



THE DETERMINANTS OF CONSUMPTION EXPENDITURE ON DURABLES IN OF BARBADOS

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ABSTRACT

Since Barbados is a small open economy with a high import bias in its absorption mix, consumer expenditure on durables is one area of spending that needs to be closely monitored. Such expenditures use valuable foreign reserves without having the potential to earn foreign exchange. In fact, it is often the case that policy makers would prefer to direct the scarce foreign reserves into the productive sectors of the economy. Consequently, an understanding of the factors that determine expenditure on durables is of great importance in order to inform policy decisions. This paper presents a model of consumer expenditure on durables in Barbados. In the model relative prices, income and credit have significant short and long-run effects on expenditure on durables, while hire-purchase terms have only a short-run impact. The results suggest that both fiscal and monetary policy play a significant role in such expenditure.

JEL Classification: E40, E21, D91

Key words: Consumer durables; Consumption; Dynamic OLS

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I. Introduction

Since Barbados is a small open economy with a high import bias in its absorption mix, consumer expenditure on durables is one area of spending that needs to be closely monitored. This is because such expenditures use valuable foreign reserves. In fact, it is often the case that policy makers would prefer to direct the scarce foreign reserves into the productive sectors of the economy. Consequently, an understanding of the factors that determine expenditure on durables is of great importance to policy makers.

During 1960 to 2008 expenditure of consumer durables in Barbados grew from approximately \$7 million to over \$330 million; an annual average growth rate of 8.5%, and was matched by similar growth in imports of consumer durables. The growth rates of selected variables: income, expenditure on durables, consumer durable imports and credit, shown in Table 1, illustrate the possible relationships, which may influence the level of expenditure on consumer durables in Barbados. Between 1960 and 1976, when the average growth rate of credit to the private sector was at its' highest expenditure and imports of consumer durables both grew by 12.7%. From 1977-83, in an environment of credit controls and import quotas on goods in an effort to lower the outflow of foreign exchange, expenditure on the import of durables expanded at an annual average rate of 18.4%. During that period, income grew by 1.9%, while credit increased by 8.6%, albeit at a much slower level than the rate recorded in the previous period. In the 1984-89 period, when credit ceilings to the personal and distribution sectors were increased and subsequently removed, expenditure on durables continued to grow but at a slower rate than in the preceding period while the rate of credit to the private sector continued to rise.

During the 1990 to 1992 period, credit to the personal sector was at its lowest. With the reintroduction of credit controls to banks and financial institutions from 1990 to 1991, in an effort to correct balance of payment imbalances in the early 1990's, the rate of credit fell by 3.9%, whereas expenditure on durables and consumer durable imports deteriorated considerably, both falling by 14.4%. Real negative economic growth was also experienced during the abovementioned period, followed by an increased in unemployment and a corresponding fall in disposable income. The decline in income may have led to a delay in purchases of durables,

possibly resulting in a build up in demand for future purchases, as seen by the 19% rise in credit and the 53.4% expansion in spending on consumer durables in 1993. From 1993 onwards, income expanded at an average annual rate of 2.4%, credit increased by 15.9% whereas expenditure on durables and consumer durable imports rose substantially, as hire purchase limits and ceilings on credit and credit controls were eventually discontinued. With the imposition of VAT, which replaced the stamp duty on all durable goods, expenditure on durables rose considerably and can be attributed mainly to the increase in the demand for motor vehicles, which represent almost half of durable imports.

The current study builds on the paper of Holder (1986, pp. 6), which posits that smaller growth rates in consumption expenditure on durables may be attributed to frequent changes of credit control and hire-purchase regulations. This view gains support from the fact that consumer credit, which grew at an annual growth rate of 19.6% between 1960 and 1976, slowed to 8.6% and declined by 3.9%, respectively, during periods of control (1977-83 and 1990-92). Given the advances in econometric analysis, apart from an extended data set, a more superior estimation procedure to the one used previously, is adopted to investigate the nature of durable consumption expenditure in Barbados. In addition, since Holder's study, controls on credit have been removed and thus it is interesting to see if his conclusions still hold.

In section 2, the model used to test the relative importance of the factors affecting durable purchase is presented. Section 3 describes the data used and the empirical results are shown and analysed, this is followed by the summary and conclusions.

II. Theoretical Model

Following Holder (1986), we specify a model of real consumer expenditure on durables as:

$$C = f(y, CR, HP, RP) \quad (1)$$

where c is real consumer expenditure on durables, y is real gross domestic product, CR represents loans to the personal sector deflated by price of durables, HP is the hire purchase term

given by $HP = d + (1-d)/m$, d is the minimum down payment, m is the maximum monthly repayment period and RP is the price of durables (PCD) relative to the price of non-durables (PND).

In a growing economy, we would expect that as income grows, the demand for durables, and hence expenditure on durables should increase. Since purchases can be made almost immediately, there should be a short-run impact from changes in income, and, over time, the equilibrium level of consumption in the economy should be higher.

The choice of the monetary variable to be included is controversial. The controversy surrounds the question: is it the cost of credit or the supply of credit that matters? Hamburger and Zwick (1977; 1979) suggest selective controls have no effect. To support their view, they suggested that individuals choose an overall liability position in planning purchases and therefore individuals will respond to selective controls by substituting uncontrolled forms of credit. Whilst there is some truth in this assertion, the view taken in this paper is that the individual's access to uncontrolled credit is limited and substitution is not simple, even if possible. Further, even if substitution is possible, this would not make selective controls ineffective, it may make them less effective than they would have been if substitution were not possible. Maris (1981), Cuthbertson (1980) and Garganas (1975) all agree that consumer expenditure on durables is responsive to changes in consumer credit. Cuthbertson contends that the rate of interest will only be significant in a perfectly competitive 'credit system'. In such a world, the level of credit and additions to the stock of durables are chosen simultaneously. He concludes that in such a system credit and durables are complements. Taubman (1971) asserts that if consumers are rationed, borrowing is unresponsive to changes in interest rates since consumers are already constrained to borrow lower amounts than they preferred at existing rates. Moreover, Attanasio et al. (2008) report that liquidity constraints exist and have important implications for the borrowing behaviour of lower income households. They posit that for consumers who are not liquidity constrained, credit demand should be a function of the interest rate, while liquidity constrained consumers should be more responsive to maturity changes.

In the present model credit is used since it is the policy that has been utilised and studies on the monetary sector have shown that interest rate policy is not a deterrent to borrowing in Barbados. In this regard, note must be taken of an official view of the content of interest rate regulation. The then Deputy Governor of the Central Bank of Barbados, Worrell (1997) states:

“The Central Bank of Barbados’ direct interventions with respect to interest rates reflected the underlying market conditions: the interest rate rose when credit conditions tightened and fell when credit eased.....Spreads between deposit and loan rates were adjusted in line with the banks’ requirements. The loan rate was controlled in name only; exemptions were pervasive and the actual was frequently above the ‘controlled’ maximum.”

Examining a related issue, Williams (1996), the current Governor, concludes:

“The hypothesis of cost-axiomatic pricing is supported by the results for the banking system in Barbados. Results suggest accommodation by regulators in their approach to the setting of interest rate ceilings and floors and contradicts the conventional literature which posits that interest rate regulation impacts adversely on bank profitability.”

The foregoing observations suggest that interest rate policy has been implemented in a manner that has afforded banks a high degree of discretion in regard to the fixing of the loan rate of interest. The model thus assumes that credit is supply-side determined even in the period when banks were free of Central Bank directives. The reasoning follows that of Cuthbertson (1980, p. 65). It is believed that the presence of credit permits the consumer to anticipate income and, thus, to smoothen his consumption over time while at the same time borrowing towards durable expenditure. That is, credit allows the individual to save after purchase instead of before.

Hire-purchase (instalment) credit is the primary source of credit for consumer durables, therefore the terms and conditions (down payment and amortization period) should have a serious impact on the level of expenditure. Moreover, in the Barbadian context, any substitution via the use of ‘uncontrolled credit’ would most likely take the form of other non-bank institutions lending, such as car dealers and retail stores providing credit to consumers. The variable HP is used to capture these effects and represents the ability to obtain credit. . Diaz and Luengo-Prado (2006) maintain that as the down payment decreases the amount of credit to be obtained as durable entity loans is higher and households will be better able to finance a higher fraction of the durables that they can purchase. Credit is tighter when the down payment increases or the repayment period is shortened. Such policies, although having a transitory effect on expenditure,

will in the short-term result in a slower speed of adjustment/replacement, that is, cause a delay in purchases.

Consumer theory posits that the demand for any given good or service is a function of its own price as well as the price of other goods and services. In the present model it has been attempted to capture the possibility of substitution between durables and non-durables by including their price ratio (relative prices). As the price of consumer durables increases relative to the price of all other goods and services, this will lead to a reduction in durable purchases.

Since durable purchases may be postponed, technological changes, advertising, attitudes and tastes will play a major role in deciding the level of purchases. However, no index is available to represent these and therefore their impact on expenditure will be captured in the error term v_t .

III. Data And Methodology

This study uses annual data from 1960 to 2008. Figure 1 shows the data while Table 2 presents some summary statistics. The durable and non-durables price series were obtained from the Central Bank of Barbados Annual Statistical Digest (ASD) and a draft import and export unit price index for Barbados by Jones and Moore (2008). Real consumer expenditure on durables was calculated by deflating consumer expenditure on durables by the price of consumer durables. The import value of consumer durables was used as a proxy for consumer expenditure on durables. A 20% mark-up is applied to the value of the imported durables and is taken as a reasonable trade margin for wholesalers or retailers based on stylised facts. From 1997 to 2008 a 15% was added to account for the imposition of the Value Added Tax (VAT), which replaced the 20% stamp duty, imposed on imported goods¹. The maximum repayment period and the minimum deposit rate were acquired through an informal phone survey of three of the leading

¹ With the imposition of VAT, the consumption tax, which was imposed on a wide variety of goods at rates ranging from 17% to 89%, was replaced by an excise tax of identity rates. None of the two were used in the calculation of consumption expenditure since the rate was basically the same and were applied identically. Secondly, both taxes varied according to the type of good and are not uniformly applied across product class.

durable retailers². Holder (1986) used 10% as the minimum down payment for the period 1960-1976, thereafter using weights according to the data, however, for the 1977 to 2008 period we modelled the minimum down payment as a fraction of one months payment to the maximum repayment period, that is $(1/m)$, where m is the maximum repayment period. As a matter of note, for 1960 to 1976 period, the 10% deposit calculated represents approximately 3 months of total repayment that is $(3/m)$.

Although we have longer data series than Holder did in 1986, we still only have 49 data points and, as such, we opt for a single-Equation estimation approach to co-integration analysis. At the same time we must be mindful of issues of endogeneity in choosing our estimation procedure, since in the presence of simultaneity cointegration regressions may be biased in small samples even though they are consistent estimators Stock and Watson (1993). Therefore, to take explicit account of endogeneity, the dynamic OLS (DOLS) method developed by Saikkonen (1991) and generalised by Stock and Watson (1993) is employed.

In this regard, The DOLS procedure provides unbiased and asymptotically efficient estimates of the long-run relation, even in the presence of endogenous regressors. Thus, the endogeneity of any of the regressors has no effect, asymptotically, on the robustness of the estimates. Further, statistical inference on the parameters of the cointegrating vector is facilitated by the fact that the t-statistics of the estimated coefficients have an asymptotic normal distribution, even with endogenous regressors (Stock and Watson, 1993). Another advantage of DOLS is that it allows for direct estimation of a mixture of $I(1)$ and $I(0)$ variables,³ which is an important gain since the Johansen multivariate procedure does not admit $I(0)$ variables to the cointegrating vector. Often we are interested in the long-run effects of such variables (for example, interest rates which are often $I(0)$), and it would be incorrect to assume that because they are $I(0)$ they can not exert an influence on the dependent variable. In addition, Stock and Watson (1993) show that the DOLS estimator is asymptotically equivalent to the maximum likelihood estimator of Johansen (1988) in the case where the variables are $I(1)$, and even in the presence of multiple long-run relations if there are no cross Equation restrictions (see also Caporale and Pittis, 1999; Park and Phillips,

² The three retailers surveyed represent the majority of the retail market for consumer durables.

³ As noted in Loayza and Ranciere (2006, pp. 6) the assumption “that long-run relationships exist only in the context of cointegration among integrated variables” has been a common misconception of the cointegration literature.

1988; Phillips, 1991; Watson, 1994). Moreover, it performs well in small samples, which is perhaps the most important reason for our choosing DOLS. The potential biases due to endogeneity among the regressors and small sample size are dealt with by the inclusion of lags and leads of the first differences of the $I(1)$ variables. Thus, the estimation of the long-run relation for Equation 1 is based on the following regression:

$$C_t = B'X_t + \sum_{j=-K}^K \lambda_j' \Delta X_{t-j}^I + \xi_t \quad (2)$$

where $X = [y, CR, HP, RP]$, XI denotes the sub-set of $I(1)$ variables of X , B is the vector of long-run coefficients and the inclusion of ΔX_{t-j}^I takes care of the possible endogeneity of X . The Equation is estimated in most cases with $K=2$ for annual data, but then a ‘general to specific’ procedure⁴ is applied to reduce the model to a more parsimonious congruent specification where only significant variables are retained.

In order to investigate the short-run dynamics, the estimates from Equation 2 can be used to formulate a general error correction model of the form:

$$\Delta C_t = \sum_{j=1}^p \phi_j \Delta C_{t-j} + \sum_{j=0}^p \phi_j' \Delta X_{t-j}^I + \sum_{j=0}^p \gamma_j' Z_{t-j} + \zeta_j \sum_{j=1}^p (C_{t-1} - B'X_{t-1}^*) + \varepsilon_t \quad (3)$$

which specifies changes in real consumer expenditure on durables as a function of lagged values of the first difference of the nonstationary variables, stationary variables that may have short-run effects (Z), and stationary combinations of the nonstationary variables, which represents the long-run relation between real consumer expenditure on durables and its determinants. This long-run relation among variables is given by the elements of B and the rate at which real consumer expenditure on durables responds to disequilibrium in the long-run relation is given by ζ . Note that X^* represent those variables which survives the reduction process. In estimating

⁴ See Campos *et al.* (2005) for detailed expositions on the general-to-specific approach to econometric modelling.

Equation 3, a general-to-specific approach will be used in order to reduce it to a more parsimonious representation.

IV. Estimation And Results

We begin our investigation by utilising a series of unit root tests to ascertain the stationary properties of the series under investigation. Specifically, the study employs the Augmented Dickey-Fuller (ADF) test for unit roots (Dickey and Fuller, 1979). However, the power of the ADF can be significantly reduced since it corrects for serial correlation in the error term by adding lagged values of the first difference of the dependent variable. This reduced power can be more of an issue in small sample. As such, we use the Phillips-Perron, PP, (Phillips and Perron, 1988) which, instead of adding differenced terms as explanatory variables to correct for higher order serial correlation, makes the correction on the standard error of the coefficient of the lagged dependent variable.

However, all the above mentioned tests take a unit root as the null hypothesis and thus have a high probability of falsely rejecting the null of non-stationarity when the data generation process is close to a stationary process (Blough, 1992; Harris, 1995). Therefore, we also employ the KPSS test described in Kwiatkowski et al. (1992) where the null hypothesis is specified as a stationary process.

The results of the unit root analysis are presented in Table 3 and suggest that all the variables of Equation 1, with the exception of the relative price variable (RP), can be considered as following a unit root process. However, RP appears to mimic an $I(0)$ process. Note that in each case the three tests are in agreement on the stationarity properties of the respective series.

Next, Equation (2) is estimated with OLS and a general-to-specific approach applied where insignificant variables are sequentially eliminated until a parsimonious representative equation is obtained. The resulting estimates are presented in the top panel of Table 4. The model passes the various diagnostic tests, including that of mis-specification and normality of the residuals, and

appears to explain the movements of consumer durable expenditure fairly well. Moreover, Figure 2 shows that the model fits the data quite well and there are no abnormalities in the residuals. In addition, the estimated coefficients have the correct sign and are significant at least at the 0.05 significance level.

The results suggest that in the long-run expenditure on durables is positively determined by real income and the level of credit, but negatively related to relative prices. The long-run real income elasticity is somewhat high; a 1% increase in real income leads to roughly a 2.3% expansion in expenditure. This is fairly close to Cuthbertson (1980) who finds an income elasticity of 1.5, while Holder (1986) reports unitary income elasticity for Barbados over the period 1960-1982. However, as discussed in the introduction, since Holder's study there has been an explosion in expenditure on consumer durables, particular with respect to automobiles. The level of credit has a small but positive impact on the level of expenditure, where a 10% increase in personal credit will over time result in a 2.3% rise in consumer expenditure on durables. Relative prices are also an important determinant of consumer expenditure on durables in the long-run. In this regard, there appears to be some substitution effects going on, where a 10% increase in the price of durables relative to the price of nondurables leads to a 3.6% decline on expenditure on durables.

The error-correction model is presented in the lower panel of Table 4 along with a number of diagnostic tests, which confirm that the model is well specified in a statistical sense. However, it should be noted that a pulse dummy variable, with a one for 1992 and zeros otherwise, is included in the model. This is because the residuals from the general model showed a spike for the year 1992 and thus the need for the pulse dummy, which did survive the reduction process. Figure 3 shows that the final parsimonious error-correction model is a good fit and does well at picking up the turning points in the data. The model also has a behavioural interpretation as it incorporates both the long-run information concerning consumer expenditure on durables (in the form of the lagged error-correcting term, ECT_{t-1}) and the short-run dynamics in terms of contemporaneous and lagged changes in its determinants. Indeed, the significance of the ECT term confirms the existence of a stable equilibrium (cointegrating) relationship between real consumer expenditure on durables and its determinants in the long-run for Barbados. Its

coefficient of 0.51 suggests that it takes approximately two years for consumer expenditure on durables to return to the long-run steady state growth path when disequilibrium occurs.

In addition, the findings indicate that, in the short-run, changes in credit to the personal sector have a positive impact on the growth in real consumer expenditure on durables. In this regard, a 1% increase in loans to the personal sector will lead to a contemporaneous increase of 0.84% in real consumer spending on durables. However, much of this impact dies out over time and we end up with the small coefficient noted above. We find that hire-purchase conditions also impact on durable expenditure in the short-run, but with opposite effects coming from the current and previous periods; the immediate impact of an increase in hire-purchase terms is a decline in spending followed by an increase in the second period. This confirms the suggestion that a tightening of hire-purchase regulations will cause consumers to delay purchases. This may reflect the need for consumers to save more in order to make the down payment. Moreover, the affect of hire-purchase terms is only transitory with no long-run impact (note that a restriction that the sum of the coefficients on current and lagged values of HP is not significantly different from zero produces an F-statistic of 0.09 with a p-value of 0.76 and therefore cannot be rejected) given its absence from the long-run equation.

V. Conclusion

This study has attempted to examine the determinants of consumer expenditure on durables in Barbados and in the process judge the effectiveness of both monetary and fiscal policies as it relates to spending on durables. The analysis and results suggested that monetary policy, as well as fiscal policy, have a strong role to play in determining expenditure on durables. Of course, this statement is condition on both monetary and fiscal impacting positive on credit; however the empirical literature on the Barbadian economy would suggest that such a conditioning statement is true. For example, with respect to monetary, Moore and Williams (2008) show that, in Barbados, commercial bank lending, to all sectors fall (rise) in response to a tightening (easing) in monetary policy. Similarly, Worrell (1997) and Worrell et al. (2003) argue that fiscal policy can be, and has been, used in Barbados to boost the potency of monetary policy on bank credit.

Thus, to the extent that monetary policy impacts positively on credit, either by lowering the cost of borrowing or increasing the availability of credit, will encourage consumers to purchase durables. Conversely, a tightening of monetary policy will have the opposite effect. It should however be noted, that although it is credit rather than interest rates that exerts direct impact on expenditure, interest rates do have a part to play, either by impacting on the cost of credit or implicitly through the down payment component of the hire-purchase agreement.

Given the significance of real income, both in the short- and long-run, fiscal policy can be effective in restraining or promoting expenditure in line with any desired macroeconomic objective. For example, during an economic downturn, by reducing taxes and providing other tax incentives, government can effectively increase real incomes, which would boost spending on durables immediately and over time.

From the analysis it can be inferred that shorter repayment periods are beneficial to banks in as much as the turnover rate of credit is high and, when coupled with the interest rate charges on instalment credit, this may help to push up their profitability.

IV. Appendix

Table 1: Growth rates of selected variables

Year	Income	Expenditure on durables	Consumer durable imports	Credit to Personal Sector
1960-76	1.1	12.7	12.7	19.6
1977-83	1.9	18.4	18.4	8.6
1984-89	3.2	5.5	5.5	11.9
1990-92	-4.7	-14.4	-14.4	-3.9
1993-08	2.4	13.4	13.7	15.9

Source: Central Bank of Barbados

Table 2: Some Summary Statistics of the Data

	C	Y	CR	HP	RP
No. of Observations	49	49	49	49	49
Mean	1.17	786.13	4.62	0.04	0.88
Standard deviation	0.86	173.25	5.73	0.00	0.18
Minimum	0.17	528.00	0.13	0.03	0.54
Maximum	3.28	1194.60	21.64	0.04	1.17

Table 3: Unit Root Analysis

Variables	ADF	PP	KPSS
LC	-1.260	-0.888	0.874***
Δ LC	-8.387***	-10.524***	0.248
LY	-0.190	-0.004	0.899***
Δ LY	-5.547***	-5.599***	0.0861
LCR	-0.945	-0.942	0.864***
Δ LCR	-6.246***	-6.327***	0.093
LHP	-0.309	-0.309	0.468**
Δ LHP	-6.866***	-6.866***	0.236
LRP	-3.475**	-3.492**	0.182

Notes: *,** and *** denotes rejection of the null hypothesis at the 10%, 5% and 1% level, respectively. Δ is the first difference operator and L represents the natural logarithm.

Table 4: Determinants of Consumption Expenditure on Durables in Barbados

<u>Long run estimates¹:</u> $\ln C = -16.162 + 0.228 \ln CR_t + 2.348 \ln y_t - 0.363 \ln RP_t$ (-4.378) (2.681) (4.198) (-1.950)	
R² = 0.97; JOINT - F(12,31) = 74.14 [0.000]; DW = 1.83; AR- F(2,35) = 0.322 [0.727]; ARCH- F(1, 29) = [0.908]; Norm. -χ^2(2) = 0.404 [0.817]; HET- F(24,6) = 0.475 [0.910]; RESET - F(1,306) = 0.688 [0.413].	
<u>Parsimonious Error-Correction Model:</u> $\Delta \ln C_t = 0.848 \Delta \ln CR_t + 1.372 \Delta \ln y_t - 0.278 \Delta \ln HP_t + 0.106 \ln \Delta HP_{t-2} - 0.514 ECT_{t-1} - 0.516 dummy1992$ (8.839) (2.896) (-3.740) (1.902) (-5.322) (-5.851)	
R² = 0.67; JOINT - F(6,37) = 12.56 [0.000]; DW = 1.94; AR- F(2,35) = 0.034 [0.963]; ARCH- F(1,35) = 0.149 [0.702]; Norm. -χ^2(2) = 1.093 [0.579]; HET- F(11,25) = 0.899 [0.897]; RESET - F(1,36) = 0.519 [0.476].	

Notes:¹For the sake of space, the nuisance terms (lagged and lead changes of the I(1) variables) are not reported but are available from the authors upon request.

T-statistics computed from the heteroscedasticity and autocorrelation consistent standard errors are in parentheses. The F-statistic for the respective diagnostics tests are shown and the associated p-value in square brackets. R² is the fraction of the variance of the dependent variable explained by the model and *JOINT* is a test of the joint significance of the explanatory variables, *DW* is the Durbin Watson statistic, *AR* is the Lagrange multiplier test for *p*-th order residual autocorrelation correlation, *RESET* = Ramsey test for functional form mis-specification (square terms only); *Norm* is the test for normality of the residuals based on the Jarque-Bera test statistic (χ^2 (2)). *ARCH* is the autoregressive conditional heteroscedasticity for up to *p*-th order (see Engle, 1982a). *HET* is the unconditional heteroscedasticity test based on the regression of squared residuals on the squared fitted values.

Figure 1

A Plot of the Data

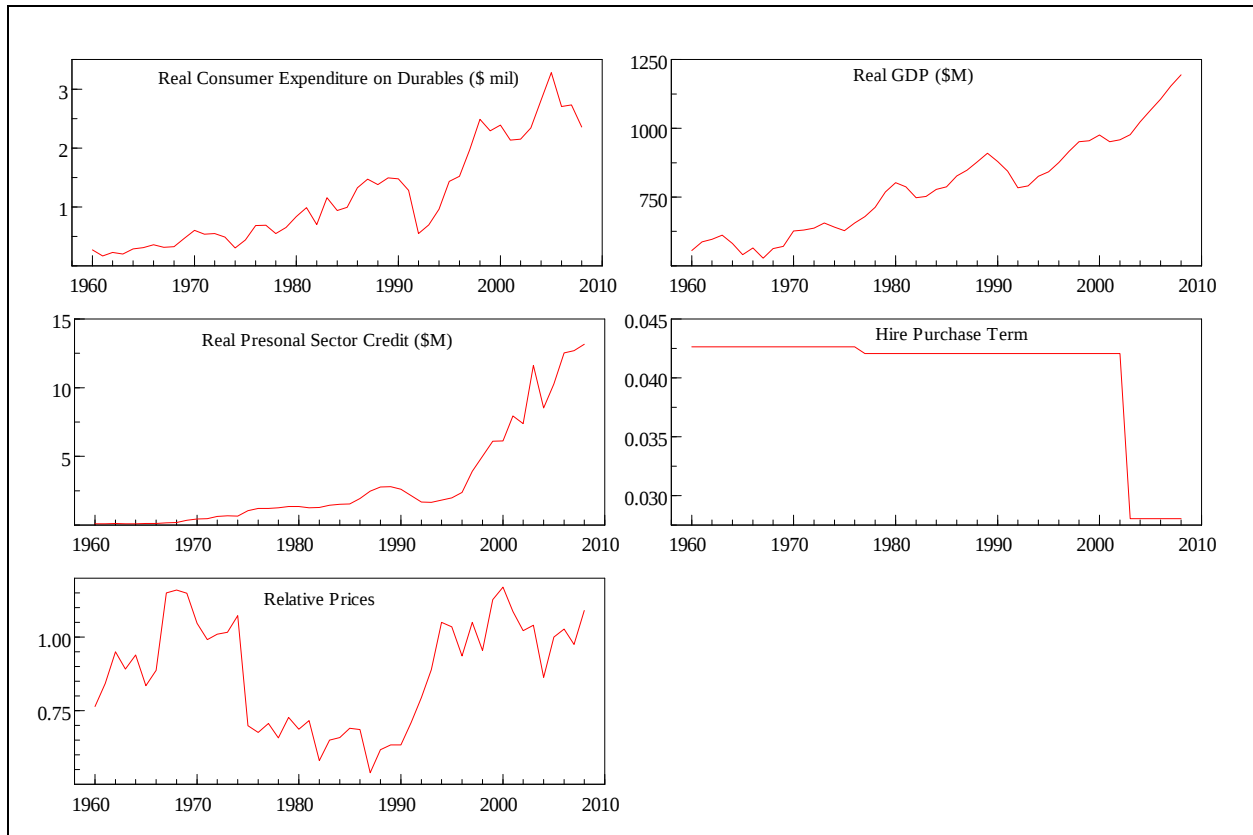


Figure 2: Long-run Model Fit

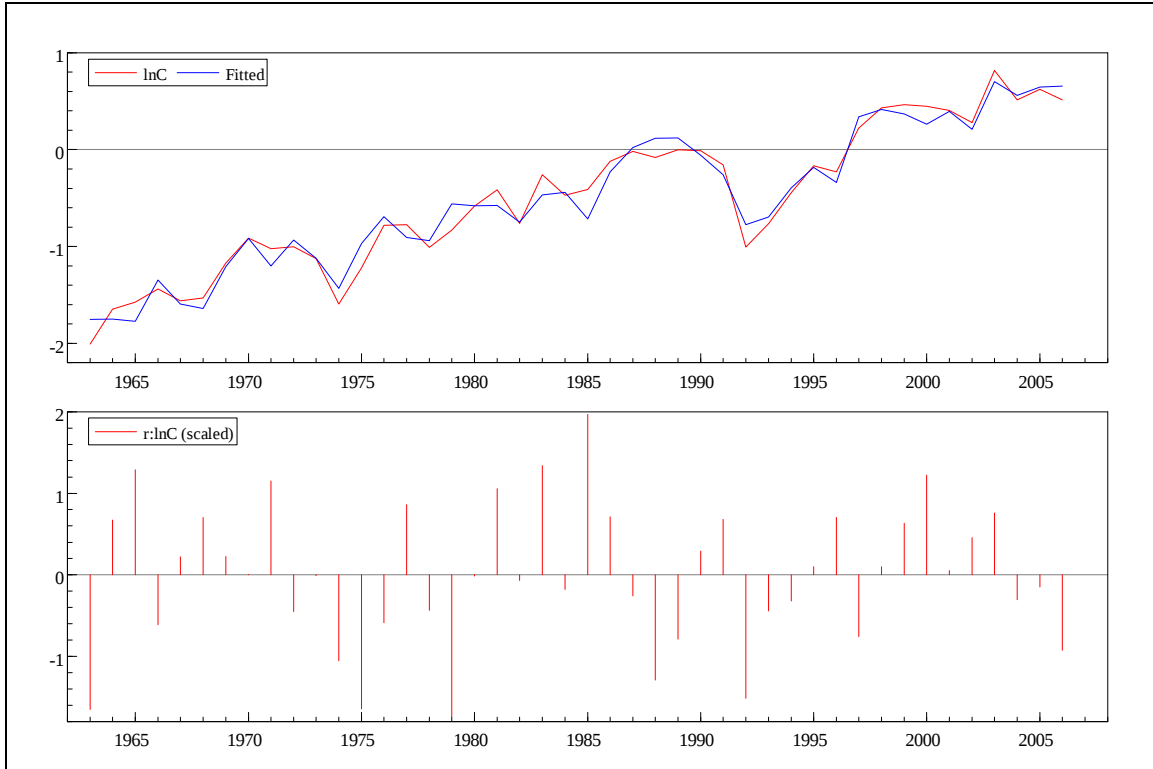
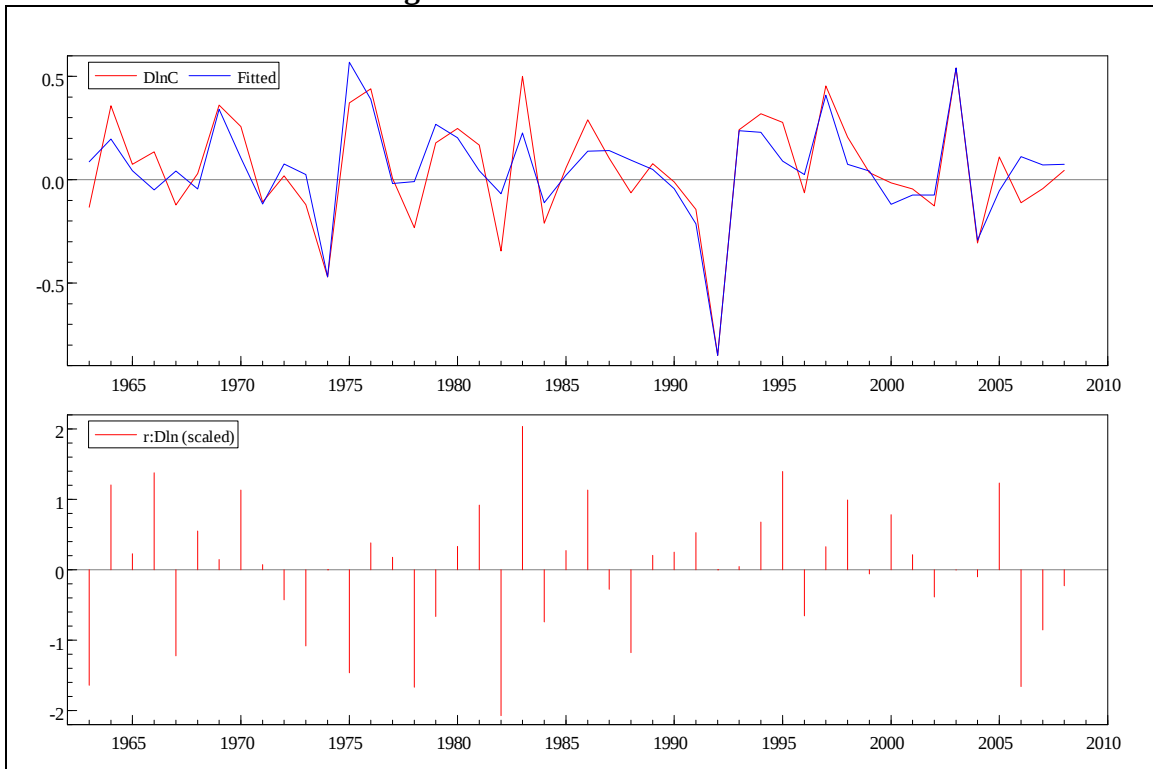


Figure 3: Short-run Model Fit



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