to be theory consistent, there must exist a cost function ***c(u, p)*** such that

aInc(u, p)

dh ***a Pi*** *I* _ E *a ir(pwinc(u, p}}.*

(76) *R* Gorman shows that for these partial differential equations to have a solution, (a) the rank of the matrix formed from the coefficients ***a**$_{ir}$**(p)*** can be no larger than 3 and **(b),** the functions 0„( ) must take specific restricted forms. There are three generic forms for (75), two of which are reproduced below

$$wi= ai(P)\pm bi(Ain\ x\ di(P)\ E\ y_m(p)(\ln x)m \quad m=1 \tag{77}$$

$$a,(\quad bi(P)\ E\ it,,(p)xu--fdi(p)\ E\ 0,,.(p)x^{\circ}-, \tag{78}$$

where ***S*** is a finite set of elements ***o, S _its*** negative elements and ***S**** its positive elements. A third form allows combinations of trigonometrical functions of ***x*** capable of approximating a quite general function of ***x.*** However, note that the y,„, ja$_m$ and O_m functions in (77) and (78) are ***not*** indexed on the commodity subscript i, otherwise the rank condition on a„ could not hold.

Equations (77) and (78) provide a rich source of Engel curve specifications and contain as special cases anumber of important forms. From (77), with ***in =1,*** the form proposed by Working and Leser and discussed above, see (15), is obtained. In econometric specifications, ***a**$_i$**(p)*** adds to unity and ***b**$_i$**(p)*** to zero, as will their estimates if OLS is applied to each equation separately. The log quadratic form

$$= a_i(p)- F\ b_i(p)\ln x + d,(p)(in\ x)^2, \tag{79}$$

was applied in Deaton (1981c) to Sri Lankan micro household data for the food share where the quadratic term was highly significant and a very satisfactory fit was obtained (an ***le*** of 0.502 on more than 3,000 observations.) Note that, while for a single commodity, higher powers of In x could be added, doing so in a complete system would require cross-equation restrictions since, according to (77), the ratios of coefficients on powers beyond unity should be the same for all commodities. Testing such restrictions (and Wald tests offer a very simple method-see Section 4(a) below) provides yet another possible way of testing the theory.

Equation (78) together with ***S*** = ***-1, 1,*** 2, ..., ***r,...)*** gives general polynomial Engel curves. Because of the rank condition, the quadratic with ***S = (-1,11*** is as