DISPARITIES IN INCOME ELASTICITIES

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Abstract

This paper uses expenditure survey data to analyse disparities in income elasticities of demand by ethnic origin. Engel curve estimates indicate that the food elasticity varies with ethnic origin, while the others are quite similar. With data on five food commodities, the income elasticities display considerable disparities.

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1. Introduction

Houthakker's (1957) classical article on the measurement of income elasticities of demand across countries has provided much stimulus to research on international consumption comparisons.¹ The main objective of this research is to find meaningful regularities in consumption behavior, such as Engel's law, the extent to which income elasticities differ across countries, and so on. Thus, Houthakker found strong support for Engel's law and that elasticities are similar, but not equal. Subsequently, Russell (1967) demonstrated that differences in these elasticities could be partly explained by variations in income and (to a lesser extent) differences in relative prices across countries.

Rather than using cross-country data, it is possible to analyse these issues with a hitherto neglected source of data, the consumption patterns of individuals from different countries now living in the same country. As such data come from a common expenditure survey, problems of lack of comparability of variables associated with international data are largely avoided. Additional problems of differing relative prices, currencies, political systems and climates are also eliminated. With these extraneous factors (and income) held constant, it is possible to attribute any differences in consumption patterns to ethnic origin, i.e. tastes. In this paper we use such a data base to estimate the effects of ethnic origin on income elasticities. The only previous study along these lines is that of Williamson (1967) who used a survey carried out in Massachusetts in 1875 to analyse the consumption patterns of American, English, Irish and other families.

2. The Model

For our Engel curve system we use the increasingly popular Working (1943)-Leser (1963) model which expresses the budget shares as a linear function of the logarithm of total expenditure. This model generally fits expenditure survey data quite well [Deaton and Muellbauer (1980), Leser (1963, 1976)] and has attractive aggregation properties [Muellbauer (1975, 1976)]. Let $p_i q_i$ be the expenditure on good i ($i=1, \dots, n$), $M = \sum_{i=1}^n p_i q_i$ be total expenditure ("income" for short) and let $w_i = p_i q_i / M$ be the i^{th} budget share. The Working-Leser model specifies

$$w_i = \alpha_i + \beta_i \log M + \varepsilon_i, \quad (1)$$

where α_i and β_i are constants and ε_i is an error term with the usual classical properties.²

Let there be H households, each belonging to one of E ethnic origins. We extend (1) to incorporate ethnic origin by allowing α_i and β_i to vary,

$$w_{ih} = \alpha_{il} + \beta_{il} \log M_h + \sum_{e=2}^E (\alpha_{ie} + \beta_{ie} \log M_h) D_{eh} + \varepsilon_{ih} \quad (2)$$

$i = 1, \dots, n$ goods; $h = 1, \dots, H$ households,

where $D_{eh} = 1$ if household h is a member of ethnic group e , zero otherwise; and $e = 1$ is the base ethnic group. Eq. (2) implies that the income elasticity for good i by ethnic group e is

$$\partial \log q_{ih} / \partial \log M_h = 1 + (\beta_{il} + \beta_{ie}) / w_{ih} \quad \text{h} \in e,$$

which, if the w_{ih} 's are approximately the same, differs with ethnic origin if $\beta_{ie} \neq 0$.

3. Results

Our data are from the 1974-75 Household Expenditure Survey undertaken by the Australian Bureau of Statistics, reported by Gaetjens (1980).³ These data consist of expenditure in Australia on food, housing and other for six income groups and five ethnic origins (according to place of birth of the household head). Total food is also disaggregated into (i) bread, cakes and cereals, (ii) meat and fish, (iii) dairy, oils and fats, (iv) fruit and vegetables and (v) other food (mostly restaurant and take-away food).⁴ We use native-born Australians as the base ethnic group.

We first use the 30 observations (6 income groups $\times$ 5 ethnic origins) to estimate (2) with the 3 commodity data. Table 1 gives the OLS estimates and Table 2 the implied income elasticities (evaluated at sample means).⁵ None of the slope coefficients for U.K. and Ireland are significant, indicating that

TABLE 1

ENGEL CURVE ESTIMATES FOR THREE COMMODITY DATA

(|t| statistics in parentheses)

	Ethnic origin				
	Australia	U.K. and Ireland	Italy	Greece	Asia
	<u>Intercepts $\alpha_{ie} \times 100$</u>				
Food	42.46 (7.31)	9.53 (1.20)	33.44 (3.23)	21.65 (1.91)	22.66 (2.54)
Housing	29.99 (3.00)	-5.33 (0.39)	-19.13 (1.08)	32.91 (1.69)	-2.93 (0.19)
Other	27.55 (2.41)	-4.20 (0.27)	-14.30 (0.70)	-54.56 (2.44)	-19.73 (1.13)
	<u>Slope coefficients $\beta_{ie} \times 100$</u>				
Food	-4.38 (3.76)	-1.92 (1.20)	-5.29 (2.60)	-2.65 (1.19)	-3.84 (2.20)
Housing	-3.12 (1.56)	1.30 (0.47)	3.63 (1.03)	-5.98 (1.57)	1.05 (0.35)
Other	7.50 (3.28)	0.62 (0.20)	1.67 (0.42)	8.63 (1.98)	2.80 (0.82)

For individuals not born in Australia, the intercepts and slope coefficients are relative to those for native-born Australians (the base ethnic group); see eq. (2).

TABLE 2

INCOME ELASTICITIES OF DEMAND FOR
THREE COMMODITIES

(Standard errors in parentheses)

	Ethnic origin				
	Australia	U.K. and Ireland	Italy	Greece	Asia
Food	.79 (.06)	.70 (.05)	.64 (.06)	.75 (.07)	.64 (.06)
Housing	.79 (.14)	.88 (.12)	1.04 (.21)	.43 (.20)	.87 (.14)
Other	1.12 (.04)	1.13 (.03)	1.15 (.04)	1.29 (.07)	1.17 (.04)

income elasticities for this group and those for the Australian born are not significantly different. This can be explained in terms of the close cultural ties between the three countries. Those born in Italy and Asia have a significantly lower elasticity for food than do native-born Australians. Relative to the Australian born, the Greeks have a higher elasticity for other, which is marginally significant. All income elasticities for food are significantly less than unity, which again confirms Engel's law.

The conclusion which emerges from the three commodity data is that, except for food, elasticities do not exhibit much significant variation with ethnic origin. This finding is consistent with Houthakker's (1957).

Next we use the five commodity food data to estimate (2) with the w_i 's replaced by the food budget shares (the ratio of expenditure on the i^{th} type of food to total food) and M replaced by food expenditure. This is a conditional Engel system as total expenditure on the group is held constant. Tables 3 and 4 give the OLS estimates and conditional income elasticities (evaluated at sample means).⁶ Again there are no significant differences between the native-born Australians and those from U.K. and Ireland. Households from Italy have a significantly higher income elasticity for meat and fish and a lower elasticity for dairy. Asian households have significantly higher elasticities for bread, dairy and fruit, with an offsetting lower elasticity for other food. Interestingly, bread is a luxury for Asians (income elasticity significantly greater than unity), while it is a necessity for other households.

These results indicate that as we disaggregate goods and move away from the broad commodity groups, income elasticities show more variation with ethnic origin.

TABLE 3

ENGEL CURVE ESTIMATES FOR FIVE
COMMODITY FOOD DATA

(|t| statistics in parentheses)

	Ethnic origin				
	Australia	U.K. and Ireland	Italy	Greece	Asia
	Intercepts $\alpha_{ie} \times 100$				
Bread, etc.	24.29 (13.76)	-2.71 (1.06)	3.56 (0.95)	-0.72 (0.19)	-19.08 (5.92)
Meat & fish	40.42 (6.51)	3.25 (0.36)	-33.11 (2.50)	19.65 (1.48)	-4.84 (0.43)
Dairy, etc.	30.52 (7.96)	1.43 (0.26)	40.65 (4.98)	17.70 (2.16)	-14.37 (2.05)
Fruit & vegetables	24.34 (4.88)	-0.32 (0.04)	14.58 (1.37)	-12.15 (1.14)	-17.89 (1.96)
Other food	-19.56 (1.38)	-1.65 (0.08)	-25.69 (0.85)	-24.48 (1.37)	56.18 (2.17)
	Slope coefficients $\beta_{ie} \times 100$				
Bread, etc.	-3.90 (7.52)	0.89 (1.19)	-0.09 (0.08)	0.30 (0.30)	5.45 (6.06)
Meat & fish	-4.73 (2.59)	-1.16 (0.44)	9.72 (2.70)	-3.82 (1.08)	0.95 (0.30)
Dairy, etc.	-4.81 (4.27)	-0.06 (0.03)	-9.72 (4.37)	-3.17 (1.46)	4.17 (2.14)
Fruit & vegetables	-2.98 (2.03)	0.09 (0.04)	-3.24 (1.12)	4.33 (1.53)	5.79 (2.28)
Other food	16.43 (3.93)	0.24 (0.04)	3.32 (0.40)	2.37 (0.50)	-16.36 (2.26)

See notes to Table 1.

TABLE 4

CONDITIONAL INCOME ELASTICITIES OF DEMAND
FOR FIVE FOOD COMMODITIES

(Standard errors in parentheses)

	Ethnic origin				
	Australia	U.K. and Ireland	Italy	Greece	Asia
Bread, etc.	.65 (.05)	.74 (.05)	.69 (.07)	.63 (.09)	1.14 (.07)
Meat & fish	.81 (.07)	.75 (.08)	1.19 (.12)	.68 (.11)	.83 (.12)
Dairy, etc.	.66 (.08)	.69 (.07)	.12 (.12)	.54 (.11)	.95 (.12)
Fruit & vegetables	.79 (.10)	.80 (.11)	.60 (.16)	1.08 (.13)	1.17 (.12)
Other food	1.46 (.07)	1.48 (.07)	1.68 (.14)	1.65 (.14)	1.00 (.09)

4. Concluding Comments

In this paper we have argued that in carrying out cross-country consumption comparisons there are advantages in using data on individuals from different countries now living in the same country. We used survey data classified by ethnic origin to estimate Engel systems and then analysed disparities in income elasticities. With data on food, housing and other, we confirmed Houthakker's (1957) results and found the food elasticity to differ with ethnic origin, while the other elasticities were quite similar. With data on five food commodities, income elasticities displayed much greater disparities.

FOOTNOTES

1. See, e.g., Clements, Suhm and Theil (1979), Clements and Theil (1979), Goldberger and Galametsos (1970), Izan and Clements (1979), Lluch, Powell and Williams (1977), Lluch and Williams (1975), Russell (1967), Suhm (1979) and Theil (1967).
2. As the w_i 's have a unit sum, it follows that $\sum_i \alpha_i = 1$, $\sum_i \beta_i = \sum_i \varepsilon_i = 0$. Least-squares estimates satisfy these adding-up restrictions.
3. The survey is fully described in the Australian Bureau of Statistics (1977).
4. A listing of all data used in this paper is available on request.
5. It should be noted that the use of grouped data may mean that the error term in (2) is heteroskedastic. To allow for this we re-estimated using a weighted least-squares procedure [see, e.g., Kmenta (1971, pp. 323-4)] and all results were very similar to the OLS. We also added the logarithm of family size as an additional explanatory variable and the results were inferior due to multicollinearity.
6. For the food data we also used weighted least-squares with very similar results; adding the family size variable produced inferior results.

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