Savings Propensities from Wage and Non-Wage Income *

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In econometrics, the consumption function has been subject to continual debate and respecification. This paper reinvestigates some aspects of the relation between incomes and consumption behaviour in the UK 1963-76, and, in particular, focuses on the study by Klein, Ball et al (1961) which attempts to take account of the role of income distribution. The questions of parameter stability and misspecification are considered in detail, and the conclusion is reached that a correct specification of the models presented below has yet to be found.

Economic Theory

Classical saving theories assume that the propensity to save out of profits is significantly higher than the propensity to save out of wages. Firstly, workers receive a wage rate which is barely sufficient to maintain their consumption at the subsistence level. Therefore, workers are not able to save any significant proportion of their income. Secondly, capitalists have a high saving propensity because of the requirements of competition or because of their desire for social power and prestige.

To the neo-Keynesians, too, the most important "fact" about saving is that most of it comes from profits. Their belief is that:

$$S = swW + spP \quad ; \quad 0 \leq sw < sp \leq 1$$

where P = profits, W = wages, sp,sw are the respective propensities and S is total saving. The classical hypothesis sets sw = 0. Kaldor has three supporting arguments for belief that sp > sw. Firstly, that a high proportion of profits is retained at source. This is true but it is dubious whether the neoKeynesian hypothesis may be inferred from it ((15)pp 215)). The other two arguments relate to personal saving behaviour : profit is thought of as a risky income. If dividend receipts are subject to greater fluctuation than labour income, it may be argued that the former will be saved in a higher proportion than the latter (this would be predicted by the permanent income hypothesis). Alternatively, it may be argued that if one income stream has the same value on average but a larger variance than a second stream, a risk-averse receiver of the first will wish to hold a larger cushion of wealth than the receiver of the second. One problem here, which we shall meet below, is that if profits are defined as comprising all forms of property income, they include interest and rent as well as the 'riskier' profits. The difference between sp and sw may be diluted by the former (15)p.217)). The third reason, of skewness of distribution of income, is attributed to Kaldor by Hacche, but not by Bliss.

The distribution of personal income from property is heavily skewed in favour of households with relatively high incomes and wealth. The cross-sectional evidence is then that the savings propensity rises with size of income (see below).

Kaldor's view is, however, that the neo-Keynesian saving hypothesis rests more safely on differences between the two forms of income per se, than on any supposed differences between the sets or classes of people who ultimately receive them. Pasinetti, on the other hand, adopts a saving function which differentiates not between income types but between classes of income receiver. He describes aggregate saving by $S = s\ell(W+P\ell) + scPc$ where PL, Pc are workers and capitalists received profits. Pasinetti argued that Kaldor had neglected profits accruing to labourers but, in fact, Kaldor assumed that workers profits (owing to retention and risk) are saved in the same proportion as capitalists' profits, not in the same proportion as wages!

In this study, the concern is with personal saving and no further attention will be paid to corporate savings - thus we shall ignore any interaction between the two propensities, such as those outlined in Dixit (1976 p.66) and Bacche (1979 p.215). From the above discussion, it would seem that the search for different saving propensities should be conducted with regard to (1) the nature of different income streams and (2) the size of distribution of personal incomes. It is important to note the qualifications which must be made to the following analysis, where it is effectively assumed that propensities are constant". Consider Bliss (1975 p.126):

> "The habit of assuming 'propensities to save' here meaning given fractions of income and profit, has badly infected the theory of economic growth, so that the assumptions that ratios of saving to other qualities are given constants is quite usual. Of course, there must be a propensity, ex post, in that a certain proportion of income or profit will be saved in the solution to the model. But to assume such a ratio constant in advance is taken as given something that ought to be the subject of economic analysis".

This is an important qualification, particularly because we shall examine parameter stability as a guide to misspecification.

Mention may also be made here of Marglin's (1971) adaptation of the classical saving hypothesis. Marglin argues that the significant dichotomy with saving rates is between organisations and individuals and not between capitalists and workers. His view is that "households do not save, by and large and on the average, except inadvertently - when their incomes are rising faster than they can adjust their spending" (p.80) This, he says, applies both to worker and capitalist incomes - any statistical difference in saving propensity is due either to different rates of growth of the different incomes or because successful workers become capitalists and failed capitalists become workers - the differences in saving rates are thus accountable in terms of income changes. Thus, Marglin's view of the study below would presumably be that it considers a relation subsidiary to the "true" division. However, the study also contradicts his hypothesis that $sw = 0$. Let us now consider how Klein et al (7, 8) have approached the specification of the "consumption function" with different income types. We shall then outline the approach to parameter stability before detailing the results of estimation.

Klein and Goldberger start from the observation that, when high income groups are included in cross-section studies of the consumption-income relation, striking nonlinearities emerge. Thus they argue that "characteristics of the size distribution of income would be desirable variables in an aggregative consumption function" (18p.4). Owing to the lack of continuous time-series data on the size distribution of income, they proceed to use the functional distribution of personal income as a proxy for its distribution. Klein, Ball et al have applied this approach specifically to the UK. They include two income variables to represent the two main factor shares : wages and profits. From the discussion above it is clear that we would expect a higher propensity to consume out of wages either because it is an income stream of lower variability than profits or because profits accrue to the richer elements of society and "taking a long view is easier with a full stomach". {(1) p.138}. Thus, consumption depends on two types of income, W wage income and D property income.

$$(1) \qquad Ct = \gamma_0 + \sum_{i=0}^{\infty} \lambda^i (\gamma_1 w_{t-i} + \gamma_2 D_{t-i})$$

i.e. a geometric lag, where distant values of income have a geometrically declining effect on present consumption. Multiplying by λ and subtracting the result from (1) yield the Koyck lag

$$(2) \qquad C_t = (\gamma_0 - \lambda\gamma_0) + \gamma_1 W_t + \gamma_2 D_t + \lambda C_{t-1}$$

Thus, the formulation is a Brown-type dynamic specification which entails continuous partial adjustment of consumption habits. Wallis' criticism that this is wholly ad hoc with no real description of economic behaviour (1979) p.10) must be well taken.

The Empirics

Klein, Ball et al estimated version of (2) is

$$(3) \qquad C_t = \gamma_0 + \gamma_1 \left(\frac{wE}{p} \frac{1}{Tw}\right)_t + \gamma_2 \left(\frac{D}{p} \frac{1}{T\partial}\right)_t + \gamma_3 C_{t-i} + U_{3t}$$

Where C is consumption in constant prices; w is an index of average weekly earnings; E is the total number of employees; p is a price index of final output; Tw is the tax rate as wage and salary income; $T\partial$ is the tax rate on non-wage personal income.

The treatment of taxes in (3) is very unusual and would not seem the best way to estimate disposable income. In this study $\left(\frac{1}{Tw}\right)$ and $\left(\frac{1}{T\partial}\right)$ have been replaced by $(1-T\partial)$ and $(1-Tw)$. (Regressions were run using Klein's exact specification for purposes of comparison and incomes emerged with a negative, insignificant effect on consumption). Liquid assets were omitted by Klein, Ball et al because they were found to be insignificant when included; they have not been included in this study although it might well be that they should have been, especially in view of Townend's recent findings.[2/] Another omission, which again has not been remedied is salaries. The assumption is that they move in direct proportion to wages, although a Kaleckian analysis would lead one to believe that the latter were far more variable than salaries which in some respects may be treated as overhead costs.[3/]

Klein, Ball et al report the following for 1947-56 as annual data, estimated by Theil's "two rounds" method as part of a simultaneous equation system:

$$(4) \qquad C_t = 16.86 + 0.17 \left(\frac{wE}{p} \frac{1}{Tw}\right)_t + 0.054 \left(\frac{D}{p} \frac{1}{1\partial}\right)_t + 0.61\ C_{t-1}$$

This yields a long run marginal propensity to consume out of wages of (0.17/0.39) = 0.44 and out of property income of (.05/.39) = .13 (7 p.27). These may also be interpreted as base year elasticities. The propensities seem to be extremely low and this may, in part, be due to their incorrect treatment of taxes. It is interesting to note that the propensity to consume out of wages is three times as large as it is out of property income. Also, another defect of the analysis to follow is the problem of simultaneous equation bias - and this is likely to lead to the above being <u>overlarge</u> estimates of the propensities, as OLSQ is an inconsistent estimator and instrumental variable estimation has not been systematically pursued, in deference to examination of parameter stability.

A slightly different approach has been pursued by Burmeister and Taubman for the USA. Their analysis is more explicitly based on Kaldor's approach to propensities to save out of different income types (2). Thus, they pursue the safe-risky dichotomy and find that the dichotomy which gives the most significant difference in saving propensities is that between labour income, rent and interest on the one hand, and dividends and self-employment income on the other. This should be borne in mind in considering the coefficients reported below because rent and interest are included as property income.

Surrey (1971) also incorporates a split between wages and salaries and current grants (another omission from this study) on the one hand and other personal income on the other. It is interesting to note that he finds evidence of instability in his specification as the coefficients differ enormously when it is run over different time periods.

Thus, there are a number of purposes to the study in hand: to investigate the size of the propensities predicted by this simple model; to relate the distribution of income to the rise in the saving propensity from 6%-7% up to about 1972 to 12%-15% since. The hypothesis could be advanced that this was due to a shift in income distribution, but it seems unlikely, a priori, to have been of such a significant size for this to be plausible; to investigate whether this function shows any greater stability than the many other consumption functions which failed to account for consumption behaviour after 1973 - this is where our discussion of parameter stability is of concern and to which we now turn.

Parameter Stability and Misspecification

While tastes and institutions vary over time, there seems to be a good case for arguing that the basic motives underlying economic behaviour are invariant ((12),15)). For example, one might argue that all generations have obtained utility from consuming food, while the types of food desired, and available, may have changed over time. Hence, Salmon argues, we may distinguish two types of structural change: (a) when the behavioural basis for economic decisions is supposed to have changed; (b) when the institutional structure alters ((15) p.7). It is argued that (a) will only occur in the very long run, since (a) is taken to refer to agents' fundamental decision rules. One might question the length of this "long run" and whether some institutional changes might not be detectable by the methods to be used below. For instance, while the sudden, preannounced introduction of VAT might have a fairly obvious effect on the purchase of consumer durables, the increasing role of advertising in conditioning consumer demands over the past 100 years or so may not be so readily observable.

The second element in Salmon's argument concerns the nature of econometrics as a non-experimentalist "science". The econometrician must take the data set as given and has no control over its a priori design. The econometrician is unable to remove any detected variation due to previously uncontrolled factors. Hence, a large number of models/theories can be constructed and imposed on the observed data "with apparently the implicit assumption that the data is sufficiently well designed to discriminate satisfactorily between competing theories". ((12)p.6). There is then the problem of distinguishing a bad model from poor evidence in the data. Thus, it is argued that we may discover parameter variation in our imposed model when we have no control over the experimental design.

Classical regression models, however, assume parameter constancy as an approximation to reality. It assumes that the model which is estimates is the "true" representation of the world. Since techniques are now available to relax this constraint, Salmon questions whether the assumption which is part of a statistical technique is appropriate in terms of the economic problem. Furthermore, many tasks of model adequacy in the constant parameter framework are based on the lumped effects present in the residuals, and concern only the detection of model adequacy : parameter variation can give us diagnostic information on misspecification - at the price of some precision concerning what qualifies as 'misspecification'.

The results presented below are based on estimation by ordinary least squares and by the Kalman filter. ('Smoothing' has not been vigorously pursued as this study can only be seen as the earliest stage of model selection - see below). Again, following Salmon (15), we may outline the basis of this estimation : Standard OLS parameter estimates can be computed recursively, giving an expression:

(5) $$B_{t+1} = B_t + k_t v_t$$

where B_s is the estimate based on the first observations, K_t is the gain, v_t is the one-step ahead forecast error (innovation). The gain is a simple function of parameter variance/covariance matrix and this inevitably decreases monotonically as further data points are processed. Under the assumption of parameter constancy, the OLS estimates will automatically stabilise, despite the arrival of new information in the form of v_t. Thus, OLS forces a best fit to be taken whether or not the model is 'true'. The OLS criteria are too robust in the face of misspecification. Salmon, therefore, argues that we need a criterion which acknowledges that our model may not be "true". When parameters are allowed to vary, (5) is still applicable - but under the Kalman filter, the gain matrix does not monotonically decrease, since the parameter evolution process is presumed to be determined by a non-zero variance/covariance matrix. Thus, the sequence of parameter estimates will not converge as each successive data point arrives and new information in the innovations does affect the estimates.

Thus, a filtered parameter estimate is the value that arises from applying (5) - by sequential processing of the data. However, filtering is relatively inefficient compared to smoothing, since the former uses only information from the data up to point t, in estimating $\hat{\beta}_{t+1/t}$. The innovations are the one-step ahead forecast errors based on the filtered estimates i.e. $v_t = y_t - X_t\hat{\beta}_{t/t-1}$. They play a fundamental role in the actual estimation, since they will form an independent white noise sequence with zero mean and constant variance when the model is correctly specified. Smoothed estimates, however, are based on the entire data set $1,\ldots t,\ldots,T$ when focussing on each point t in the sample. To obtain these one must specify a process for parameter evolution (based on little or no economic theory). However, this study focussed on filtered estimates as it has not reached a sufficient state of fine-tuning to warrant comprehensive smoothing. However, it must be stressed that the filtered estimates below are subject to this relative inefficiency and, in particular, it is found that variation towards the end of the sample is understated relative to that shown by smoothing techniques.

The Models Estimated

Two basic formulations were experimented with in various sub-variant specifications: Klein's model and that of Davidson et al (3).

a) Klein's model. As outlined above this model is one of partial adjustment/habit persistence, where the dynamics are represented by a Koyck lag. (We may repeat here that salaries and current grants are effectively omitted variables). The basic specification is (in real terms):

(6) $$CONSUM = constant + B_1\ Nonwg + B_2\ Emern + B_3\ Lcons + Seas.dummies$$

(variables as defined below). Where B_1, B_2 are the short run marginal propensities to consume and $(B_1/1-B_3)$, $(B_2/1-B_3)$ the long run propensities. The formulation of (6) is given by estimated equations (1), (2). The following variants have also been estimated: the constant is omitted (5) (6) (7); it is estimated in logs (7) (8) (9); allowance is made for the effects of inflation (3) (4) (5) (8) (9). The treatment of inflation is somewhat crude : the idea is that inflation may raise the savings propensity (a) because it is unanticipated, (b) because of the length of adjustment of consumption to changes income not occuring instantaneously, and hence income may be eroded before it has been able to spend it. Similarly, one may relate inflation to the erosion of "wealth" and hence saving may increase to restore the desired level. As with Deaton's model, however it is actual inflation which is entered as the explanatory variable, although if one believes it is the difference between expected and actual inflation which is the key variable, the use of actual inflation can only be justified by the assumption that anticipated inflation is constant throughout the sample ((14) p.36). Such an assumption is somewhat unrealistic especially in view of the arguments concerning gear-shifts in inflationary expectations. Two equations were also estimated for the subperiod 1963-73 (2) (4). It has not been possible to pursue any general-to-specific approach since the PSTAB programme allows only 10 regressors (including the dependent variable).

(8) DHSY model: The preferred formulations of DHSY ((3)(12)(15)) have been adapted to allow two types of income and to focus on overall consumption expenditure rather than nondurable expenditure which DHSY examine. DHSY take a long run relation from economic theory, $\bar{C}_t = kY_t$ and the short run model

$$(7) \qquad \Delta_1 C_t = k^* + B_1 \Delta_1 Y_t$$

is consistent with long run theory in the formulation

$$(8) \qquad \Delta_1 C_t = K^* + B_1 \Delta_1 Y_t + \gamma(Y_{t-1} - C_{t-1}) + v_t$$

where $\gamma(Y_{t-1} - C_{t-1})$ measures the disequilibrium effect. For estimation, our versions of DHSY are based on

$$(9) \qquad \Delta_4 C_t = f(\text{constants}, (C/N)_{t-4}, (C/w)_{t-4}, \Delta_1 N_t, \Delta_1 W_t, \Delta_1\Delta_4 N_t, \Delta_1\Delta_4 W_t, \Delta_1 P_t, \Delta_1\Delta_4 P_t)$$

where N_t = nonwg; W_t = emern; P ; prices. And as with Salmon ((12)p.30) the choices are from: (i) the inclusion of a constant or of the two ratio terms; (ii) the inclusion or not of the price terms; (iii) a level or log specification. (eqns.(10)-(17) below). DHSY argue that $\Delta_4 C_t$ "represents a sensible decision variable when different commodites are being purchased in different quarters of the year" (p.684), although perhaps the model is less suited to total consumption expenditure which is the dependent variable in this study. Similarly, the formulation may not be so suitable for nonwage income because of its greater variability and stronger seasonal (see Diagram 1) pattern than wage income. As regards the coefficients on the ratio terms: a significant coefficient is evidence of disequilibrium behaviour and to some extent parameter variation is acceptable. The model can be interpreted as saying that consumers plan to spend in each quarter of the year the same as they spent in that quarter of the previous year, modified by a proportion of their annual change in income $(\Delta_4 N_t, \Delta_4 W_t)$ and by whether that change is itself increasing or decreasing $(\Delta_1 \Delta_4 N_t, \Delta_1 \Delta_4 W_t)$; these short run decisions are then altered by the longrun feedback from the ratio terms.

THE DATA

The data are all quarterly, seasonally unadjusted for the period 1963-76. Sources: Monthly Digest of Statistics; DOE Gazette; Blue Book; Economic Trends.

Nonwg. This is an index of nonwage income, 1963OI = 100. It is defined as income from rent, self-employment, dividends and interest payments before providing for depreciation and stock appreciation, deflated by non-wage income taxed: Tə is equal to (taxes as dividends, interest and trading and rent increases divided by total income from these courses-

Consum - is an index of consumer expenditure, 1963OI = 100. (Lcons is its value lagged by one period) - deflated by the retail price index (everything is based on 1970 prices).

Emern - is an index of average weekly earnings, 1963OI = 100. It is derived by multiplying average weekly earnings by the number of manual employees and then deflating by the retail price index and multiplying by (1-tw). tw is equal to taxes on wages, salaries and forces salaries divided by total income from employment.

Diagram 1 plots these three variables : consumption shows a definite seasonal pattern with its peak occuring in the fourth quarter and is at its lowest in the first quarter. Wage income shows no definite seasonal pattern, although arguable it is at its peak in the fourth quarter. Nonwage income is clearly subject to greater variability than wage income, and it seems to peak in the second and third quarters. We can also see that nonwage income rockets up the graph in 1973-1975. While the scale is misleading there is some evidence of a shift in the relative distribution of income from wages to nonwage income in this period. In 1963 nonwage income is c. 21% of wage income, and 25% in 1976. However, in 1974I the ratio reached 31%. Presumably this is in some way related to the rapid increase in inflation in this period, the property boom and the OPEC price rise all of which would have been at work in this period. It would be interesting to investigate which components of nonwage income were responsible for this upward shift. From our previous discussion we would expect this relative shift to nonwage income to raise the overall level of savings, although the size of shift is relatively small and it cannot be expected to account for the whole of the experienced increase.

RESULTS

a) Classical Interpretation

The OLS estimates for the two models are presented in Table (1a) and (1b).

Firstly, as regards the coefficient estimates, it is perhaps equations (1) (5) and (6) which best confirm our a priori expectations i.e. significant coefficients of a not displeasing size, yeilding longrun marginal propensities to consume of .8 → .9 for wage income, and .22 → .25 for non-wage income (Table 7). In these equations there is little indication of first order autocorrelation and $\bar{R}^2$ is very high. Inflation emerges with a significant negative coefficient in (3) and (5). The constant does not emerge as significant in any of the Klein models. Neither does it seem altogether valid to assume adjustment is the same for nonwage as wage income - this is effectively assumed by the Koyck lag.

On classical grounds, the DHSY models do not look as good as Klein's : there is significant first order autocorrelation, the $\bar{R}^2$ is lower; D4W, D4N, DID4N always emerge as significant; the ratios are significant in (11). Interestingly, this gives some evidence of disequilibrium behaviour but of different types for the different incomes : when $(C/N)_{-4}$ rises then assumption out of nonwage income at time t also rises; when $(C/W)_{-4}$ rises, consumption at time t out of wages falls.

However, even on classical grounds we may cite a number of problems with the estimates:

(i) Simultaneous equation bias : the consumption function is ideally part of a simultaneous system. Under such conditions, the assumption of independence of regressors and disturbances is broken and the OLS estimate is inconsistent and the bias on coefficients is positive in thise case (14). As such, four equations have been reestimated by the instrumental variable technique (Table 6). Instrumental variables is an inefficient estimator (hence the statistics may be insignificant) but it provides us with consistent estimates. Very noticeable from these IV results is the effect on the dynamics coefficient : there is a drastic change in adjustment speed, suggesting not only simultaneous equation bias but dynamic mispecification bias.

(ii) There may be a problem with omitted variables (salaries and current grants and liquid assets). This too may lead to bias, presumably positive, and perhaps also to inconsistent coefficient estimates.

(iii) Seasonality is not given much of an explanation by the use of seasonal dummies - this does not really model economic behaviour. Only additive dummies have been used, and if dummies are an acceptable method, multiplicative dummies may also be appropriate.

(iv) DW is inappropriate in the presence of a lagged dependent variable.

(6) Parameter Variation (Table 2)

Firstly, we may consider multicollinearity. Gilbert's sample design efficiency statistic is presented (it equals 100 when design is orthogonal). It is clear that the DHSY model is less subject to multicollinearity than Klein's model - the former having SDE as high as 91% for (10) while Klein's model ranges from 14%-23%. Thus, the Klein model may be subject to some multicollinearity - the variances and covariances of the estimated regression coefficients are large and thus the estimates of the regression coefficients imprecise.

The T test for zero innovation mean seems to be very weak, being significant only for equation (2).

The Portmanteau statistics (Q_{12}, Model Q_{12}) for whiteness of innovations and residual autocorrelation suggest the Klein models to be better specified than DHSY. None of Klein's models have significant statistics, which is perhaps quite a startling result (the critical value is 21.03). It should be noted that this statistic may not be altogether appropriate with regard to the residuals, but it does give us some useful information. On the other hand, all of the DHSY models show evidence of significant autocorrelation up to twelfth order. The autocorrelation function results reveal: that Klein's model can suffer from 4th order autocorrelation which is not surprising; the DHSY formulations are free from 4th order problems, but they all suffer from 1st order autocorrelation and many from 2nd, 3rd and 11th order as well.

For the innovations, 1969:I and 1975:I-II, emerges as the periods of greatest forecast error (NEGATIVE) indicating overprediction. (Salmon has found the same). One wonders whether this in some way reflects the lack of any dummies for expenditure switching in early 1968 and 1973 due to institutional changes (14), since such dummies cannot be incorporated on PSTAB. Graphical representations of parameter variation are presented on Tables 3, 4, 5 for equations (3), (5) and (9). It is important to beware of the scale of these graphs!

The innovations charts clearly demonstrate the overprediction of the model for early 1974 and 1975. The coefficient on lagged consumption appears to be the most constant but we must be aware of the problems mentioned above of OLS estimation in the possible presence of dynamic misspecification - I.V. estimation drastically changes the size of this coefficient. We must also note the possible variation induced by simultaneous bias : essentially, PSTAB should be used in conjunction with the correct estimator which does not appear to be OLS for this study. It is therefore possible that simultaneous equation bias is throwing up time - varying S.E. bias in the regression coefficients. The detected variation might disappear were the correct estimation procedure to be used. We must also remember the inefficiency of filtered estimates and that the variation towards the end of the sample is very likely understated in these graphs.

As regards the inflation term one should note that the variation in its coefficient takes it into both positive and negative ranges. However, this effect is less in the equation which includes a constant (compare Tables 3 and 4). It is possible that this reflects the working of expected inflation through the constant term ((14)p.36). The coefficients on Emern and Nonwg seem to demonstrate considerable variation - e.g. for equation (5) the former varies from .2 to ·4, and the latter from .02 to .13. Most of this variation occurs in 1973-75: the coefficient on nonwg rockets down from the end of 1974; the coefficient on emern shoots up from the middle of 1973. The former may well be related to the behaviour of the data mentioned above (and Diagram 1). If we accept the Portmanteau statistic indication of constancy, the implication is that as nonwage income rose in 1973-75, its recipients saved and saved. (The income distribution argument might suggest their being so rich they could not find enough things they needed to buy). If one accepts the evidence of disequilibrium behaviour (equation (10)), these coefficient changes might be quite acceptable variations. However, we can see that the explicit treatment of "income distribution" has not corrected the over-prediction of 1974-5.

Furthermore, the question of 'acceptable variation' raises major questions concerning what our model actually models. For instance, in a temporary equilibrium framework, were the model here to be applied we might expect parameter variation as the regimes switched (see (11)). Our model (Klein's) does not model disequilibrium behaviour nor does it model the regime at work in the economy. One might, for instance, hypothesise a switch in regime in 1973, say into repressed inflation, however, the results here can in no way prove this to be the case. The regime in the economy is not represented.

However, a few regressions have been run using smoothing techniques for some of the Klein models. Table 8 presents the contrasting estimates obtained for equation (6) with random walk evolution hypothesised for Nonwg and Emern respectivelely. The likelihood values for testing the stability of these coefficients do not reject a zero variance for these coefficients. Similarly, for equations (3) and (5) the coefficient on Lcons has been found to be stable (with $-2 \log (\lambda) \approx 1$) . The suggestion is then that Klein's model is not "that badly" specified as regards these stability tests: however, a more rigorous and systematic analysis of all the coefficients is warranted before making definite conclusions. Presumably, if smoothing was applied to all coefficients, and the models proved stable, we would have cause to revise our estimates of the size of the propensity in view of this more efficient estimation. However, one would then presumably, wish to 'smooth' in conjunction with an I.V. estimator.

SUMMARY

We have seen that our results are far from conclusive, but we have, at least, identified a set of problems which must be dealt with. A major obstacle, however, is that we are not able to identify which problem is doing which part of "the damage". Economic theory tells us that there are the probable/possible omitted variables of salaries, current grants and liquid assets. It also tells us that the finer our dichotomy of income types, the more accurate will our coefficients be. It also says that our fixed coefficient approach takes no account of the future.

Classical econometrics tells us we have simultaneous equation bias, omitted variables bias and a treatment of both seasonality and of "partial adjustment" that is ad hoc and based on no real theory of economic behaviour.

The parameter variation approach suggests Klein's model to be more appropriate than DHSY's to be the analysis of overall consumer expenditure. It also tells us that Klein's model suffers from 4th order autocorrelation and some degree of multicollinearity. The rigorous examination of parameter stability has yet to be pursued (in the form of smoothed estimates) - in view of all the problems mentioned above it is highly questionable that such fine-tuning would be very informative.

CONCLUSION

I would argue that this exploration of the role of different types of income in the consumption/savings function does suggest that there is something there to be estimated. The results with Klein's ad hoc formulation are surprisingly good, and informative. The main problems to be overcome lie in the dynamic specification and the specification of which income variables are to be included. Two further problems should also be mentioned: firstly, if might be argued that nonwage income is not a design variable in its quarterly form. There may be a need for a "permanent nonwage income variable" and, since this is likely to show less variability in the short period and thus the coefficient on this income type may no longer be so small. Secondly, there is arguably some misspecification in treating the adjustment coefficient as identical for the two incomes types.

Perhaps, too, this whole analysis ought to be placed in a Marglinian framework, where the corporate/household savings dichotomy is fully explored. While one must not place too much credence in our actual coefficient estimates, the suggestion appears to be that 'workers' MPC is c.85 while that of 'capitalists' around a quarter.[4/] This latter estimate is almost exactly that obtained by Kalecki for the USA 1929-40 by a very different methodology.[5/] Kalecki, however, includes undistributed profits and thus is examining the retained earnings of corporations as well. This opens up another avenue for examination whereby one might examine the inter-relation of capitalist savings out of profits at the pre- and post-dividend levels. Furthermore, it implies that by 1976, more than 50% of personal savings came from 'capitalists' rather than workers'.[6/]

TABLE 1(a) KLEIN MODEL * indicates significance at 5% level All regressions include seasonal dummies
F indicates full-scale regression. t ratios in parenthesis

			CONSUMPTION = DEP.VAR					Residual		Innovation				
Eqn. No.	SMPL.	LEVELS OR LOGS	CONST.	EMERN	NONWG	LCONS	D4P	Mod Q12	Q12	Mod Q12	Q12	SDE	DW	$\bar{R}^2$
1.	F	Levels	0.8796 (.15)	0.2873* (2.56)	0.0784 (1.69)	0.6568* (7.2)		14.63	12.4	15.35	13.49	18.41	1.7969	.9715
2	1963-1973	Levels	-9.0425 -(1.42)	0.4161* (3.4)	0.0940* (2.19)	0.6354* (7.1)		2.98	2.48	7.63	5.8	17.38	2.2326	.9801
3	F	Levels	-15.5897 (-1.748)	0.4647* (3.46)	0.0690 (1.53)	0.6451* (7.17)	-0.196* (-2.36)	11.89	9.74	12.58	9.74	17.05	2.1248	.9697
4	1963-1973	Levels	-16.2365 (-1.83)	0.4477* (3.6)	0.1046* (.2.27)	0.6554* (6.9)	-0.0778 -(.5)	7.36	6.09	4.6	3.58	18.92	2.5244	.9778
5	F	Levels		0.3179* (4.08)	0.0929* (2.22)	0.6560* (7.3)	-.0617* (-2.18)	12.09	9.96	15.63	12.41	15.10	2.00	.9692
6	F	Levels		0.2943* (3.6)	0.0761* (2.07)	0.6596* (7.2)		13.69	11.59	18.68	15.09	14.73	1.8033	.9698
7	F	LOGS	0.0982 (.556)	0.2163* (2.4)	0.0915* (2.1)	0.6767* (8.5)		8.7	7.51	12.93	11.15	23.33	1.6837	.9765
8	F	LOGS	-0.3279 (-0.9)	0.2582* (2.6)	.0878* (2.06)	0.7309* (8.9)	-0.0089 (-1.4)	7.46	6.36	7.83	6.48	22.24	1.9157	.9758
9	F	LOGS		0.19152* (2.8)	0.1133* (2.9)	0.7006* (9.0)	-0.0973 (-1.92)	6.65	5.69	8.79	7.28	16.63	1.9615	.9770

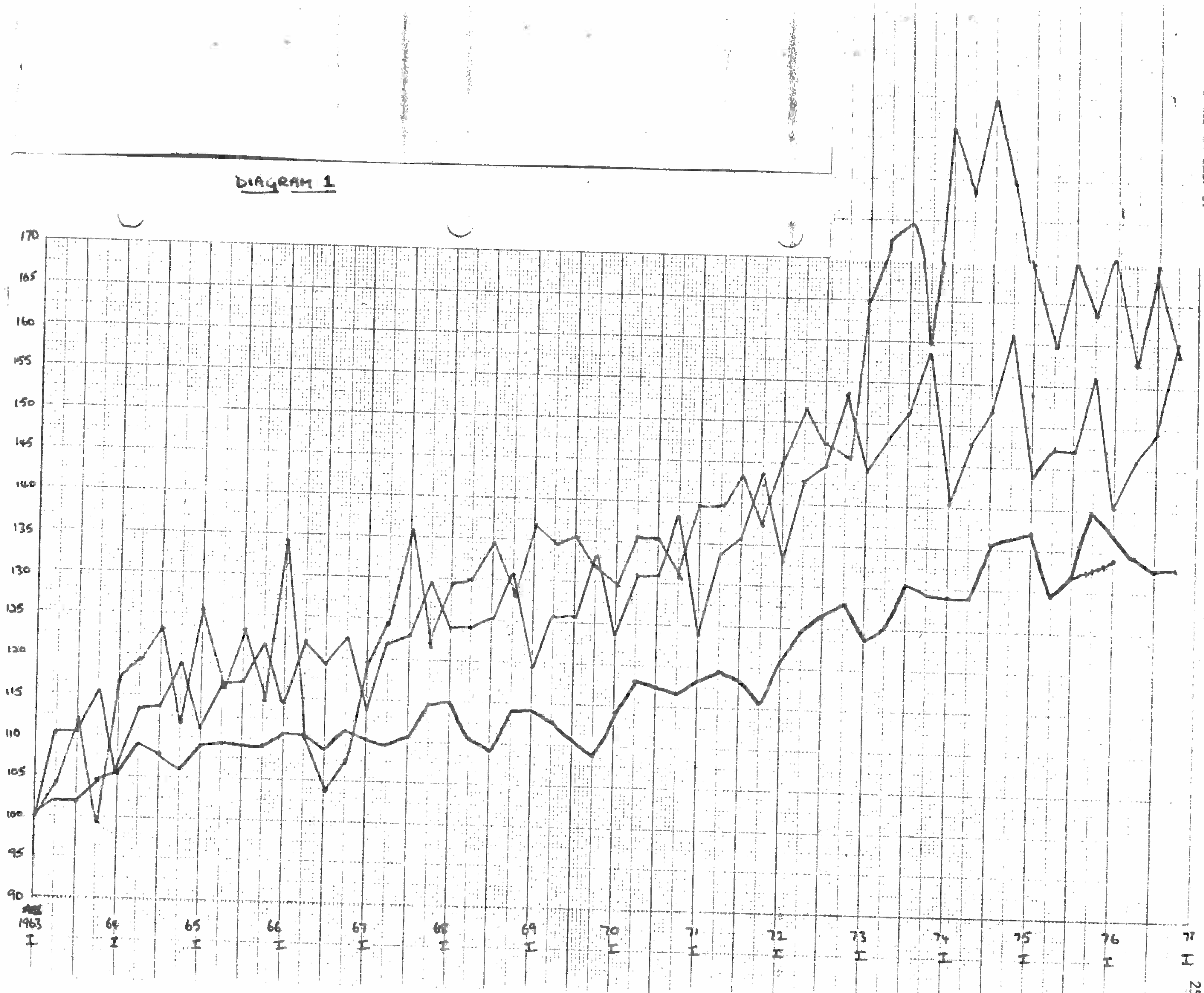
TABLE 1(b) DHSY MODEL

Levels or logs & Dep. Var	CONST	RATION	RATION	D1D4P	D4P	D1D4N	D4N	D1D4W	D4W	RESIDUAL INNOVATION Mod Q12	Q12	Mod Q12	Q12	SDE	DW	$\bar{R}^2$
Levels D4CC (10)	1.3027* (2.16)					−0.1292* (−2.5)	0.1569* (3.45)	−0.1978 (−1.3)	0.3762* (2.23)	40.22	35.39	45.03	37.18	91.34	.8679	28.94
Levels D4CC (11)		12.8179* (2.3)	−9.8922 (−2.15)			−0.1296* (−2.6)	0.1118* (2.36)	−0.2499 (−1.72)	0.4748* (2.96)	27.16	24.33	32.93	27.02	68.4	.9362	35.19
Levels D4CC (12)	2.7743* (3.6)			0.1026 (.66)	−.0845* (2.7)	−0.1009* (−1.96)	0.1142* (2.48)	−0.1372 (−1.1)	0.3556* (2.17)	31.98	27.84	25.67	21.71	71.95	.9749	36.42
Levels D4CC (13)		−4.7402 (−.60	8.0371 (.99)	0.1341 (.85)	−0.0591 (−1.3)	−0.1300* (2.03)	0.1506* (2.35)	−0.1721 (−1.0)	0.3231* (1.99)	28.78	25.64	26.33	22.26	44.99	.9639	38.58
Logs DH4LCC (14)	0.0271* (3.89)			0.1474 (.61)	−0.1743* (−2.9)	−0.1083* (−2.07)	0.1078* (2.33)	−0.1301 (−.83)	0.3085* (2.17)	25.19	22.04	24.03	20.47	62.46	1.1051	37.11
LOGS DHLCC (15)		−0.0148 (−.24)	0.1292 (1.59)	−0.0114 (.4)	−.1073 (−1.02)	−0.1473* (−2.46)	0.1543* (2.95)	−0.2252 (−1.38)	0.3844* (2.3)	26.75	23.51	23.04	20.59	47.95	1.0977	20.94
LOGS D4LCC (16)		0.0309 (.75)	0.0588 (1.39)			−0.1495* (−2.75)	0.1542* (2.98)	−0.1496* (−2.7)	0.4195* (2.74)	29.09	26.05	29.71	24.43	68.57	1.0266	22.71
LOGS D4LCC (17)	0.0109* (2.4)					−0.1362* (−2.6)	0.1525* (3.27)	−0.1297 (−.97)	0.3217* (2.28)	38.26	33.56	41.37	34.46	71.62	0.9382	28.25

TABLE 2

Eqn. No.	CONST, RATIO, NOTHING	A1C	Likeli-hood	RESIDUALS Mod Q12	Q12	SDE	Sig.Lag.ACF. Resid.	Innov.	INNOVATIONS Mod Q12	Q12	T
1	CONST.	$-.311E^{3}$	$-.165E^{3}$	14.63	12.4	18.41	4	4	16.35	13.49	.0547
2	CONST.	$-.25E^{3}$	$-.133E^{3}$	2.98	2.48	17.38	-	-	7.63	5.8	2.0324
3	CONST.	$-268E^{3}$	$-143E^{3}$	11.89	9.74	17,05	-		12.58	5.74	0.42
4	CONST.	$-111E^{3}$	$-.204E^{3}$	7.33	6.09	18.92	-	-	4.6	3.58	.0675
5	NOTHING	$-.2789E^{3}$	$-.1474E^{3}$	12.09	9.96	15.10	4	4	15.63	12.41	.0589
6	NOTHING	$-.3188E^{3}$	$-.1663E^{3}$	13.69	11.59	14.73	4	4	18.68	15.09	.0973
7	CONST.	$-.344E^{3}$	$-.18E^{3}$	8.7	7.51	23.33	-	-	12.93	11.15	.3591
8	CONST.	$-.307E^{3}$	$-.1625E^{3}$	7.46	6.36	22.24	-	-	7.83	6.48	1.525
9	NOTHING	$-.319E^{3}$	$-.1678E^{3}$	6.65	5.69	16.63	-	-	8.79	7.28	0.2677
10	CONST.	$.133E^{3}$	$.605E^{2}$	40.22	35.39	91.34	1,2,3	1,2,3,11	45.03	37.48	0.9862
11	RATIOS	$.132E^{3}$	$.589E^{2}$	27.16	24.33	68.4	1,2	1,2,11	32.93	27.02	0.5733
12	CONST.	$.144E^{3}$	$.641E^{2}$	31.98	27.84	71.95	1,2	1	25.67	21.71	.0227
13	RATIOS	$.141E^{3}$	$.616E^{2}$	28.78	25.64	44.99	1,2	1	26.33	22.26	.0064
14	CONST.	$-.853E^{2}$	$-.506E^{2}$	25.19	22.04	62.46	1	1	24.03	20.47	.2006
15	RATIOS	$-.718E^{2}$	$-.449E^{2}$	26.75	23.51	47.97	1,2	1,2	23.04	20.59	1.7296
16	RATIOS	$-.899E^{2}$	$-.519E^{2}$	29.09	26.05	68.57	1,2	1,2	29.71	24.43	1.3833
17	CONST.	$-.103E^{3}$	$-.575E^{2}$	38.26	33.56	71.62	1,2,3	1,2	41.37	34.46	1.2155

DIAGRAM 1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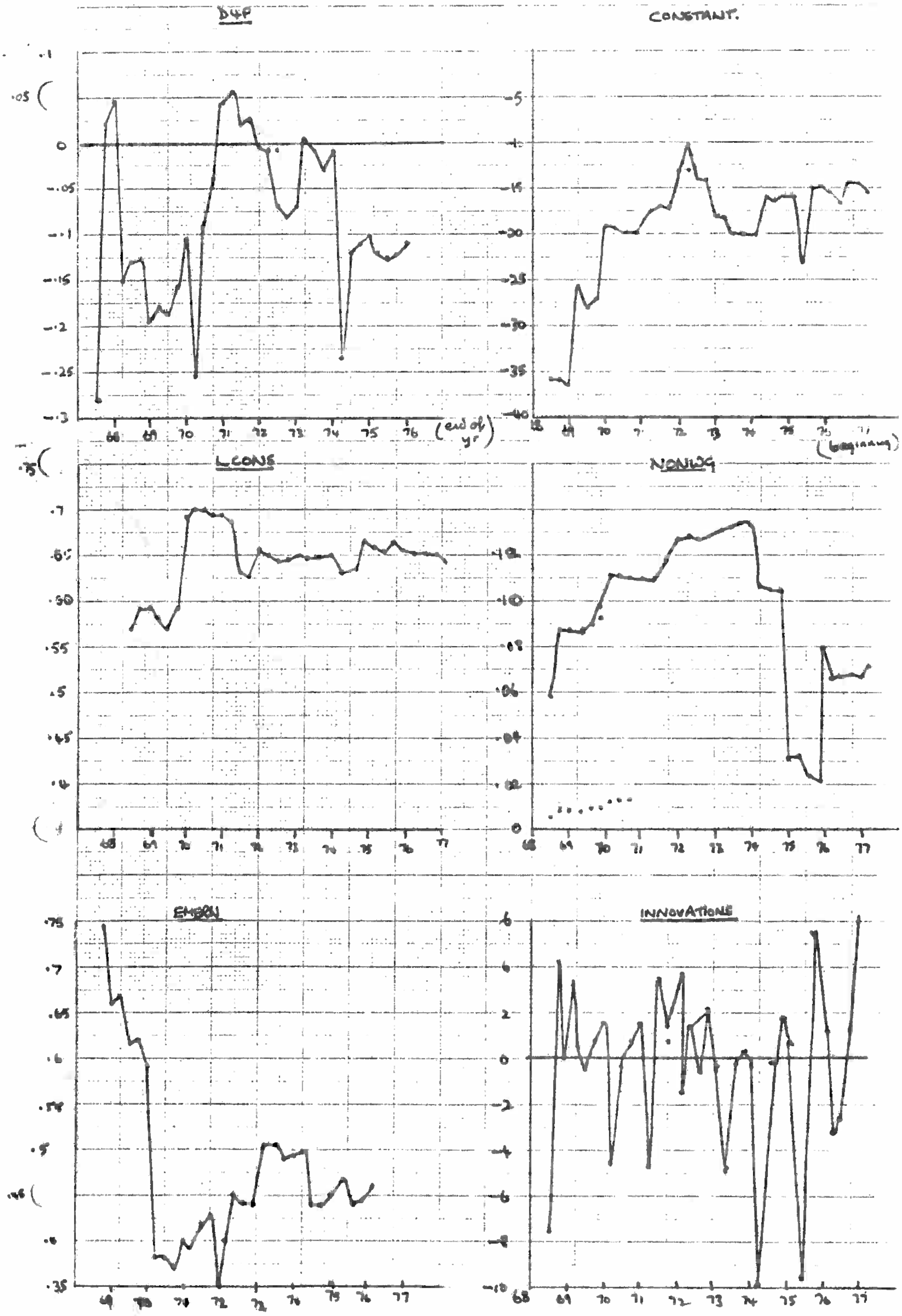
77 I

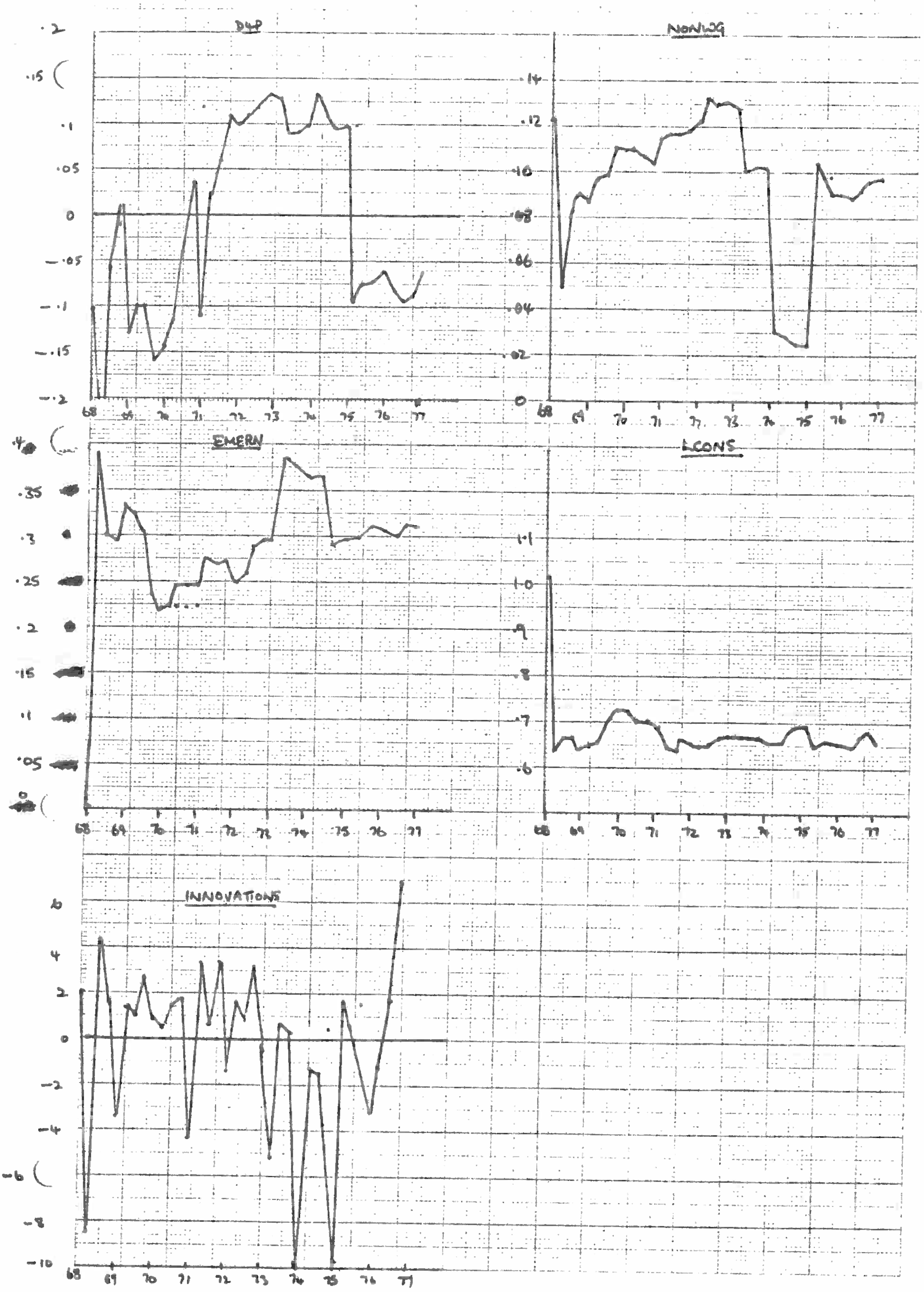
eqn (2) Consum = f(Emern, Nonwg, D4P, Const, LCons, Sono.)

Table 3



eqn (5) Cnsum = f(Emern, Nonwg, D4P, Lcons, Seas.)

table 4



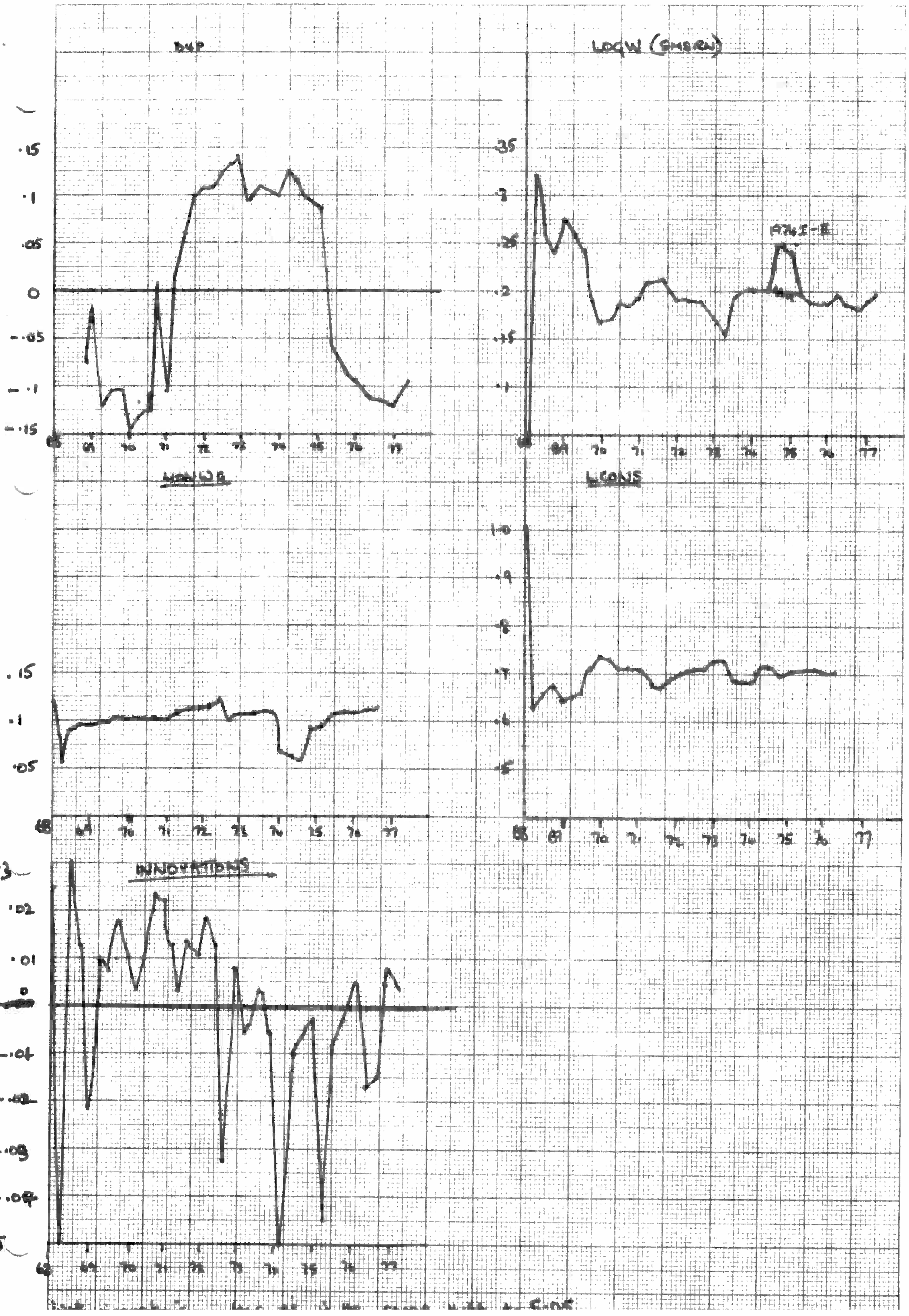

DUP
LOGW (GMSRN)
NONWG
LCONS
INNOVATIONS

TABLE 6

Instrument variable estimates - using regressors' lagged values as instruments.

1a. 1963-76

Consum = 1.2717 + .5688 Emern + .1925 Nonwg + .2758 Lcons + seas
(.09) (1.05) (1.5) (.58)

R^2 = .9626 DW 2 1.2431 SE = 3.04

6a. 1963-76 (MPC = APC)

Consum = .6089 Emern + .1887 Nonwg + .2535 Lcons + seas
(1.84) (1.59) (.61)

R^2 = .9614 DW = 1.2098 SE = 3.06

16. 1963-73

Consum = 56.6381 + 1.713 Emern - .0144 Nonwg - .0759 Lcons + seas
(-.8) (1.01) (.07) (.08)

R^2 = .9212 DW = 1.2699 SE = 4.2136

66 1963-73 (MPC = APC)

Consum = .2255 Emern + .1127 Nonwg + .6384 Lcons + seas
(1.2) (1.49) (2.9)

R^2 = .9749 DW = 2.0558 SE = 2.3485

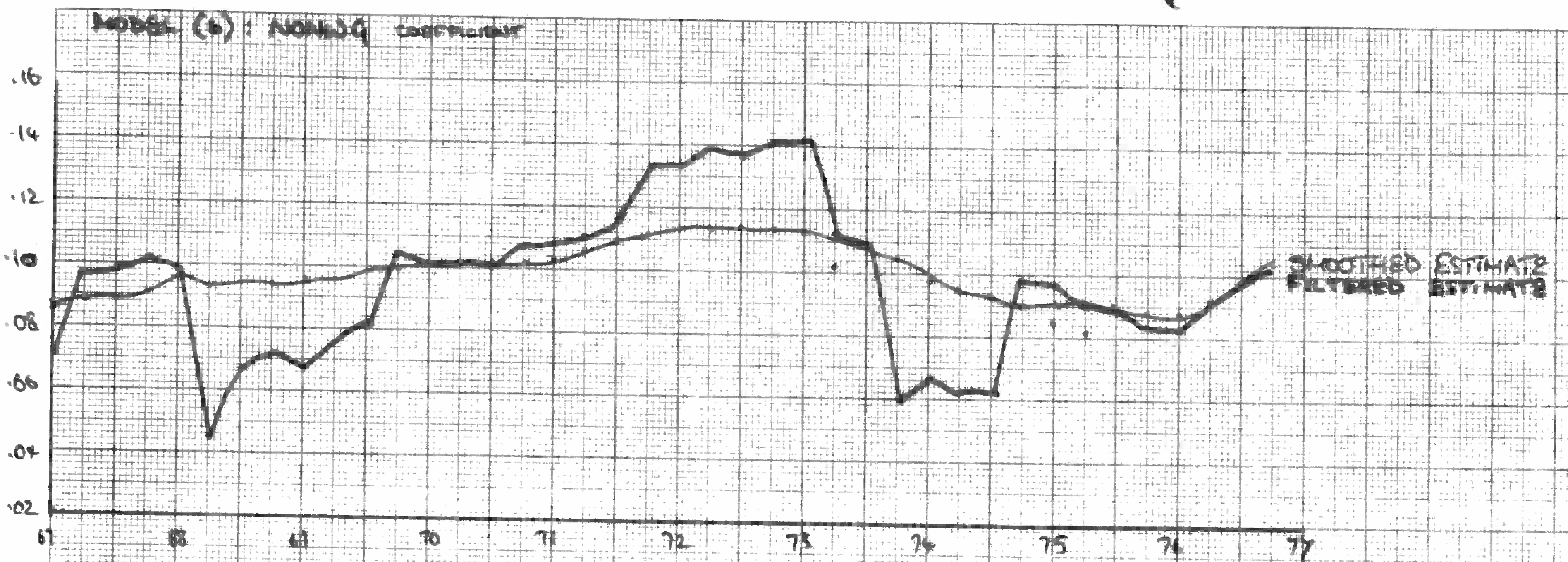
TABLE 7

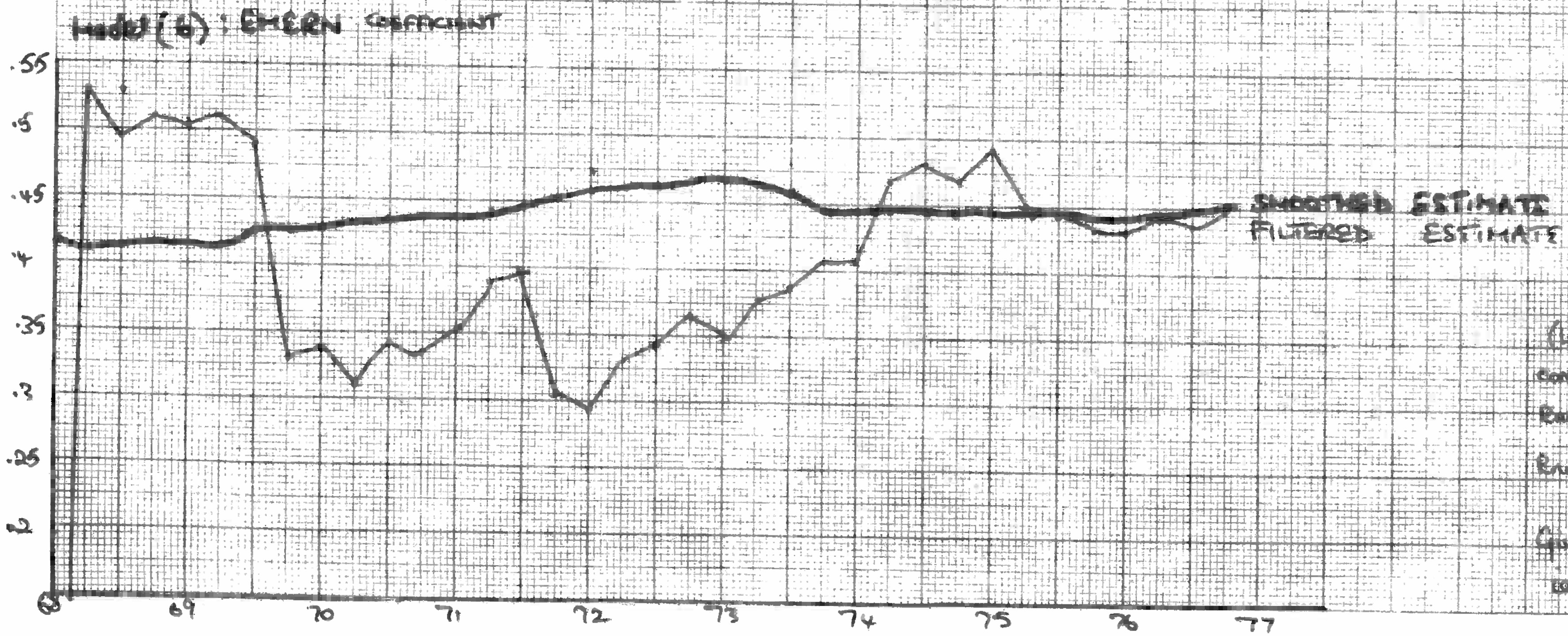
ESTIMATED LONG RUN PROPENSITIES TO CONSUME (Assuming significance)
(Point estimates)

EQUATION	WAGE	NONWAGE
1	.837	.228
2	1.141	.258
3	1.309	.194
4	1.299	.303
5	.924	.270
6	.864	.223
6a	.815	.252
6b	.712	.356
1a	.7854	.2658

LONG RUN ELASTICITIES OF CONSUMPTION W.R.T. INCOME

EQUATION	WAGE	NONWAGE
7	.669	.283
8	.959	.326
9	.639	.378





(Log) LIKELIHOODS:

Constant : 5.11379

[illegible] : 5.0933

[illegible] : 5.0894

Gives −2(λ) → 1

5% of χ^2_{1df} = 3.841

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Footnotes:

1/ See Pasnetti, Review of Ec.Studies 1962; Kaldor, R.Ec.St. 1966.

2/ Townend, BOEQB, 1976.

3/ M.Kalecki (1971) 'Dynamics of the capitalist economy' (see also T.Weiskopf, Cambridge Journal of Economics, 1979).

4/ Alternatively one can define: workers as wage-income receipients; capitalists as recipients of nonwage income - and acknowledge that there will be some overlap.

5. Kalecki - chapter on "the determination of profits".

6. i.e. we said that by 1976, nonwage income was c.25% of wage income.

Thus let capitalist income be 25
worker income be 100
The capitalist's propensity to save is .75
The worker's " " is .15
Thus .75(25) = 18.75
.15(100) = 15

We have "omitted" salary earnings from this picture though. Neither have we resolved all the "confusion" about income classes and classes.

7. Using Garbade's Likelihood ratio test:

$$-2\,(\log(\lambda)) = -2\,|\log L(Q_0) - \log L(Q)| \sim X_1^2$$

where X_1^2 5% = 3.841

Q_0 is likelihood for CONST regression

likelihood on random walk regression