328 (– 0.1826)	– 0.1078 (– 0.1251)	– 0.2253 (– 0.2158)
Manufacturing (*MF*)	0.0277 (0.0553)	0.0858 (0.1198)	– 0.2597 (– 0.2858)	– 0.5554 (– 0.5089)	– 0.8915 (– 0.6725)
Product Agrculture (*PA*)	– 0.5354 (– 0.7528)	– 0.9543 (– 0.9447)	– 1.0290 (– 0.8330)	– 0.9239 (– 0.6367)	– 1.2215 (– 0.7028)
Food (*FD*)	– 0.3184 (– 0.5791)	– 0.4422 (– 0.5619)	– 0.6250 (– 0.6276)	– 0.6500 (– 0.5496)	– 0.8884 (– 0.6303)
Beverages (*BEV*)	0.6557 (0.6944)	0.6850 (0.5095)	0.3258 (0.1930)	– 0.3607 (– 0.1793)	– 1.0505 (– 0.4320)
Tobacco (*TB*)	0.5676 (0.4678)	– 0.3292 (– 0.1901)	– 1.5346 (– 0.6974)	– 1.3327 (– 0.5012)	– 1.3916 (– 0.4291)
Textiles (*TX*)	– 0.0721 (– 0.1165)	– 0.2491 (– 0.2814)	– 0.5670 (– 0.5075)	– 0.7309 (– 0.5508)	– 1.1016 (– 0.6929)
Wood Product (*WP*)	– 1.2991 (– 1.3645)	– 1.4931 (– 1.1007)	– 2.0007 (– 1.1582)	– 2.4629 (– 1.1981)	– 2.9124 (– 1.1805)
Rubber Product (*RP*)	– 0.5659 (– 0.8199)	– 0.5586 (– 0.5726)	– 0.8801 (– 0.7149)	– 1.4793 (– 1.0080)	– 1.7636 (– 1.0001)
Chemical (*CM*)	– 0.0189 (– 0.0273)	– 0.3567 (– 0.3606)	– 0.4723 (– 0.3768)	– 0.8105 (– 0.5406)	– 0.8736 (– 0.4870)
Petrol and Coal (*PC*)	0.9702 (1.0839)	0.5333 (0.4193)	0.2721 (0.1720)	– 0.1652 (– 0.0878)	– 0.4499 (– 0.2004)
Non-Metallic Product (*NM*)	0.4166 (0.6129)	0.2902 (0.2997)	0.0568 (0.0474)	– 0.3870 (– 0.2707)	– 0.9396 (– 0.5455)
Basic Metal (*BM*)	0.0810 (0.0992)	– 0.2404 (– 0.2226)	– 0.4207 (– 0.3120)	– 0.1335 (– 0.0824)	– 0.7036 (– 0.3167)
Metal Product (*MP*)	0.7337 (0.7509)	0.6665 (0.4784)	0.9871 (0.5548)	1.3585 (0.6362)	1.5555 (0.6009)
Electrical Product (*EP*)	0.3221 (0.4991)	– 0.2516 (– 0.2767)	– 0.6030 (– 0.5238)	– 0.4911 (– 3774)	– 1.0079 (– 0.6544)
Transport (*TPT*)	– 0.1030 (– 0.0948)	– 0.5657 (– 0.3663)	– 0.9629 (– 0.5054)	– 1.6447 (– 0.7258)	– 3.551 (– 1.3184)

Note: The *t-statistics* are in parentheses.
None of the above components are statistical significance at 5% level

5.2.3 Granger Causality Test between $\dot{DD}$ and $\dot{IIP}$

The following is an analysis done to test if there is a Granger Causal relationship between changes in demand deposits and changes in output of *IIP* components.

$$\dot{IIP}_t = \sum_{i=1}^{n} \alpha_i \, \dot{DD}_{t-i} + \sum_{j=1}^{n} \beta_j \, \dot{IIP}_{t-j} + u_{1t} \qquad (5.7)$$

$$\dot{DD}_t = \sum_{i=1}^{m} \lambda_i \, \dot{DD}_{t-i} + \sum_{j=1}^{m} \delta_j \, \dot{IIP}_{t-j} + u_{2t} \qquad (5.8)$$

where it is assumed that u_{1t} and u_{2t} are uncorrelated.

The results of Granger Causality test in Table 5.6 show that changes in the output of *IIP* components such as Total *IIP*, Manufacturing *IIP*, Beverages *IIP*, Wood Product *IIP*, Rubber Product *IIP*, Electronic and Electrical Product *IIP* with respect to changes in *DD* are significant. These relationships are unidirectional from changes of *DD* to changes in output. On the other hand, changes of output of Transport Equipment *IIP* granger causes changes in *DD*. The rest of the components have a bi-directional relationship namely the Electricity *IIP*, Product Agriculture *IIP*, Food *IIP*, Textile *IIP*, Non-Metallic Product *IIP* and Basic Metal *IIP*. There is an inconsistency of the directions of the relationship between changes in *DD* and changes in *IIP*.

In conclusion, the three analysis on output carried out above suggest that there are unclear relationship between changes in *DD* and changes in *IIP*.

Table 5.6 Granger Causality Test between $\dot{DD}$ and $\dot{IIP}$

Sample: 1975:01 2000:06 Lag:2	Obs:303		
Null Hypothesis	F-Statistic	Probability	Outcome
$\dot{DD}$ does not Granger Cause $\dot{TIIP}$	9.31694	0.00012*	**Unidirectional**
$\dot{TIIP}$ does not Granger Cause $\dot{DD}$	1.01985	0.36190	
$\dot{DD}$ does not Granger Cause $\dot{EL}$	9.05952	0.00015*	Bi-directional
L does not Granger Cause $\dot{DD}$	3.88606	0.02157*	
D does not Granger Cause $\dot{MF}$	6.65876	0.00148*	Unidirectional √
F does not Granger Cause $\dot{DD}$	1.74521	0.17639	
D does not Granger Cause $\dot{PA}$	6.423314	0.00186*	Bi-directional
A does not Granger Cause $\dot{DD}$	5.23593	0.00582*	
D does not Granger Cause $\dot{FD}$	6.98304	0.00109*	Bi-directional
D does not Granger Cause $\dot{DD}$	4.89745	0.00808*	
D does not Granger Cause $\dot{BEV}$	6.79622	0.00130*	Unidirectional √
V does not Granger Cause $\dot{DD}$	0.31850	0.72749	
does not Granger Cause $\dot{TX}$	16.1971	2.1E-07*	Bi-directional
does not Granger Cause $\dot{DD}$	12.5422	5.9E-06*	
does not Granger Cause $\dot{WP}$	5.49639	0.00453*	Unidirectional √
does not Granger Cause $\dot{DD}$	0.20280	0.81656	
does not Granger Cause $\dot{RP}$	6.31485	0.00206*	Unidirectional √
does not Granger Cause $\dot{DD}$	2.28805	0.10324	
does not Granger Cause $\dot{NM}$	8.59474	0.00023*	Bidirectional
does not Granger Cause $\dot{DD}$	3.41699	0.03410*	
does not Granger Cause $\dot{BM}$	4.95914	0.00761*	Bidirectional
does not Granger Cause $\dot{DD}$	5.48051	0.00460*	
does not Granger Cause $\dot{EP}$	5.24896	0.00575*	Unidirectional √
does not Granger Cause $\dot{DD}$	2.11025	0.12302	
does not Granger Cause $\dot{TPT}$	1.22435	0.29542	Unidirectional
does not Granger Cause $\dot{DD}$	2.38224	0.09410*	

Note: * There's granger causality relationship at the 5% level
$^{+}$There's granger causality relationship at the 10% level
√ Those components that has the same Granger Causality relationship with the growth of CU as the Total IIP
Those components that show insignificant Granger Causality relationship are not reported.