



<b>Title</b>	Omitted variables, dynamic specification and tests for homogeneity
<b>Authors(s)</b>	Madden, David (David Patrick)
<b>Publication date</b>	1994-08
<b>Publication information</b>	Madden, David (David Patrick). "Omitted Variables, Dynamic Specification and Tests for Homogeneity" (August, 1994).
<b>Series</b>	UCD Centre for Economic Research Working Paper Series, WP94/12
<b>Publisher</b>	University College Dublin. School of Economics
<b>Item record/more information</b>	<a href="http://hdl.handle.net/10197/1756">http://hdl.handle.net/10197/1756</a>
<b>Publisher's statement</b>	Provisional draft. Not for quotation without permission of author
<b>Notes</b>	A hard copy is available in UCD Library at GEN 330.08 IR/UNI

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CENTRE FOR ECONOMIC RESEARCH

Omitted Variables, Dynamic  
Specification and Tests for Homogeneity

by

David Madden  
University College Dublin

WP94/12

August 1994

DEPARTMENT OF ECONOMICS  
UNIVERSITY COLLEGE DUBLIN  
DUBLIN 4

# Omitted Variables, Dynamic Specification and Tests for Homogeneity

David Madden\*  
University College Dublin  
August 1994

Abstract: This note examines the sensitivity of tests for homogeneity in demand systems to such factors as omitted variables and dynamic and stochastic specification. It estimates demand systems for Ireland using time-series data for different unconditional demand systems with differing dynamic and stochastic specification and also estimates a conditional demand system, thus attempting to reconcile disparate results from previous work in this area.

Keywords: Homogeneity, Dynamic Specification, Conditional Demands.

JEL Classification: C22, C32, D12.

\* Provisional draft. Not for quotation without permission of author. Correspondence to: David Madden, Economics Department, University College Dublin, Belfield, Dublin 4, Ireland.

# Omitted Variables, Dynamic Specification, and Tests for Homogeneity<sup>1</sup>

## 1. Introduction

Homogeneity of degree zero in prices is one of the weakest restrictions placed on estimated consumer demand systems. Yet this restriction is frequently rejected in applied studies.<sup>2</sup> Such rejections appear to be sensitive to a number of factors.<sup>3</sup> Two of the most important of these factors are the issue of omitted variables in a static model and the stochastic/dynamic specification adopted.

These issues have been previously examined by various authors. Deaton and Muellbauer (1980) introduced the Almost Ideal Demand System (AIDS), estimating an eight good model using annual UK data from 1954-74. They noted how homogeneity was less firmly rejected when their model was estimated in first-differences. Using the same data set, Deaton (1981) examined the role of housing, estimating an AIDS model conditioned on the quantity of housing which he assumed to be fixed, rather than freely chosen. He found that the F-statistics for homogeneity on a good-by good basis were lower following the inclusion of housing, as was the system-wide test statistic. Blanciforti and Green (1983) incorporated habit effects in an AIDS model after the manner of Pollak and Wales (1969) and estimated

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<sup>1</sup> I wish to thank Peter Neary, Rodney Thom and Richard Blundell for helpful comments and John Fitzgerald and Fergal O'Brolchain for assistance with the data. I remain responsible for any errors.

<sup>2</sup> See, for example, the references in the survey papers by Deaton (1983) and Blundell (1988).

<sup>3</sup>For a detailed discussion of possible reasons for failure of homogeneity see Muellbauer and Pashardes (1992).

this model on an eleven good classification using annual US data for 1948-78. Their results suggested that habit-formation was the reason for the autocorrelation found in Deaton and Muellbauer's results. However, the inclusion of the habit formation term appeared to make little difference to tests for homogeneity.

More general dynamic models were estimated by Anderson and Blundell (1983, 1984). They introduced dynamic factors via the error correction mechanism of Hendry and Von Ungern Sternberg (1981). Their more general dynamic specification is derivable from agents minimising a quadratic loss function (see Nickell, 1985). Their long-run solution is the AIDS specification but they allow for non-homogeneous behaviour in the short-run. They estimate a five good model over annual Canadian data (1947-79) and a four good model over quarterly UK data (1955 1 to 1981 2). In both cases, they find that long-run homogeneity can not be rejected.

Another general approach to dynamic modelling was adopted by Muellbauer and Pashardes (1992) who estimated an AIDS model incorporating both habit-formation and durability effects using the same breakdown of goods as Deaton and Muellbauer (1980) but with a longer run of data. They found that homogeneity is strongly rejected for the static version of the AIDS model but accepted for the dynamic version.

A different approach was adopted by Leybourne (1993) who estimated a time-varying AIDS model using UK quarterly data (1958 1 to 1988 3) over five categories of expenditure. He found that tests for homogeneity were sensitive to the use of a time-varying or constant coefficient model. However, in both cases the homogeneity restriction was rejected for one good, although the relevant good was sensitive to the model chosen.

Finally we note the contribution of Stoker (1986). He estimated a four good Linear Expenditure System (LES) on annual US data, including income distribution variables. He

found the income distribution variables to be significant but also found that a simple dynamic model with first-order autocorrelation fitted the data equally well. He concluded that it was not possible to statistically discriminate between omitted variables in a static model and simple dynamic models and, as we have seen, both factors have been suggested as possible reasons for failure of homogeneity.

The evidence presented above confirms the sensitivity of tests for homogeneity to dynamic specification and/or omitted variables. Comparison between the results however is complicated by the fact that they are estimated for different countries, over different time periods and using different classifications of goods. We propose to estimate a variety of models, over the same data set, but incorporating different assumptions about dynamic structure and the inclusion, as conditioning variables, of previously omitted goods. Thus we attempt to draw together the previously disparate results in this area. We also briefly discuss the issue of the appropriate dynamic specification *per se*.

## **2. Estimation.**

We will estimate the following seven models, and, in each case, test for homogeneity: AIDS in levels (Model 1), AIDS in first differences (Model 2), AIDS in levels with a quadratic time trend added (Model 3), AIDS in levels conditioned on total employment (Model 4), AIDS in levels with habit formation terms (Model 5) and two versions of a more general dynamic AIDS along the lines of Anderson and Blundell (Models 6a and 6b). In all cases the models are estimated over annual Irish data, from 1958 to 1988. We have six categories of goods: food, alcohol and tobacco, clothing and footwear, fuel and power (including petrol), durables (including transport and equipment), and finally other goods and

services. To avoid the singularity in the system, the other goods and services equation was omitted. The estimating equations for the models are as follows:

$$w_{it} = \alpha_i + \sum_j \gamma_{ij} \log p_{jt} + \beta_i \log \left( \frac{m}{P} \right)_t \quad (1)$$

$$\Delta w_{it} = \alpha_i + \sum_j \gamma_{ij} \Delta \log p_{jt} + \beta_i \Delta \log \left( \frac{m}{P} \right)_t \quad (2)$$

$$w_{it} = \alpha_i + \sum_j \gamma_{ij} \log p_{jt} + \beta_i \log \left( \frac{m}{P} \right)_t + \delta_i t + \zeta_i t^2 \quad (3)$$

$$w_{it} = \alpha_i + \sum_j \gamma_{ij} \log p_{jt} + \beta_i \log \left( \frac{m}{P} \right)_t + \eta_i N_t \quad (4)$$

$$w_{it} = \alpha_i + \sum_j \gamma_{ij} \log p_{jt} + \beta_i \log \left( \frac{m}{P} \right)_t + \sum_j \theta_{ij} w_{j,t-1} \quad (5)$$

$$\Delta w_{i,t} = \alpha_i + \sum_j \phi_{ij} \Delta \log p_{jt} + \mu_i \Delta \log \left( \frac{m}{P} \right)_t - \Pi [w_{t-1}^* - \Gamma \log p_{t-1}^* - \beta \log \left( \frac{m}{P} \right)_t] \quad (6)$$

where  $w_{it}$  is the expenditure share of good  $i$  in period  $t$ ,  $p_{jt}$  is the price of good  $j$  in period  $t$ ,  $m$  is total money expenditure,  $P$  is a price index defined by  $\log P = \sum_k w_k \log p_k$ <sup>4</sup>,  $N_t$  is total employment in period  $t$  and  $\Delta$  is the first difference operator. To enable identification of the parameters of the lagged budget shares in (5) we impose  $\sum_j \theta_{ij} = 0$ . In (6),  $w_{t-1}$  and  $\log p_{t-1}$  are vectors and the asterisk indicates that the  $n$ th row is omitted. The  $\phi_{ij}$  and the  $\lambda_i$  are short-run coefficients, while  $\Pi$  is an appropriately dimensioned short-run coefficient matrix. Initial attempts to estimate (6) proved unsuccessful as the system was too parameter-intensive and

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<sup>4</sup> This definition of  $P$  is an approximation and Pashardes (1993) has suggested that its use may lead to bias, similar to that introduced by omitted variables. He also suggest, however, that this problem is more serious for estimates from micro-based data, rather than the aggregate data used here.

did not converge. We thus estimated two simpler versions: one where the matrix  $\Pi$  is diagonal and all the  $\pi_{ii}$  are the same (eqn. 6a) and the other where  $\Pi$  is diagonal but the  $\pi_{ii}$  can differ. The matrix  $\Gamma$  and the vector  $\beta$  are the corresponding long-run coefficients.

In terms of the relationships between the models, (1) is nested in (3), (4), (5) and (6), while (2) is also nested in (6). (6a) is nested in (6b).

The above equations also provide for ease of imposition and hence testing of the fundamental properties of demand theory. For eqns. (1) to (5) homogeneity implies  $\sum_i \gamma_{ij} = 0$ , while for (6) long-run homogeneity implies that the sum of the elements in the rows of  $\Gamma$  are zero.

### **3. Results**

In table 1 we provide good-by-good and system wide tests for homogeneity for our six models. The system-wide statistics we present are the Wald chi-square statistics. As Laitinen (1978) has pointed out, for small samples this statistic is biased towards rejection. Thus we also present critical values for Hotelling's  $T^2$  statistic, which Laitinen claims is more appropriate for a sample of our size.

The results reported in Table 1 are curious in some ways. Taking the system-wide tests first and addressing the central issue in this paper, we do observe markedly different results from homogeneity tests for the different models. However, the pattern of results is not entirely in accordance with intuition. Dynamic specification does influence the results, but it is unexpected that one of the most general dynamic specifications, eqn. 6b, within which eqns. 1, 2, and 6a are nested, shows the most decisive rejection of homogeneity. The AIDS model estimated in first differences, an ad hoc specification which gives no information concerning the long run, shows the least rejection of homogeneity, and when



small sample adjustments are made, this model only barely rejects homogeneity. The addition of omitted variables, eqn. 4, does show a slight improvement over the static model, eqn 1. The habit-formation model, eqn. 5, also shows only a bare rejection of homogeneity.

Turning now to the results for equation by equation testing for homogeneity, we see that for two goods, alcohol and tobacco and clothing and footwear, homogeneity is not rejected for specifications 1 to 5. Durables and other goods and services show the most consistent rejection of homogeneity. We also note that for (5), homogeneity cannot be rejected on a good-by-good basis. The same would be true for (2) at the 99% significance level.

#### 4. Dynamic Specification in General

In this paper we have been investigating the sensitivity of homogeneity tests to dynamic specification, without discussing what the appropriate dynamic specification actually is. We do not propose to go into exhaustive detail concerning the appropriate dynamic specification but we do make the following observations.

Following the discussion in Hendry and Mizon (1978) we can regard the dynamic error correction model (6b) as the most general specification. (1) and (2) are nested within (6b) but only if what is called the *common factor test* is not rejected. Furthermore, model (1) is only valid if the common factor is 0, while (2) is valid if the common factor is 1.

To illustrate this we rewrite (1) as

$$w_{it} = \alpha_i + \sum_j \gamma_{ij} \log p_{jt} + \beta_i \log \left( \frac{m}{P} \right)_t + u_{it}$$

where the error term  $u_{it} = \rho_i u_{i,t-1} + \epsilon_{it}$  and  $\epsilon_{it} \sim N(0, \sigma^2)$ .

If we lag (1) by one period, multiply it by  $\rho_i$  and subtract it from (1) we obtain

$$w_{it}^* = \alpha_i^* + \sum_j \gamma_{ij} \log p_{jt}^* + \beta_i \log \left( \frac{m}{p} \right)_t^* + \epsilon_{it} \quad (7)$$

where  $w_{it}^* = w_{it} - \rho_i w_{i,t-1}$  etc. This can be rewritten as

$$w_{it} - \alpha_i^* + \rho_i w_{i,t-1} + \sum_j \gamma_{ij} (\log p_{jt} - \rho_i \log p_{j,t-1}) + \beta_i (\log \left( \frac{m}{p} \right)_t - \rho_i \log \left( \frac{m}{p} \right)_{t-1}) + \epsilon_{it} \quad (8)$$

We can compare this equation with

$$w_{it} = \lambda_0 + \lambda_1 w_{i,t-1} + \lambda_2 \log p_{1,t} + \lambda_3 \log p_{1,t-1} + \lambda_4 \log p_{2,t} \\ + \lambda_5 \log p_{2,t-1} \dots + \lambda_{14} \log \left( \frac{m}{p} \right)_t + \lambda_{15} \log \left( \frac{m}{p} \right)_{t-1} + \epsilon_{it} \quad (9)$$

(8) and (9) are equivalent if  $\lambda_1 \lambda_2 = -\lambda_3$ ,  $\lambda_1 \lambda_4 = -\lambda_5$  etc. The testing of this restriction is the common factor test. If this test is not rejected then we cannot reject the hypothesis that all the  $\rho_i$  in (8) are equal. Then we can test (1) by testing  $\rho_i = 0$  and (2) by testing  $\rho_i = 1$ . The common factor test was decisively rejected for all  $w_i$ , thus suggesting that neither (1) nor (2) are appropriate specifications. This casts some doubt over the validity of the homogeneity tests for these specifications.

Some further light on the different specifications can be obtained from tables 2 to 6 which presents diagnostic statistics for the different specifications.<sup>5</sup> These tables suggest that the specifications for durables are not adequate in (1), (4) and (5), while food shows some higher order autocorrelation in (1) and (4) and also may be mis-specified in (3) and (5).

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<sup>5</sup> The non-linear procedure used to estimate 6a and 6b did not provide diagnostic statistics.

Recall that durables was the good for which homogeneity showed the most decisive rejection. The results in tables 2 to 5 suggest that mis-specification may lie at the root of this.

#### **4. Conclusion**

In this paper we have investigated two of the possible explanations as to why zero degree homogeneity in prices and incomes in demand functions is not observed in aggregate time-series data. Various other explanations have been put forward: aggregation over consumers, aggregation across goods, rational money illusion, lack of intertemporal separability (which has been partially examined here via the habit-formation model), simultaneous equations bias and exogenous shifts in taste.<sup>6</sup> However, it seems intuitively plausible that dynamic mis-specification and perhaps to a lesser extent omitted conditioning variables account for a good deal of the explanation.

As mentioned above empirical evidence tends to support this conjecture. However, the results for this paper show less *systematic* link than other results in this area. In particular, the most general dynamic specification shows the strongest rejection of homogeneity. The addition of a previously omitted variable does bring down the value of the test statistic as compared to a static model as does the introduction of habit-formation effects via the addition of lagged dependent variables. The model estimated in first differences shows least rejection of homogeneity on a system wide basis, but more general tests for dynamic specification cast doubt over the robustness of this result.

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<sup>6</sup> See Muellbauer and Pashardes (1992) for a more detailed discussion of these factors.

**Table 1: Tests for Homogeneity**

<u>Good</u>	(1)	(2)	(3)	(4)	(5)	(6a)	(6b)
Food	1.28	6.35*	4.90*	2.14	0.25	38.33*	7.87*
A & T	0.19	0.18	1.92	0.19	1.97	17.19*	11.73*
C & F	0.83	0.11	0.00	0.63	0.59	2.42	16.77*
F & P	0.18	3.02	7.16*	0.54	0.80	2.22	2.33*
Dur	4.18	5.81*	6.98*	3.74	0.75	20.26*	35.35*
Oth G	14.37*	0.12	6.97*	19.07*	2.51	1.78	4.91*
SYS	65.60	19.23	102.42	55.59	20.76	63.78	105.89
LLF	613.2	606.8	663.7	621.3	625.4	719.3	735.73

Note: Figure for individual goods give F statistics. Critical value at 95% significance level 4.35 (for eqns. 6a and 6b critical value 4.18). \* indicates significant at 95% level i.e. *rejection* of homogeneity.

SYS: Wald Chi-square statistic for system wide test of homogeneity, critical value at 95% = 11.07. When Hotelling T<sup>2</sup> applied, critical value at 95% = 16.58.

LLF: Value of log-likelihood function.

**Table 2: Diagnostic tests for Eqn. 1**

	Food	A & T	C & F	F & P	Durables
R <sup>2</sup>	0.976	0.821	0.921	0.847	0.762
DW	1.360	1.633	1.931	1.282	1.107
AC	17.559*	14.411	6.012	8.562	11.616
BPG	9.236	10.458	7.884	9.297	6.410
JB	1.712	1.098	1.104	1.826	12.583*
R2	1.692	0.555	0.287	0.810	2.417
R3	2.607	0.449	1.052	3.423	4.986*
R4	2.161	0.300	1.780	3.098	3.159*

DW: Durbin-Watson Statistic, at 95 %  $D_L=0.998$ ,  $D_U=1.931$ .

AC: LM test for higher order autocorrelation, distributed as Chi-Square with 9 df. 95 % critical value, 16.92.

BPG: Breusch-Pagan-Godfrey test for heteroscedasticity, distributed as Chi-Square with 7 df. 95 % critical value, 14.07.

JB: Jarque-Bera test for normality, distributed as Chi-Square with 2 df. 95 % critical value, 5.99.

R2: Ramsey Reset Specification test, distributed as F with 1 and 21 df. 95 % critical value, 4.32.

R3: Ramsey Reset Specification test, distributed as F with 2 and 20 df. 95 % critical value, 3.49.

R4: Ramsey Reset Specification test, distributed as F with 3 and 19 df. 95 % critical value, 3.13.

\* indicates significant at 95 %

**Table 3: Diagnostic tests for Eqn. 2**

	Food	A & T	C & F	F & P	Durables
R <sup>2</sup>	0.542	0.696	0.473	0.722	0.504
DW	1.810	2.318	2.584	1.074	1.713
AC	4.108	9.849	10.363	15.124	10.441
BPG	10.759	3.908	5.638	5.090	5.040
JB	0.873	7.849*	0.117	0.385	1.119
R2	0	1.042	1.031	0.478	1.248
R3	0.334	1.798	0.887	1.213	1.524
R4	1.959	1.219	2.919	1.179	1.422

DW: Durbin-Watson Statistic, at 95 %  $D_L=0.975$ ,  $D_U=1.944$ .

AC: LM test for higher order autocorrelation, distributed as Chi-Square with 8 df. 95 % critical value, 15.51.

BPG: Breusch-Pagan-Godfrey test for heteroscedasticity, distributed as Chi-Square with 7 df. 95 % critical value, 14.07.

JB: Jarque-Bera test for normality, distributed as Chi-Square with 2 df. 95 % critical value, 5.99.

R2: Ramsey Reset Specification test, distributed as F with 1 and 20 df. 95 % critical value, 4.35.

R3: Ramsey Reset Specification test, distributed as F with 2 and 19 df. 95 % critical value, 3.52.

R4: Ramsey Reset Specification test, distributed as F with 3 and 18 df. 95 % critical value, 3.16.

\* indicates significant at 95 %.

**Table 4: Diagnostic tests for Eqn. 3**

	Food	A & T	C & F	F & P	Durables
R <sup>2</sup>	0.981	0.935	0.943	0.977	0.837
DW	1.383	2.334	2.202	1.517	1.487
AC	13.916	10.421	4.481	15.342	12.160
BPG	9.009	7.877	13.200	9.384	10.760
JB	0.616	0.207	2.062	0.350	0.588
R2	6.189*	0.081	0.035	8.615*	3.336
R3	3.600*	1.527	0.539	7.374*	1.700
R4	2.486	1.119	1.359	5.021*	3.188

DW: Durbin-Watson Statistic, at 95%  $D_L=0.782$ ,  $D_U=2.251$ .

AC: LM test for higher order autocorrelation, distributed as Chi-Square with 9 df. 95% critical value, 16.92.

BPG: Breusch-Pagan-Godfrey test for heteroscedasticity, distributed as Chi-Square with 9 df. 95% critical value, 16.92.

JB: Jarque-Bera test for normality, distributed as Chi-Square with 2 df. 95% critical value, 5.99.

R2: Ramsey Reset Specification test, distributed as F with 1 and 19 df. 95% critical value, 4.38.

R3: Ramsey Reset Specification test, distributed as F with 2 and 18 df. 95% critical value, 3.56.

R4: Ramsey Reset Specification test, distributed as F with 3 and 17 df. 95% critical value, 3.20.

\* indicates significant at 95%.

**Table 5: Diagnostic tests for Eqn. 4**

	Food	A & T	C & F	F & P	Durables
R <sup>2</sup>	0.979	0.813	0.923	0.872	0.756
DW	1.126	1.654	1.909	1.044	1.170
AC	28.220*	14.071	7.041	20.547*	13.419
BPG	7.323	10.288	10.251	11.798	14.738
JB	2.065	1.107	0.843	1.023	5.092*
R2	1.553	0.566	0	0.537	3.612
R3	3.354	0.434	0.441	1.596	4.636*
R4	2.413	0.289	0.773	1.156	3.103

DW: Durbin-Watson Statistic, at 95%  $D_L=0.854$ ,  $D_U=2.141$ .

AC: LM test for higher order autocorrelation, distributed as Chi-Square with 9 df. 95% critical value, 16.92.

BPG: Breusch-Pagan-Godfrey test for heteroscedasticity, distributed as Chi-Square with 8 df. 95% critical value, 15.51.

JB: Jarque-Bera test for normality, distributed as Chi-Square with 2 df. 95% critical value, 5.99.

R2: Ramsey Reset Specification test, distributed as F with 1 and 20 df. 95% critical value, 4.35.

R3: Ramsey Reset Specification test, distributed as F with 2 and 19 df. 95% critical value, 3.52.

R4: Ramsey Reset Specification test, distributed as F with 3 and 18 df. 95% critical value, 3.16.

\* indicates significant at 95%.



**Table 6: Diagnostic tests for Eqn. 5**

	Food	A & T	C & F	F & P	Durables
R <sup>2</sup>	0.9707	0.865	0.9387	0.941	0.846
h	n.a.	n.a.	n.a.	0.643	n.a.
AC	9.130	8.127	6.849	10.898	10.599
BPG	15.832	9.337	11.839	7.114	17.862
JB	0.404	2.090	1.908	1.687	0.552
R2	0.319	2.222	2.665	5.374*	5.175*
R3	0.149	1.412	1.409	2.538	5.222*
R4	1.072	0.919	2.862	1.576	4.017*

h: Durbin's h Statistic, distribution standard normal.

AC: LM test for higher order autocorrelation, distributed as Chi-Square with 8 df. 95% critical value, 15.51.

BPG: Breusch-Pagan-Godfrey test for heteroscedasticity, distributed as Chi-Square with 12 df. 95% critical value, 21.03.

JB: Jarque-Bera test for normality, distributed as Chi-Square with 2 df. 95% critical value, 5.99.

R2: Ramsey Reset Specification test, distributed as F with 1 and 15 df. 95% critical value, 4.54.

R3: Ramsey Reset Specification test, distributed as F with 2 and 14 df. 95% critical value, 3.74.

R4: Ramsey Reset Specification test, distributed as F with 3 and 13 df. 95% critical value, 3.41.

\* indicates significant at 95%.

## REFERENCES

- Anderson, G., and R. Blundell (1983):** "Testing Restrictions in a Flexible Dynamic Demand System: An Application to Consumers' Expenditure in Canada," *Review of Economic Studies*, Vol. 50, pp. 397-410.
- , and ----- (1984): "Consumer Non-Durables in the UK: A Dynamic Demand System," *Economic Journal Conference Volume*, Vol. 94, pp. 35-44.
- Blundell, R. (1988):** "Consumer Behaviour: Theory and Evidence - A Survey," *Economic Journal*, Vol. 98, pp. 16-65.
- Deaton, A. (1981):** "Theoretical and Empirical Approaches to Consumer Demand Under Rationing," in *Essays in the Theory and Measurement of Consume Behaviour*, ed. A. Deaton. New York: Cambridge University Press.
- , (1983): "Demand Analysis," in *Handbook of Econometrics*, ed. Z. Griliches and M. Intriligator. JAI Press.
- , and **J. Muellbauer (1980):** "An Almost Ideal Demand System," *American Economic Review*, Vol. 70, pp. 312-326.
- Hendry, D.F., and T. Von Ungern Sternberg (1981):** "Liquidity and Inflation Effects on Consumer Expenditures," in *Essays in the Theory and Measurement of Consume Behaviour*, ed. A. Deaton. New York: Cambridge University Press.
- , and **G.E. Mizon (1978):** "Serial Correlation as a Convenient Simplification, not a Nuisance: a Comment on a Study of the Demand for Money by the Bank of England," *Economic Journal*, Vol. 88, pp. 549-563.
- Laitinen, K. (1978):** "Why is Demand Homogeneity So Often Rejected?," *Economics Letters*, Vol. 1, pp. 187-191.
- Leybourne, S.J. (1993):** "Empirical Performance of the AIDS Model: Constant-Coefficient versus Time-Varying Coefficient Approaches," *Applied Economics*, Vol. 25, pp. 453-463.
- Muellbauer, J., and P. Pashardes (1992):** "Tests of Dynamic Specification and Homogeneity in a Demand System", in *Aggregation, Consumption and Trade: Essays in Honour of H.S. Houthakker*, eds. L. Philips and L.D. Taylor. Kluwer Academic Publishers: Dordrecht and London.
- Nickell, S. (1985):** "Error Correction, Partial Adjustment and all that: An Expository Note," *Oxford Bulletin of Economics and Statistics*, Vol. 47, No. 2, pp. 119-129.
- Pashardes, P. (1993):** "Bias in Estimating the Almost Ideal Demand System with the Stone Approximation," *Economic Journal*, Vol. 103, pp. 908-915.

**Pollak, R.A., and T.J. Wales (1969):** "Estimation of the Linear Expenditure System," *Econometrica*, Vol. 37, pp. 629-750.

**Stoker, T.M. (1986):** "Simple Tests of Distributional Effects on Macroeconomic Equations," *Journal of Political Economy*, Vol. 94, pp. 763-795.