

**A DEMAND FUNCTION FOR PRIVATE  
INDIVIDUAL CREDIT IN BARABDOS**

by

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### INTRODUCTION

Chart 1 shows that commercial bank credit to private individuals has grown tremendously over the period 1966 to 1994. In real terms, consumer debt move from \$23.7 million in 1966 to \$102.6 million in 1994, an increase of 433%. In a small open economy, like Barbados, growth in consumer debt can have serious repercussions for the balance of payment and the economy as a whole since most of this credit is used to import commodities. Policymakers therefore must try to ascertain the causes of this credit growth - and the effectiveness of policies designed to curb it - if any attempts to influence consumer borrowing are to have a reasonable likelihood of success. So far there have been no such studies on the Barbados economy.

This paper examines the extent to which the variation in 'non-mortgage' consumer borrowing by private individuals in Barbados can be explained by changes in demand-side factors, like income, wealth, interest rates and government policy controls. A supply function is not modelled since it is argued that the quantity of consumer credit traded is demand-determined. However, for a supply side analysis <sup>of total credit</sup> see Hinds (1996).

This paper starts off by discussing the theoretical model, then the data and empirical results are presented, followed by some concluding remarks.

## THE MODEL

The theoretical model presented here is based on the standard two-period framework of Hartropp (1992). Demand is the key determinant with supply adjusting to meet households requirements and the interest rate on consumer credit set exogenously according to the base rate of the banks rather than the interaction of supply and demand for credit. The demand for consumer borrowings ( $d$ ) depends on disposable income ( $y$ ), liquid assets ( $a$ ), nominal base interest rate ( $i$ ), inflation ( $infl$ ) and government policy on credit ( $dum$ ). Formally,

$$d = f(y, a, i, infl, dum) \quad (1)$$

An increase in  $y$  is expected to result in positive borrowing and this is likely to happen if households preferences (and opportunities) favour spending now rather than later, that is, in a two-period world, if the change in current income is less than the current change in consumption. Increases in wealth is also expected to increase consumer debt. This occurs because a positive marginal propensity out of wealth implies that for a given income level, this higher consumer expenditure results in a higher level of borrowings. An increase in interest rate augments the cost of borrowing and the demand for consumer debt is reduced in the process. Inflation also decreases the value of consumer debt. The policy variable on consumer credit is designed to curb the flow of credit and ease the foreign exchange reserve position. Thus, it is expected that the sign on ' $dum$ ' is negative.

## DATA, ECONOMETRIC METHODOLOGY AND EMPIRICAL RESULTS

The model is run in logarithms using ordinary least squares for the period 1972 to 1994. This period was constrained because of the unavailability of the wealth variable. All estimations are done in the econometric statistical programme EVIEWS. Data came from the Central Bank of Barbados data file. Consumer borrowing outstanding (excluding mortgages) is advances made by commercial banks to private individuals. Disposable income is nominal gross domestic product (GDP) at factor cost minus personal income taxes. Liquid assets measured as private individual deposits at commercial banks is used to proxy wealth. Unfortunately, data on non-liquid assets are not available. All the above series were converted to real terms using the GDP deflator (1974=100). Nominal base interest rate is the prime lending rate at commercial banks. Inflation is the rate of change in the consumer price index (base year 1974). The dummy variable took the value of one when credit controls were in place, that is,  $dum=1$  for 1977 to 1986, and zero otherwise.

The Engle and Granger (1987) two step procedure (hereafter EG) is utilised to estimate the model. It is preferred to the Johansen (1988) maximum likelihood method since it is more powerful in small samples (see Inder(1993)). However, the Johansen method is employed to check the rank of the cointegration vector. This test (not reported) reveals that the cointegration vector is unique.

The EG procedure begins by testing the temporal properties of the variables. Table 1 reveals that, except for  $ld$ , all the variables are integrated of order one as judged by the Augmented Dickey - Fuller (ADF) unit root statistics and the series correlograms. The next step in the analysis is to test for a long run equilibrium relation.

The following equation (1a) gives the EG cointegration regression.  $t$  values are in parentheses underneath the coefficient estimates.  $\bar{R}^2$  is the adjusted coefficient of multiple determination and D.W is the first order test for positive serial correlation. The results indicate that  $d, a, y, i, infl$  and  $dum$  are cointegrated variables. Note all are significant and have the correct sign. The significance of the  $dum$  variable may be surprising to Central Bank officials who remove credit controls in 1986 on the presumption that they were quite inoperative.

$$ld = -8.91 + 0.82 la + 1.29 ly - 0.23 li - 0.003 infl - 0.11 dum \quad (1a)$$

(4.84)    (10.14)    (4.32)    (2.87)    (1.78)    (7.08)

$$\bar{R}^2 = 0.90 \quad D.W = 2.23 \quad ADF = -3.65 \quad (-3.02)$$

Next the error correction model (ECM) which nests the long run and short run dynamics is estimated. To do this a general to specific approach that assumes a general lag structure of order one (because of data constraints) is adopted to pick up any (perhaps costly) adjustment process of moving consumers to their desired level. Recall that  $ld$  is integrated of order zero so that

it enters in levels in the ECM. Various deletion tests and restrictions are then carried out in order to test down to a more parsimonious model. These results are given in the following equation along with some diagnostic tests — Chart 2 gives the cusum <sup>square</sup> plot for stability of the model while Chart 3 indicates the goodness of fit of the model. All the diagnostic tests are acceptable at the 5% level of significance.

$$ld = -.37 + 1.31 ld^{(-1)} + 0.41 \Delta la + 1.17 \Delta y - 0.15 \Delta i$$

(3.55)
(14.64)
(3.01)
(3.76)
(2.31)



(2)

$$- 0.005 \Delta infl - 0.003 \Delta infl^{(-1)} - 0.81 ecm^{(-1)}$$

(3.48)
(2.39)
(6.35)



$\bar{R}^2 = 0.94$     $D/W = 2.18$     $JB = 0.75$     $BG = 0.44$     $ARCH = 0.02$   
 $RR = 0.27$

*JB is the Jarque-Bera test for normality. BG is the Breusch-Godfrey test for serial correlation; ARCH is Engle's autoregressive heteroscedasticity statistic and RR is Ramsey RESET test of misspecification.*

As with the long run, current income in the short run has a positive impact on debt of an order greater than one. The impact of wealth is also positive but much smaller, about one half of the long - run parameter. On the other hand, the nominal interest rate, as in the long run, has a negative influence on debt - a 1% increase in the interest rate will reduce consumer debt by 0.17% in the short term. Inflation also reduces consumer borrowings in the short run, a similar result to that found in the long run model. Its impact in the short run declines initially and then increases. The error correction term is negative and significant, confirming the long run cointegration results. The adjustment in the long run is quite high, about 81% per annum.

## CONCLUSION

This paper uses cointegration techniques to estimate a demand function that seeks to explain private individual credit. It is shown that current income and current wealth have a significantly positive effect while current nominal interest rate and inflation have a significantly negative effect. In addition, this paper also finds that credit controls constrained consumer borrowing, a result which appears counter to the Central Bank of Barbados policy stance - the Bank remove credit controls in 1986 on the presumption that weren't functioning properly.

Studies on other developing countries are lacking but these findings are in accord with Hartropp (1992) study on the UK. Further work should explore factors such as sanguine attitudes toward debt and demographic changes (see Pollin (1988)).

Table 1:

Augmented Dickey - Fuller Unit Root Test (ADF) Results

Variables	Calculated ADF	Tabulated ADF (5%)
ld	-3.30	-3.02
la	-0.34	-3.02
$\Delta$ la	-3.47	-3.03
ly	-2.30	-3.02
$\Delta$ ly	-3.94	-3.03
li	-2.87	-3.02
$\Delta$ li	-4.15	-3.03
infl	-2.61	-3.02
$\Delta$ infl	-5.27	-3.03

$\Delta$  - indicates first difference



## REFERENCES

1. Engle, R.F., and C.W. J. Genger (1987), "Cointegration and Error Correction, Representation, estimation and Testing," Econometric, 55, 2,251-276.
2. Inder, B. <sup>(1993)</sup> "Journal of Econometrics"
3. Johansen, S. (1988), "Statistical Analysis of Cointegration Vectors," Journal of Economic Dynamics and Control, 12, 213, 231-254.
4. Hartropp, A. (1992) "Demand for Consumer Borrowing in the UK, 1969-1990," Applied Financial Economics, 2, 11-20.
5. Pollin, R. (1988), "The Growth of U.S. Household Debt: Demand Side Influences," Journal of Macroeconomics, 10, 2, 231-248.

→ Hinds, D. (1996), "The Supply of Credit in Barbados",  
Central Bank of Barbados, mimeograph, October.

Chart 1

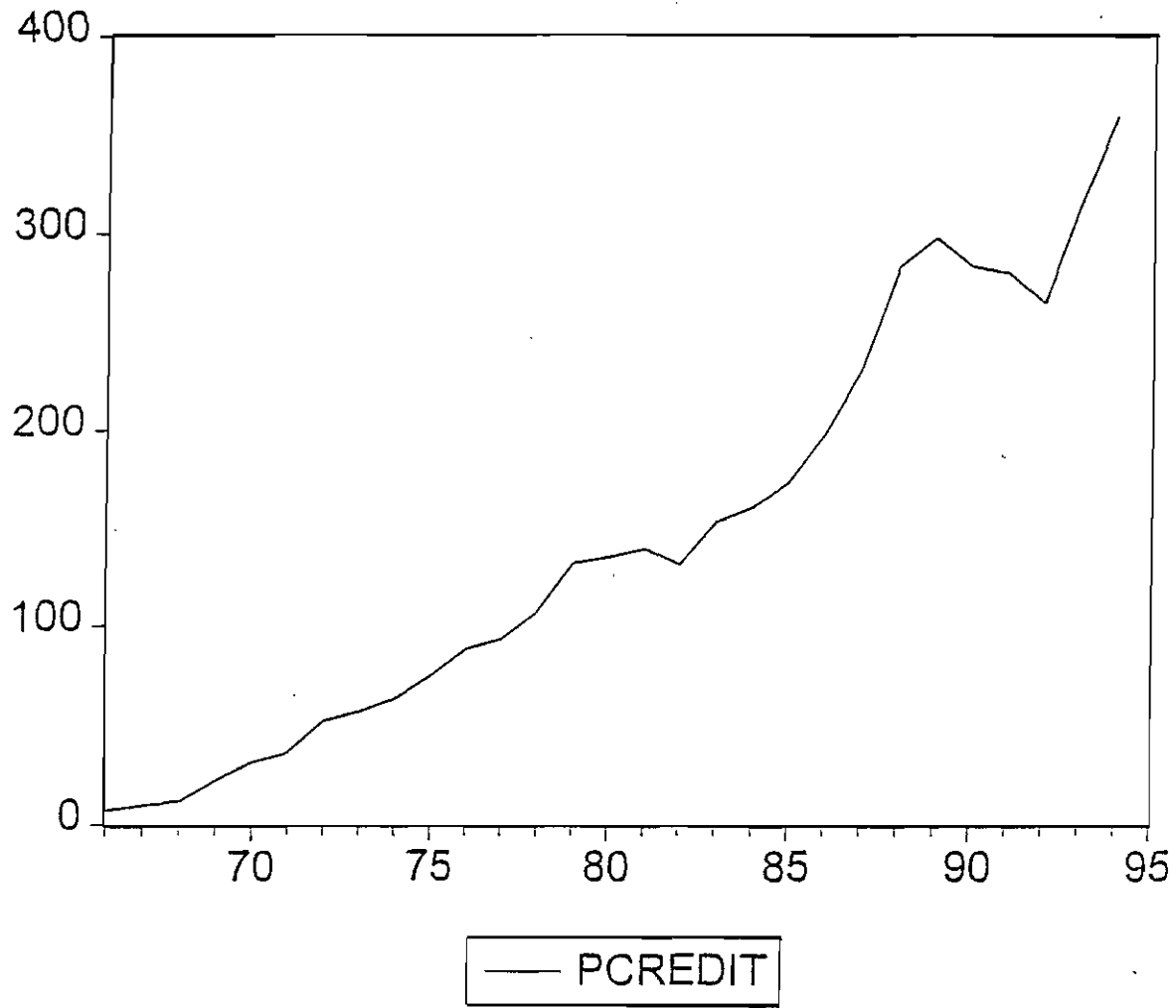


Chart 2

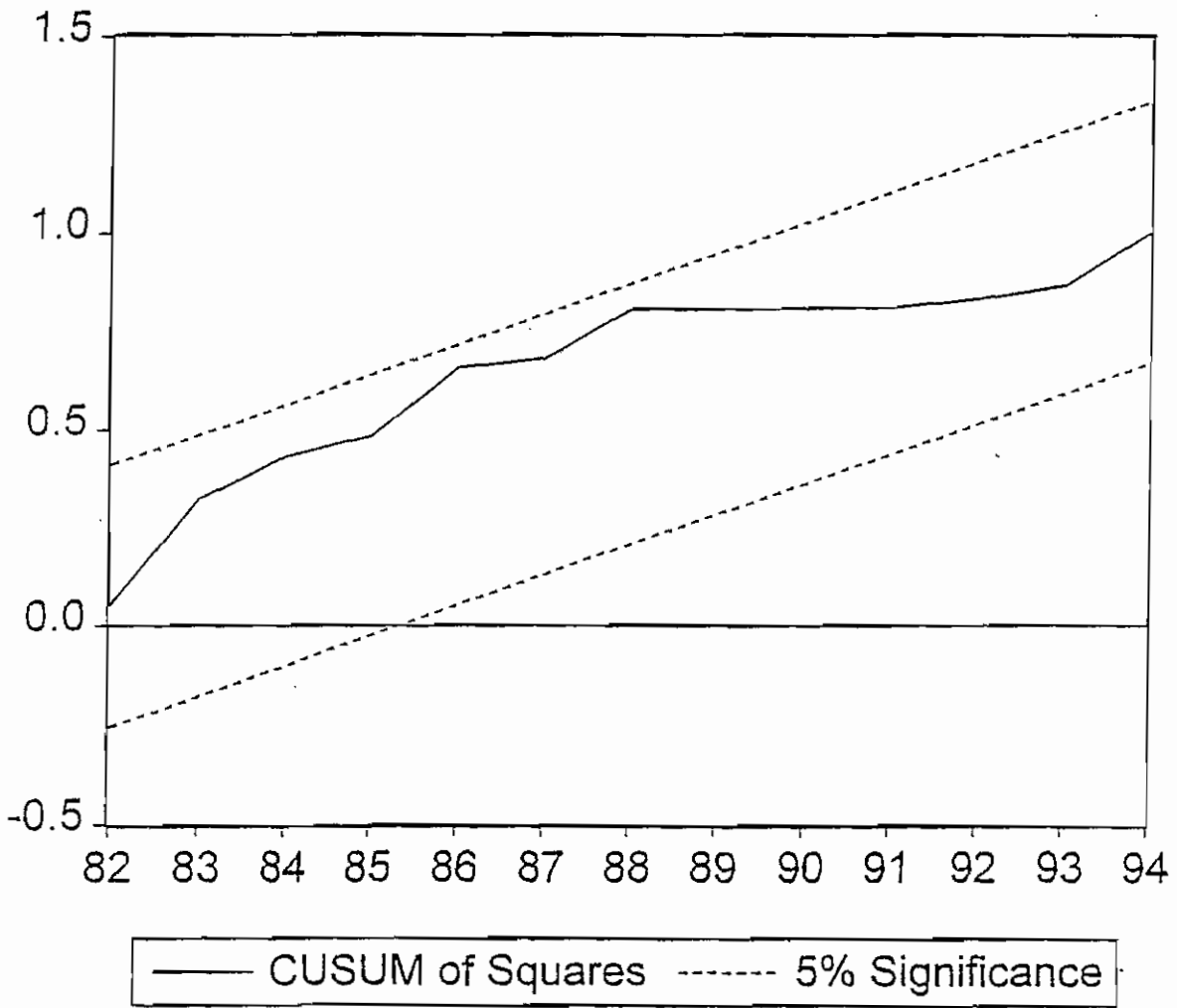
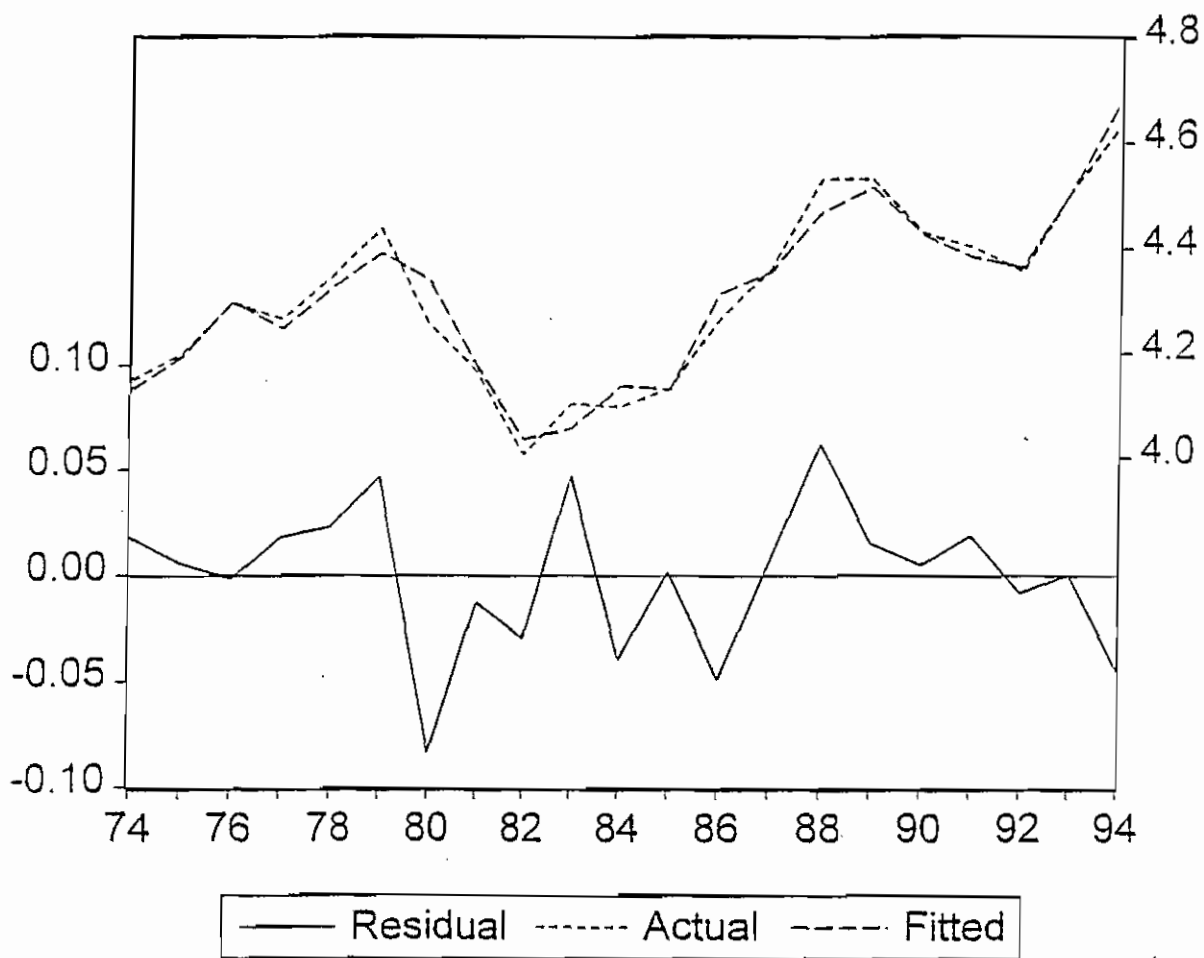
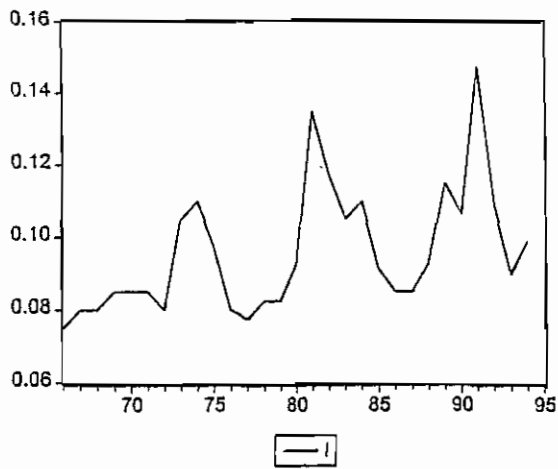
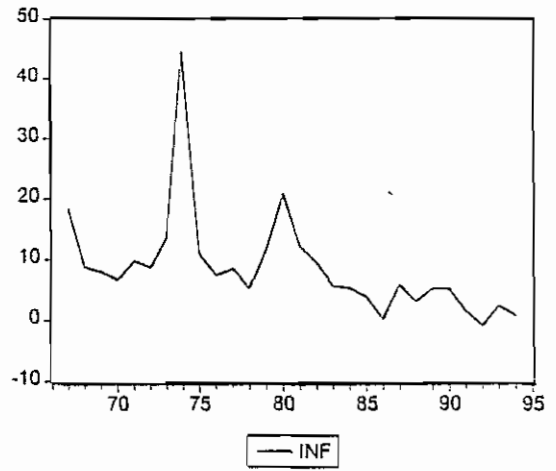
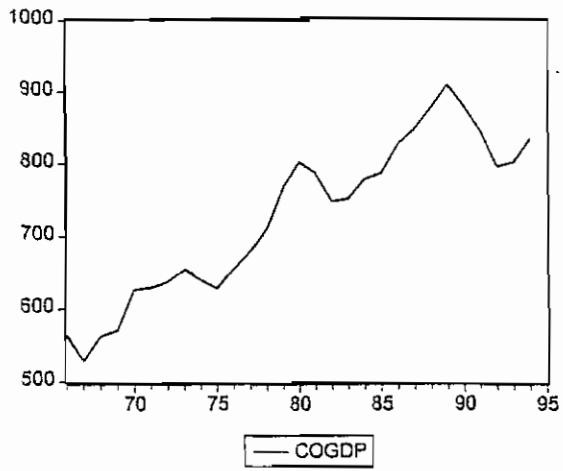
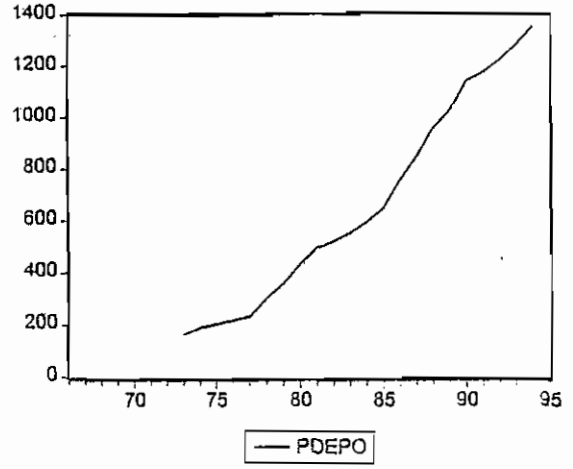
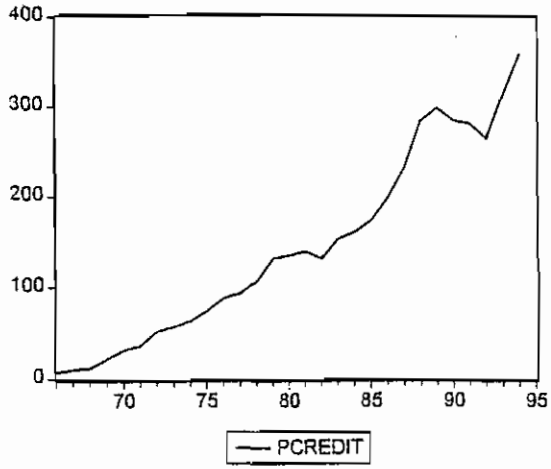
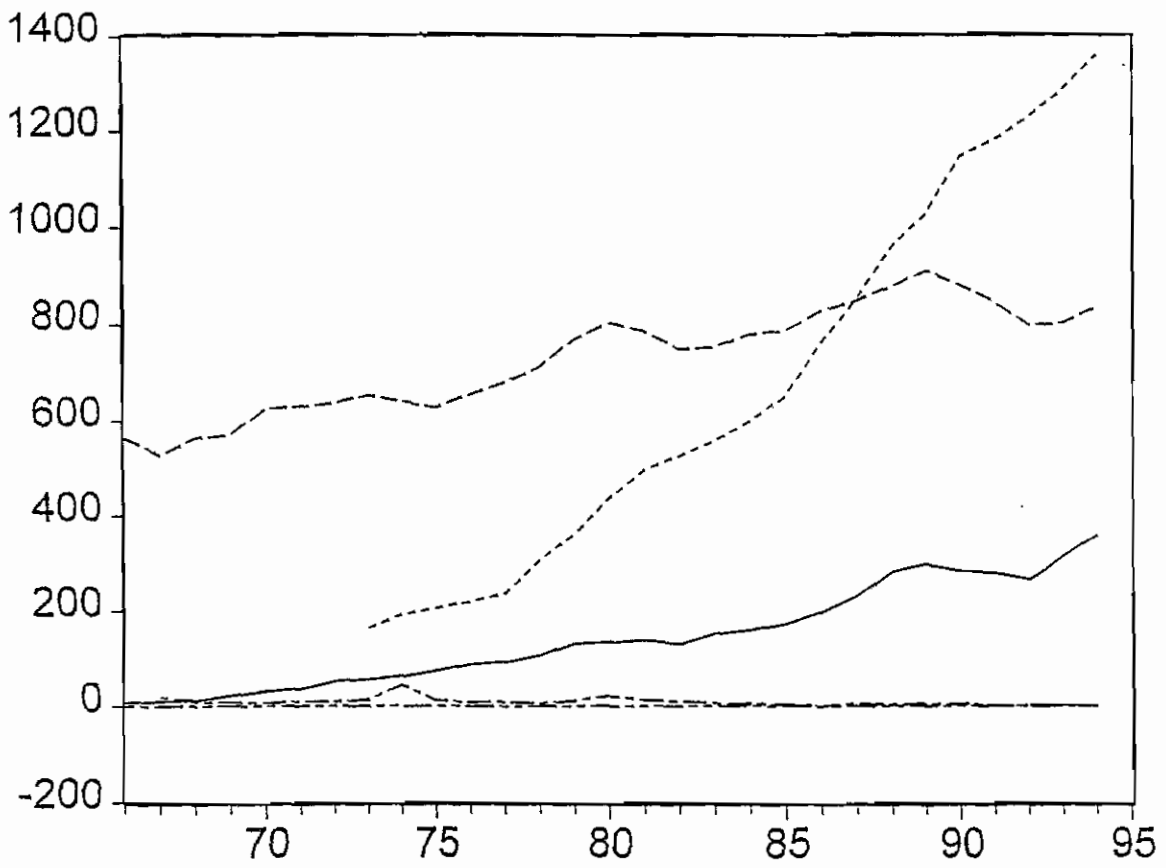


Chart 3







—	PCREDIT	- · - · -	INF
· · · · ·	PDEPO	- - - - -	I
- - - - -	COGDP		