Long-run and short-run co-movement in UK consumption and income

Steven Cook*

Coventry Business School, Coventry University, Priory Street, Coventry CV1 5FB, UK

Received 8 September 1998; accepted 23 September 1999

Abstract

The distinction between durable and non-durable consumers’ expenditure is highlighted via examination of their co-movement with income. Using UK data over the period 1955 to 1996, co-movement over the short run is found for non-durable consumption, while for durables it occurs over the long run. © 2000 Elsevier Science S.A. All rights reserved.

Keywords: Common cycles; Common features; Cointegration; Consumers’ expenditure; Lagrange multiplier (LM) tests

JEL classification: C30; E32

1. Introduction

The theoretical distinction between durable and non-durable consumption has long been recognised (see Darby, 1972), with the former viewed as analogous to investment expenditure, providing a stream of utility through time. This distinction will now be examined at an empirical level by considering the relationship between consumption and income. In contrast to previous studies, consumption will be disaggregated into its durable and non-durable components, with both long-run and short-run co-movement with income considered. Standard Engle and Granger (1987) cointegration analysis of common stochastic trends will allow the possibility of long-run co-movement to be examined, while short-run co-movement will be examined via the common features or common cycles methods of Engle and Kozicki (1993) and Vahid and Engle (1993).

In the following section, tests of short- and long-run co-movement between UK durable and non-durable consumption and income will be applied. Section 3 concludes.

*Tel.: +44-1203-838-442.
E-mail address: steven.cook@coventry.ac.uk (S. Cook)
2. Results

The consumption and income series used in this study are seasonally adjusted observations on durable consumers’ expenditure, non-durable consumers’ expenditure and personal disposable income in the UK measured in 1990 prices over the period 1955(1) to 1996(4). The natural logarithms of these series will be denoted as cd, cnd and y. These series are all clearly I(1) processes, as indicated by the results of fourth-order Augmented Dickey–Fuller (ADF) tests applied to them. The calculated ADF statistics were given as: cd, \(-3.372\); cnd, \(-2.534\); and y, \(-2.932\). The 5% critical value is \(-3.438\).

To examine whether either cd or cnd are cointegrated with y, static cointegrating regressions were conducted and ADF tests applied to the resulting residual series. The calculated ADF statistics were: \(-3.610\) (cd : y) and \(-2.306\) (cnd : y). Against a 5% critical value of \(-3.402\), cointegration is only detected between income and durable consumption.

To test for short-run co-movement between the alternative forms of consumption and income, the recently presented analysis of common cycles of Engle and Kozicki (1993) and Vahid and Engle (1993) is employed. Vahid and Engle (1993) interpret a series as having a cycle if its first differences are serially correlated. A cycle is therefore defined as common in multivariate data sets if it is present in each of the individual series, but there exists a non-zero linear combination of the series in which it is not present.

Given two series \(x_t\) and \(y_t\), the presence of a cycle in each of the individual series is tested via OLS estimation of the following regressions:

\[
\Delta x_t = \alpha_1 + \alpha_2 \Delta x_{t-1} + \alpha_3 \Delta y_{t-1} + \eta_{1t},
\]

(1)

\[
\Delta y_t = \beta_1 + \beta_2 \Delta x_{t-1} + \beta_3 \Delta y_{t-1} + \eta_{2t},
\]

(2)

The relevant LM tests are given as \(T \times R^2\) and are distributed as \(\chi^2_2\) under the null of no cycle. Conditional upon each series displaying a cycle, the testing of the commonality of this cycle first requires the estimation by two stage least squares (2SLS) of the following regressions:

\[
\Delta x_t = \gamma_1 + \gamma_2 \Delta y_{t-1} + \xi_{1t},
\]

(3)

\[
\Delta y_t = \delta_1 + \delta_2 \Delta x_{t-1} + \xi_{2t},
\]

(4)

using \(\Delta x_{t-1}, \Delta y_{t-1}\) and any possible cointegrating combination of \(x_t\) and \(y_t\) as instruments. The residuals from these equations are then used in the following regressions:

\[
\hat{\xi}_{1t} = \mu_1 + \mu_2 \Delta x_{t-1} + \mu_3 \Delta y_{t-1} + \epsilon_{1t},
\]

(5)

1The durable consumption and income series have ONS codes CCBW and CECP, respectively. The non-durable consumption series was calculated as the difference between aggregate consumers’ expenditure (ONS code CAAB) and durables.

2Following conventional practice, a trend was included in the ADF tests for the original series, but not for the residuals from the cointegrating regressions presented later. Appropriate critical values for the ADF tests were provided by the response surface results of MacKinnon (1991).
\[ \hat{\xi}_{2t} = \lambda_1 + \lambda_2 \Delta x_{t-1} + \lambda_3 \Delta y_{t-1} + \epsilon_{2t}. \]  

The relevant LM test is again given as \( T \times R^2 \), which is distributed under the null of a common cycle as \( \chi^2 \).

To test for common cycles in the consumption and income series, the variable \( x \) will be taken to be cnd and cd in turn, with \( y \) being the income series as previously defined. For cnd, the LM tests from (1) and (2) were calculated as 13.353 and 12.752, respectively. The \( P \)-values of 0.0013 and 0.0017 reject the nulls of no cycle well beyond conventional levels of significance. Conversely, the null of a common cycle was not rejected for either (5) or (6), with the calculated LM tests of 1.931 and 1.918 having \( P \)-values of 0.165 and 0.166. Non-durable consumption and income therefore possess short-run co-movement in the form of a common cycle.

For cd, the LM tests from (1) and (2) are given as 19.011 and 4.473. Against the 5% significance level of 5.991, the null of the series not possessing a cycle cannot be rejected in both cases as required. As a common cycle is dependent upon both series possessing a cycle, further analysis cannot be undertaken.

3. Conclusion

In this letter empirical evidence on the distinction between durable and non-durable consumption has been presented via an analysis of their co-movement with income. The results derived show income to exhibit co-movement with non-durable consumption over the short run and with durable consumption over the long run. This supports theoretical arguments, with non-durables being subject to short-term fluctuations in income, while expenditure on durables reflects longer-term considerations.

References