We thank the discussants for their comments which are pertinent and helpful. In general, we have little disagreement with most of the comments made. Since the discussion covers a wide range of points, it is not possible to give all the topics the attention they deserve. We will therefore comment on the issues that appear most important to us.

Given that the topics of unit roots and cointegration have received much attention in the literature, it is not surprising that several discussants address these issues.

Dolado and Maravall express doubts about the reliability of our conclusion, based on the Perron and Phillips (1987) test for unit roots, that the difference between non-property income and consumption is stationary. Reichlin presents interesting results which show that the standard tests for the order of integration can be misleading when the process generating the data is subject to structural changes. Diebold proposes the use of fractional differencing and illustrates the concept with a discussion of the "excess-smoothness" issue.

We like to note that the theoretical models we consider imply that consumption be integrated of order one and that our aim is to test
the implications of the theory. Our results do not indicate excess smoothness of consumption. The life cycle model and the specified income process imply that the volatility of changes in consumption should be smaller than that of income innovations. In our empirical analysis, the volatility of consumption is found to be too large. In other words, consumption exhibits the opposite of "excess smoothness".

Hendry addresses the issue of cointegration and suggests the use of Johansen's testing procedure. A comparison of his empirical results and the evidence presented in the paper however, is hampered by the fact that he uses a log-linear functional form and includes inflation. In Winder (1988a), the model with moving planning horizon is extended for inflation effects in the line of Deaton (1977). The analysis does not suggest that inflation effects played an important role.

Hendry also discusses the concepts of superexogeneity and encompassing to discriminate between models based on forward looking behaviour and on feedback control rules respectively. We agree that these concepts are very important. In fact, we explicitly pay attention to the structural stability of the process for consumption in the presence of changes in the income process. In our opinion, in models based on forward looking behaviour, the question of (super)exogeneity can be naturally addressed. In general, in these models, the parameters of the process for the endogenous variables will be functionally related to the parameters of the process for the forcing variables so that the forcing variables will generally be neither weakly exogenous nor superexogenous.
The identity between income and consumption innovations (up to a factor of proportionality) is one of the most farreaching implications of the theory. In this extreme form it cannot be expected to hold for aggregate data measured with errors. With respect to the analysis by Dolado and Maravall of the relationships between the innovations of consumption and income, we like to point out that some care is required when formally testing for the presence of a relationship using prewhitened series. In the literature on causality testing, these tests have been found to be conservative. Notwithstanding these remarks, we agree with Dolado and Maravall that this aspect deserves more attention.

With respect to encompassing, we like to point out that we intentionally put more emphasis on testing the various implications of a theoretical model than on validating the empirical model by testing it against alternative specifications. Discriminating between models based on forward looking behaviour and those based on feedback rules will often be hazardous, partly because of a lack of experimental data. One might expect to discriminate among them when structural changes have occured in the process of the exogenous variables given that then these models differ in terms of predictions for the endogenous variables. We agree with Reichlin that reliable procedures to detect the occurrence and nature of structural changes will be very useful. We also like to note that Winder (1988a) established a synthesis between forward and backward looking behaviour by considering the life cycle model and the model with moving planning horizon under rational habit formation. In
making a decision, the consumer is assumed to incorporate information on expected future labour income and on past consumption.

Related problems deal with the specification of the income process. Since structural changes in the process of the forcing variables have predictable implications for models based on intertemporal optimization, we chose to model the structural changes in income explicitly and to investigate the income-consumption relationship from a theory-based viewpoint.

In this respect, the remark by Wickens that the structural change in income generally precedes that in consumption is important. This finding indicates that income probably is the driving variable and that the consumer needs some time to correctly assess the nature of the change in income and to adapt his consumption path accordingly. A solution might be incorporating learning processes in the dynamic optimization models.

We fully agree with Wickens that the use of seasonally unadjusted data is preferable. Since we do not have seasonally unadjusted data on disposable labour and transfer income at our disposal, we confined ourselves to an analysis of seasonally adjusted data.

Palm and Winder (1987) and Winder (1988) report results on univariate analyses for the life cycle model using seasonally unadjusted consumption data.

According to Wickens the occurrence of an error-correction model (ECM) is the result of the budget constraint and the fact that nonproperty income is an I(1) process. However for the life cycle model, we have shown that labour income and consumption are not
cointegrated. This can be explained by the fact that the dynamics of consumption are basically determined by the preference structure. The stochastic processes of consumption and labour income are related through the innovations and the structural breaks in both series. The type of cointegration depends on the order of integration of labour income. If labour income is stationary, consumption and property income are cointegrated. Hence, consumption and disposable income are cointegrated.

The model with moving planning horizon on the other hand implies that consumption and labour income are integrated. The explanation is of course that, because of the moving planning horizon, the process for consumption is closely linked to that of income.

Both the estimates for the length of the planning period reported by Dolado and Maravall and by us are low. For the estimates, we report, it proves possible to compute standard errors. In our opinion, the values for the length of the planning horizon prohibit an interpretation of the model with moving planning horizon as a life cycle model. The model has an intermediate form between the Keynesian and the life cycle consumption model. As stated in the paper, alternative interpretations of the resulting consumption function are of course available. For instance, the error correction term can be viewed as a proxy for the liquidity constraint multiplier put forward by Muellbauer and Bover (1986). Bover mentions the possibility of time aggregation, durability and transitory consumption. With respect to durability, the model with rational habit formation analyzed in Winder (1988) can be used to
model consumption of durable goods. The model is in fact a generalization of Mankin (1982) and accommodates a rich variety of depreciation schemes and relationships between the service flows and the stock of durable goods.

With respect to the inclusion of transitory consumption, we like to point to the complication that the resulting consumption function contains a noninvertible MA(1)-process (see also equation (3) of Wickens' comment). We agree that a decent treatment of the interest rate is desirable and is expected to lead to an improvement of the model. We wholeheartedly subscribe Wickens' conclusion that there is still a lot of work to be done on this topic.

ADDITIONAL REFERENCES


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