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CONSUMER BEHAVIOR AND IMMIGRANT ASSIMILATION: A COMPARISON OF THE UNITED STATES, BRITAIN AND GERMANY, 1889/1890

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ABSTRACT

This paper utilizes household-level budget data from the 1889/90 United States Commissioner of Labor survey to estimate the full Almost Ideal Demand System with demographic and other covariates. Price data were obtained from the Aldrich Report of 1892. The purpose is to make better use of the entire data set by incorporating demographic variation and then to examine whether the consumption patterns of immigrants and the native born were significantly different once the effects of total expenditure, prices, family composition, region of residence, industry, occupation, and age of household head were taken into account. Comparisons of Engel curves are also made to households in Great Britain and Germany. Results from estimation of Engel curves and the full model (with prices) for six commodity categories (food, housing, clothing, fuel and lighting, liquor and tobacco, and "Other" goods and services) revealed that differences across ethnic groups within the United States could be reduced but not eliminated by the effects of the covariates. The foreign born spent relatively more on food and on liquor and tobacco. Although differences by ethnicity existed, both British and German immigrants to the United States were closer in their consumption patterns to workers in the area of destination than in the area of origin. Inclusion of prices did reduce the regional effects (within the United States) found in the Engel curves. Demographic effects were important. Food, housing, and fuel and lighting appeared as necessities, while clothing, liquor and tobacco, and "Other" goods and services were luxuries.

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Among important dimensions of nineteenth-century European society and its overseas offshoots were the growth of large scale and efficient industrial production, rapid urbanization, and considerable demographic change. Concomitants of this were the creation of a growing industrial working class and increased mobility of factors of production. In particular, labor moved from rural to urban areas, from older cities to newer industrial and commercial agglomerations, across national frontiers, and over long distances to different continents (Kuznets, 1966). These massive and unprecedented changes originated in considerable part on the supply side: with new technology, new products, new production locations, and large scale capital accumulation (Landes, 1969). But the composition and allocation of changes in output, as well as the impact on individual standards of living, was influenced by demand, much of which was individual consumption demand (Brady, 1972; Fishlow, 1973; Mokyr, 1977). While the focus has often been on aggregate demand, many shifts occurred in the composition of demand as incomes increased, relative prices changed, and new goods and services were introduced.

The historical industrial revolution has also been characterized by the differing experiences of various groups. For Britain, there has been much interest in the emergence of the non-agrarian working class and the related issue of the effect of the industrial revolution on income distribution and the living standards of the working classes. (See, for example, Williamson, 1985; Thompson, 1963; Taylor, 1975; Lindert and Williamson, 1983.) Similar concerns have been raised for other European nations (Stearns, 1967). For the United States, there has been considerable attention paid to the human aspects of industrialization, especially labor force growth and change (e.g.,

Lebergott, 1964, 1972) as well as the issues of inequality (Williamson and Lindert, 1980) and poverty (e.g., Lebergott, 1976; Dubnoff 1978; Haines, 1981). One of the peculiar aspects of historical American development was the significant ethnic diversity and migrant character of the labor force (Bodnar, 1985; Hutchinson, 1956). There has been interest in the different experiences of the native and foreign born in terms of employment, wages, incomes, discrimination, and poverty (Handlin, 1973; Bodnar, 1985; Laurie, Hershberg, and Alter, 1981; Hershberg, et. al., 1981; Higgs, 1971; McGouldrick and Tannen, 1977; Blau, 1980; Hill, 1975; Hannon, 1982). Indeed, the federal government was so concerned in the first decade of the twentieth century that it undertook a large scale investigation of immigrants and immigration (U.S. Congress, 1911).

Given the importance of demand factors and issues related to the role of ethnic differentials, it seems useful to combine these two questions in a study of consumption behavior among immigrants contrasted to that of native-born Americans and also the population in the area of origin. This paper will deal with largely urban, industrial workers in the late nineteenth century. This is possible because of a remarkable set of consumer budget data from the Sixth and Seventh Annual Reports of the United States Commissioner of Labor (U.S. Commissioner of Labor, 1890, 1891). The data will be discussed in the next section of the paper. The focus will be on native-born American workers, immigrants to the United States, especially those from Great Britain and Germany, and workers in Britain and Germany. The approach will be the analysis of family budgets, a tradition which goes back to the eighteenth century (Stigler, 1965, ch. 7) and which continues to be actively pursued (e.g., Prais and Houthakker, 1971; Houthakker and Taylor, 1970; Lluch, Powell,

and Williams, 1977; Deaton, 1981; Deaton and Muellbauer, 1986).

The Data

Carroll Wright, first U.S. Commissioner of Labor and pioneer empirical statistician (Williamson, 1967), collected demographic, income, and family expenditure data in 1889 and 1890 for 8,544 families in 24 states of the United States and five European countries (Great Britain, Germany, France, Belgium, and Switzerland). The heads of families were employed in nine different industries (pig iron, bar iron, steel, bituminous coal, coke, iron ore, cotton textiles, woollen textiles, and glass). Appendix Table A-1 provides information on the distribution of families by industry and geographic location. The information on family composition, income, and expenditures was extensive, and a listing of the variables is given in Appendix Table A-2.

The budget and income data were originally collected in connection with a study of the effects of tariffs on the costs of production in selected industries. The micro data were quite literally published. The sample has been discussed at length elsewhere (Williamson, 1967; Modell, 1978; Lees, 1980; Haines, 1979a, ch. 6; 1979b), and it seems reasonable and internally consistent. The method of sampling was not clarified, and the report stated only that

> "the Department has aimed to secure accounts from a representative number of employees of the establishments covered....and also from those families whose surroundings and conditions made them representative of the whole body of employees in any particular establishment. This representative character, however, has been impaired in some measure by two features: First, some families have not been willing to give the information desired, while second, other families, perfectly willing, have not been able to give reasonably exact accounts of their living expenses" (U.S. Commissioner of Labor, 1890, pp. 610-611).

Although the survey was probably not random, the American data on age of

family head seem to conform to age distributions by occupations of married males in the census of 1890 (Haines, 1979a, ch. 6). The micro data have been used by a number of researchers (Kelley, 1972, 1976; Fishlow, 1973; Modell, 1978; Haines, 1979a, 1979b, 1985; Lees, 1980), and the published data have furnished information for studies of savings and expenditures (e.g., U.S. Bureau of the Census, 1975, Series G564-573; Brady, 1956). In short, although the 1889/90 survey may have been selective of industries and of families within those industries, it nevertheless constitutes a valuable source of household level data on the economic and demographic aspects of working class family life during rapid industrialization.

Analysis of Family Budgets

The analysis of family budgets has long been used to study consumption and saving behavior and the costs of children and also to obtain weights for price indices (Stigler, 1965, ch. 7; Houthakker, 1957; Lindert, 1980; Deaton and Muellbauer, 1986). The methodological approach has had two basic strands. One, perhaps best exemplified in the work of Allen and Bowley (1935) and Prais and Houthakker (1971), adopts a more purely empirical approach. Expenditure functions are fitted on the basis of convenience or statistical goodness of fit, rather than choosing functional forms derived from specific utility functions (or preference orderings) subject to constrained maximization. Much previous historical work on budgets has been in this tradition (e.g., Williamson, 1967; Fishlow, 1973) or has been more strictly descriptive (e.g., Modell, 1978; Lees, 1980; Shergold, 1982).

There are advantages and disadvantages to this approach. On the positive side, it is relatively simple to estimate Engel curves (relating expenditure on a commodity or commodity group to income or total expenditure) using

ordinary least squares regression. Other covariates, such as family composition, location, and ethnicity, can be added in a similar ad hoc basis. For some formulations (e.g., double logarithmic), expenditure elasticities appear directly as regression coefficients. On the more negative side, these formulations do not derive from utility maximization subject to a budget constraint (or, in the dual formulation, cost minimization subject to constant utility). In consequence, these "empirical" demand functions do not necessarily possess the generally desired regularity properties of adding up, homogeneity, negativity of the own-price substitution effects, and symmetry of the cross-price effects. These properties should result from optimization of a specified, well-behaved utility function.[1] Adding up implies that the sum of all budget shares should be one -- a quite reasonable expectation.[2] Homogeneity implies that if both prices and incomes change in the same proportion (e.g., doubling) that demand will remain unchanged.[3] The negativity of the own-price or substitution effects implies that a fall (rise) in the price of a good must always be associated with a rise (fall) in its demand, holding other nominal prices constant and compensating the individual (or household) sufficiently with income to allow utility to remain unchanged. The symmetry property implies that the compensated effect of the price of commodity i on the consumption of commodity j is the same as the compensated effect of the price of commodity j on the consumption of commodity i.[4] The homogeneity, negativity, and symmetry properties relate only to situations where there is price variation, either across time or across space in the cross section. While it is sometimes reasonable to assume that prices do not vary significantly across households in the cross section, it will be shown below that this is not necessarily a good assumption.

In practice P is sometimes approximated by

(3.1) $\log(P) \approx \Sigma_k w_k \log(p_k)$

Restrictions on the Almost Ideal Demand System appear as follows:

(4) $\Sigma_{i=1}^{n} \alpha_i = 1$; $\Sigma_{i=1}^{n} \tau_{ij} = 0$; $\Sigma_{i=1}^{n} \beta_i = 0$ (adding up)

(5) $\Sigma_j \tau_{ij} = 0$ (homogeneity)

(6) $\tau_{ij} = \tau_{ji}$ (symmetry)

Negativity is defined by another more complex expression (Deaton and Muellbauer, 1980a, p. 76). This full system has been estimated for aggregate time series data for Britain for eight commodity groups over the period 1954-1974 (Deaton and Muellbauer, 1980b).

If there is little or no price variation in the cross section, then equation (1), the Engel curve version, can be estimated with ordinary least squares. If micro data are used, the aggregation problem (from using group data and averages) is avoided (Deaton and Muellbauer, 1980a, ch. 6). Unfortunately, there are many other covariates which influence expenditure patterns, most notably demographic composition of the family. The usual procedure has been to create subsamples of the original data set which are more homogeneous with respect to family composition, rural-urban residence, geographic region, social class, etc. (Phlips, 1974, pp. 103-104). This was the rationale for the presentation of data for "normal families" from the 1889/90 and 1901 U.S. Commissioner of Labor cost of living surveys (U.S. Commissioner of Labor, 1890, 1891, 1904).[9] The same strategy was used by Lluch, Powell, and Williams (1977) in their application of the extended linear expenditure system to cross-section budget data from developing countries. The problem with this approach is that it often creates small sub-sample sizes

and hence "discards" some data if those subsamples are unusable. It also complicates summarizing the results.

There have been a number of attempts to incorporate demographic variation into theoretically appropriate complete demand systems (e.g., Pollak and Wales, 1981; Deaton and Muellbauer, 1980a, ch. 8), but most require some difficult non-linear estimation. A simpler and more tractable formulation has been proposed by Deaton and applied to micro cross-section household budget data for Sri Lanka (1969-70), Indonesia (1978), and Spain (1980-81) (Deaton, 1981; Deaton and Muellbauer, 1986; Deaton, Ruiz-Castillo, and Duncan, 1985). It involves, however, somewhat of a departure from theoretically-based demand models and a move in the direction of more "empirical" flexible functional forms. In particular, Deaton proposes a quadratic Engel curve

$$(7) \qquad w_i = \alpha_i + \beta_{i0}\log(X) + \beta_{i1}[\log(X)]^2$$

which corresponds to a family of indirect utility functions proposed by Gorman (1981) with the general form

$$(8) \qquad u = \mu(p) + [\mu_2(p)/(\log(X) - \mu_3(p))].$$

As it turns out, however, estimation problems make it difficult to use the quadratic formulation with some of the present data. Thus the simpler linear specification will generally be used.

Deaton also introduces demographic (and other) effects by using per capita expenditures and additive variables to modify demographic composition and take account of regional effects, etc. For linear Engel curves, this results in

$$(9) \qquad w_i = \alpha_i + \beta_{i0}\log(X/N) + \Sigma\, T_{ir}(N_r) + \Theta Z$$

where N is total family size, the N_r's are the numbers in the rth demographic group (by age, sex, etc.), and Z is a vector of non-demographic covariates

(Deaton, Ruiz-Castillo, and Duncan, 1985).

This modification of the Almost Ideal Demand System is an effort to incorporate the differentiated needs of various family members as well as possible economies of scale in consumption. For example, children's consumption usually has a higher food share than adult consumption. This model is "not supposed to represent any specific model of how needs are generated in the household; rather it is in the spirit of a 'flexible functional form' where the important variables are allowed at least one unrestricted parameter each and which can be thought of as a suitable linearization of whatever is the true (complex) process linking family composition, welfare, and the food share" (Deaton, 1981, p. 21). The model can certainly be extended to the budget shares of other goods. The virtue of this formulation is that it is estimable by ordinary least squares, although there may be problems of heteroscedasticity (Deaton, 1981, pp. 34-37). It also derives, at basis, from a sound theoretical model. Demographic effects and other covariates are allowed to affect the model through the intercept term (provided that the vector of covariates {Z} is formulated as a series of dummy or dummy-type variables). Interaction terms are also possible.

Of obvious interest are expenditure elasticities for various commodities (or commodity groups). These are defined as

$$e_i = [\delta \log(q_i)/\delta \log(X)] = (\delta q_i/\delta X)(X/q_i)$$

for the ith commodity. Partially differentiating (9) with respect to log(X) yields

(10) $e_i = 1 + \beta_i/w_i$. [10]

If there is significant price variation across space in the cross-section, as was the case in the United States in the late nineteenth century (Haines, 1989), the full Almost Ideal Demand System with prices can be estimated. In this instance covariates for demographic and other factors may also be included. For this case the following model will be used:

(11) $w_i = \alpha_i + \beta_i \log[X/(PN)] + \Sigma \tau_{ij} \log(P_j) + \Sigma T_{ir}(N_r) + \Theta Z$

where the variables and parameters are defined as above and where P is approximated by a modification of equation (3.1). This modification is:

(3.1)' $\log(P) \approx \Sigma_k W_k \log (P_k)$

where W_k is the overall average budget share for the kth commodity group. For equation (11), the uncompensated own- and cross-price elasticities (e_{ii} and e_{ij}) would be

(12) $e_{ii} = (\tau_{ii}/w_i) - (1 + [(\beta_i W_i)/(Pw_i)])$

and

(13) $e_{ij} = (\tau_{ij}/w_i) - [(\beta_i W_j)/(Pw_i)])$

From the Slutsky equation, the compensated elasticities (e^*_{ii} and e^*_{ij}) would be

(14) $e^*_{ii} = e_{ii} + (w_i)(e_i)$

and

(15) $e^*_{ij} = e_{ij} + (w_j)(e_i)$

This paper will concentrate on applying these modified forms of the Almost Ideal Demand System (i.e., equations (9) and (11)). A basic question to be investigated is: Once total expenditure, demographic composition, and some other covariates have been taken into account, did expenditure behavior differ between native-born Americans, migrants to the United States, and households in the areas of migrant origins (in this case, Great Britain and Germany)? It

turns out that differences in relative prices may also have played some role, and an effort will be made to account for this.

It has been noted by Fishlow (1973, p. 62), looking at the 1889/90 and the 1901 U.S. Commissioner of Labor surveys as well as at a British Board of Trade inquiries for 1904/09 for Britain, France, and the United States, that immigrants to the United States behaved much more like persons in the area of destination than in the area of origin. "Immigrants adapted rapidly and definitively, not only in their patterns of expenditure, but in other ways as well" (Fishlow, 1973, p. 62). The 1901 American cost of living survey itself noted "no very marked differences are noticed between the native and foreign families in the several groups of income, but as a whole the foreign families show a little larger percentage of expenditure for rent, fuel, lighting, and food, and a little smaller percentage for clothing and sundries" (U.S. Commissioner of Labor, 1904, pp. 100-101). The implication is that prices, incomes and demographic variation explained most of the differences in expenditure behavior between groups, while taste differences accounted for little. A further investigation of this is the subject of the remainder of this paper.

Consumption Patterns circa 1890.

Some basic patterns of family budget expenditures in the United States, Great Britain, and Germany around 1890 are provided in Table 1. Within the United States, the results are given for the native born and all foreign born, as well as for British and German immigrants separately.[11] For this analysis, only renter families were used because, for homeowners, no information on housing costs (e.g., mortgage principal, interest expense, and maintenance) was provided in the survey. In addition, only families with both

husband and wife present were analyzed.[12] Finally, expenditures were grouped into seven broad categories (food, housing, clothing, fuel and lighting, liquor and tobacco, furniture, and other) in order to simplify the analysis. In much of the subsequent work, the category of furniture will be dropped, since it includes, in part at least, durable goods. Consumption of durable goods exhibits different patterns from consumption of non-durables, often resembling capital goods (Deaton and Muellbauer, 1980b, ch 15).

Table 1 reveals, overall, some differences in consumption behavior across nativity groups with the United States and between the United States, Britain, and Germany. The food share was lower for residents of the United States (43.5 percent of total expenditure) relative to Great Britain (49.9 percent) and Germany (51.5 percent). But that is not surprising, considering that average husband's and family incomes were higher in the United States. In this case Engel's Law (i.e., an inverse relationship between budgetary food share and income or total expenditure) seems to have held true. In other cross-sectional studies, and broadly over time, it also has proven the case (Houthakker, 1957; Williamson, 1967). In the 1889/90 survey for families within the United States, however, the food share was higher for foreign-born families, including those with British- or German-born heads, in spite of higher <u>family</u> incomes. This is explicable, in part, by the larger family size of the foreign born. A larger family tends to increase the budgetary food share, all other things constant (Deaton and Muellbauer, 1980b, p. 193; 1986). Thus average family size for native-born family heads was 5.00, including all household members, or 4.54, excluding boarders and others. Mean family size for the foreign-born was 5.45 (including all members) or 5.03 (excluding boarders and others). Families with foreign-born heads had more children at

all ages (of children) present in the household, relative to families with native-born heads. (See bottom panel of Table 1.)

Related to this is the fact that head's income (as opposed to total family income) was lower for the foreign-born group as a whole. (This was not true, however, among British and German immigrants, who did better than average among all immigrants in this sample.) The difference is accounted for by much larger earnings from children for the foreign-headed families. These families had an average of $136 in income from children, as opposed to $66 for families with a native head. (Immigrant German families were again an exception.) Thus children furnished both greater demands on the family budget but also, in many cases, part of the solution to the problem.[13] All this indicates the importance of controlling for demographic composition in the analysis of family budgets. As Table 1 shows, not only did the number and age composition of children in two-parent families vary widely across countries and nativity groups, but, as the last line of the table points out, there were also considerable differences in the number of boarders and other persons.

In terms of the budget shares for consumption categories other than food, native families spent more on housing than did immigrant families within the United States, again with the exception of the German born. All families living in the United States spent a considerably larger share of their budgets on housing than did the sample families living in Britain and Germany. Clothing shares were much more similar across the various groups, once more excepting both Germans in the United States and in Germany, who spent a higher than average budgetary proportion on clothing. Fuel shares were rather similar across groups and countries. Germans on both sides of the Atlantic seemed to spend more on liquor and tobacco. Within the United States,

however, there was little difference between native-headed and foreign-headed families (as a group) on this dimension. Spending on furniture, a relatively small portion of the total budget, constituted a larger budget share among the native born than among the foreign born within the United States. The furniture share was lower in Europe than in the United States and was higher in Germany than in Britain. In general, spending on furniture seemed to be income elastic (i.e., the budget share increased with income), as did spending on housing and the residual category of "Other."[14] On the other hand, food seemed to be definitely income inelastic, while clothing, fuel and light, and liquor and tobacco had less clear elasticity patterns. They could have been nearly unit elastic. But with so many other complicating covariates, it is clear that elasticity calculations should be done in a multivariate framework.

An example of one such complication appears in Table 2. There it is seen that substantial regional variations in consumption patterns existed within the United States.[15] For example, food shares and fuel/lighting shares were lowest in the Midwest and highest in New England. Housing took the largest portion of consumer budgets in the Middle Atlantic region. The share for drink and tobacco was high in the Midwest, and that for clothing high in both the South and the Midwest. These variations were due, in part, to regional differences in average family size and composition, as well as differences in total income and expenditure and in relative regional prices (see Table 5 below). But there were also differences in ethnic composition. For example, relatively few of the foreign born lived in the South. In addition, as Table A-1 suggests, composition of the sample by industry varied by region. In order to control for this multiplicity of factors, the Engel curve version of the Almost Ideal Demand System with covariates (equation (9)) was estimated by

ordinary least squares regression for the United States (Tables 3A and 3B), Britain (Table 9), and Germany (Table 10). The model was estimated for six commodity groups, with furniture being excluded because of its consumer durables characteristics. (The expenditure variable was also adjusted to exclude spending on furniture.) Table 3A presents the simple linear version (in terms of the natural logarithm of expenditure per capita) of the Engel curve for the United States, while Table 3B reports parallel results for the quadratic specification.

As may be seen in Table 3A, the linear specification has significant coefficients on the logarithm of expenditure per capita in all the equations. Both the linear and the quadratic terms of the logarithm of expenditure per capita in Table 3B were statistically significant for four of the six commodity group equations (food, fuel and light, liquor and tobacco, and other), and the quadratic term alone was significant for the clothing equation. For the housing equation, however, neither of the coefficients for the expenditure terms were statistically significant, although the expenditure coefficient had been significant in the linear specification in Table 3A. The cause was a high degree of collinearity between the linear and quadratic expenditure variables which interfered with estimation. For the smaller British and German renter samples (Tables 9 and 10) the collinearity problem was so severe that, although the logarithm of expenditure per capita was generally statistically significant in equations with only the linear or only the quadratic terms, these coefficients were usually insignificant (i.e., had large standard errors) when both were included. Thus, for reasons of practical estimation and also because of greater ease in calculating and interpreting the elasticities, only the linear specification is reported and

used for Britain and Germany (in Tables 9 and 10) and also for the full Almost Ideal Demand System model (with prices) for the United States (in Table 6).

Although the quadratic specification was generally statistically significant for the American renter sample, inclusion of the quadratic expenditure term does not necessarily much improve the statistical goodness of fit. Indeed, comparing the last panels of Tables 3A and 3B, the adjusted R^2 values were only slightly increased by incorporating the quadratic term, and the F-ratios actually declined in five of the six equations. In terms of the effect of excluding the quadratic term on the coefficients of variables other than the logarithm of expenditure per capita, changes in coefficients between Tables 3B and 3A seemed not to be too large. Dummy variable coefficients for region within the United States and for the industry, age group, occupation, and nativity of family head did not appear greatly affected. That is, absolute and, in many cases, relative changes were small. Coefficients for family composition (i.e., the number of persons in each age group) exhibited a bit more sensitivity, but the biggest changes were in the food share equation and, generally, for the variable for the number of adults. Although this discussion is imprecise, the linear form of the Almost Ideal Demand System provides a reasonable fit to the data.

Returning to a discussion of the variables in Table 3A, food, housing, and fuel and lighting had negative coefficients on the logarithm of expenditure per capita and so were "necessities". That is, they had expenditure elasticities of demand of less than unity.[16] Similarly, clothing, liquor and tobacco, and other expenditure items had, on average, expenditure elasticities greater than one and were thus, by definition, "luxuries". The actual expenditure elasticities have been calculated and are given in Table 7

below. These results differ somewhat from those which seemed apparent in Table 1, where it seemed that housing might have been expenditure elastic. Standardized for the effects of other covariates, it clearly was not. Fuel and lighting was definitely a necessity, while clothing had an elasticity not much greater than unity. (If furniture had been included in the model, its expenditure elasticities would have been considerably above one, as expected from an examination of Table 1.)

Some of the other patterns for the United States observed in Tables 1 and 2 are confirmed in Table 3A. Regional effects were often significant, even holding constant such covariates as industrial, occupational, ethnic, and demographic composition. Relative to the Midwest (the omitted dummy variable), food and housing shares were higher in the New England and Middle Atlantic regions, but were lower in the South. Conversely, shares for clothing, liquor and tobacco, and other expenditure categories were lower in the New England and Middle Atlantic regions and higher in the South. More was spent on fuel and lighting in New England. The negative (though statistically insignificant) coefficient of the South region in the fuel and lighting equation is sensible in view of the warmer climate there.

These regional effects suggest that omitted variables, particularly prices, may have been important. This view is reinforced by the fact that budget shares for fuel and lighting were significantly lower for families whose head worked in coal mining or coke manufacture (relative to the omitted dummy variable for the glass industry). Coal is bulky and has a low value to weight ratio, making transport costs an important element in retail price. Fuel prices would thus have been lower for families located near coal mines and coking plants. If fuel was price inelastic, then lower prices would have

resulted in lower budget shares. There is some evidence the fuel was price inelastic in this sample, at least among native-born and British-born workers. (See Table 7 below.) Contemporary evidence for Korea indicates a similar result (Lluch, Powell, and Williams, 1977, ch. 5).

Family composition had, as might be expected, a significant effect on expenditure shares in the United States circa 1890. A common method of standardizing for family composition in Engel curve estimation has been to use expenditure per capita in place of total expenditure. This has been done in Table 3A; but the results show that even making this adjustment is not sufficient. The coefficients for number of adults and for children in various age groups were usually significant. These coefficients (in Tables 3A, 3B, and 6) must be interpreted as second-order effects, once expenditure has been divided by total family size. The impact of an additional individual is thus, first, that caused by a reduction in expenditure per capita, and, second, that caused by the differential effects of individuals by age (i.e., adults, children 0-4, etc.). This is done in Table 4 which performs the calculation on the basis of adding one individual.[17] Removing an individual would simply reverse the signs. Table 4 provides both the absolute and relative effects of a change in family demographic composition. The relative effects are simply the absolute effects divided by the mean budget share for each expenditure category.

For the United States three commodity groups (food, housing, and fuel and light) were found to be "necessities". This implies that declines in expenditure per capita (either from a fall in expenditure or an increase in family size) should cause the budget share to increase. Table 4 indicates for the American sample that this was consistently true for food and largely true

for fuel and light, but not for housing.

For food, an additional adult in the household had a significant effect on the budget share for food, but little beyond that implied by expenditure per capita. If total expenditure were held constant, an additional adult would lower expenditure per capita and hence raise the food share in the budget. According to the results in Tables 3A and 4, the effect of an additional adult on the food share would have been approximately the full effect via expenditure per capita. This is because of the small and statistically insignificant coefficient for adults. Children had different effects by age, with an additional younger child raising the food share by less than an additional older child. (That is, an extra younger child had a larger negative effect on the food share than an extra older child, after expenditure per capita had been lowered, and hence food share increased, by the addition of one more person.) Thus the budget share for food would have increased by about 1.5 percentage points for an additional adult, but only by .84 percentage points for an extra child below age five. These effects in Table 4 are quite similar to results obtained in studies of equivalence scales when adults are seen as having different effects than children in influencing the size and composition of intrafamilial consumption demand (Deaton and Muellbauer, 1980b, ch. 8; 1986). The results for the quadratic specification in Table 3B are less clear cut, but would still indicate that, holding total expenditure constant, additional adults and older children raised the food share by more than additional very young children.

For fuel and lighting, Table 4 indicates that an additional adult increased the budget share but that the effects of additional children were small. Thus the effect of an extra adult in the United States would have been

to increase the fuel and lighting share by .23 percentage points, while extra children would have had much less effect. Also, patterns by age of child were irregular, with some raising and some reducing the budget share, and were also very small.

For housing, although the coefficient on the logarithm of expenditure per capita was significant and negative, indicating the housing was a "necessity", the coefficients in Table 4 for overall demographic effects were all negative. This implies that, although housing was a "necessity" with respect to expenditure per capita, the counteracting family composition effects were such that housing became a "luxury" with respect to demographic composition. It is interesting that children had considerably more effect than adults in raising the share of spending for rent in the United States, and that older children had more effect than younger ones. Overall, the need for space and/or other housing amenities seemed to depend most on the family's children.

For two of the categories of "luxuries" -- liquor and tobacco, and "Other" expenditures -- an additional individual in a family in the United States would have lowered the budget share, holding total expenditure constant. For the third, clothing, the demographic effects varied, with an additional lowering the budget share and an additional child raising it. For clothing, the behavior of the budget share with respect to demographic composition was similar to a "luxury" for adults and a "necessity" for children. Evidently adults could "make do" while children, growing and active, could not have clothing expenses postponed. It also seems logical that older children, with more expensive clothing and also possibly more responsive to styles, should have had larger effects on budget shares than younger children. It is also of note that the same difference between adult and child effects for the clothing

share characterized the Engel curves estimated for Britain and Germany (and also presented in Table 4).

The budget share for liquor and tobacco was less affected in an absolute sense by demographic composition than the other budgetary shares. Once the (statistically significant) effect of expenditure per capita had been taken into account in Table 3A, an additional adult in the United States would have increased the budget share for liquor and tobacco (although the effect was statistically insignificant in the quadratic formulation in Table 3B). The net effect (shown in Table 4) was, however, that an extra adult in the United States would have reduced the budget share for liquor and tobacco (a "luxury") but by less than a child. The explanation may be that, for these more purely "adult" goods, there was less substitutability for adults relative to children.

Finally, for the category of "Other" goods and services (i.e., taxes, insurance premiums, union dues, other organizational expenses, charitable and religious contributions, reading materials, medical and death expenses, amusements and vacations, and other unspecified expenditures), Table 4 reveals that these items were definitely "luxuries" and that older children had a greater impact than younger children and, interestingly, than adults.

In terms of the absolute changes (i.e., "absolute effects") in budget shares from shifts in family composition shown in Table 4, food and "Other" goods and services were of the greatest importance. Fuel and light and liquor and tobacco exhibited very small effects (well below one percentage point), while the remaining expenditure categories (housing and clothing) had impacts of less than two percentage points and often less than one. The calculation of relative changes is an effort to look at something like a demographic

elasticity. Thus in relation to the size of the budget share for each category, the relative effects in Table 4 reveal that the share for "Other" goods and services, strongly a luxury good, was most sensitive to demographic variation. Fuel and lighting was least sensitive. Food was rather unresponsive in this relative sense, largely because the budget share was so large. Housing and clothing were moderately affected by demographic variation in relative terms. It is plausible that such "Other" goods and services as insurance, charitable contributions, dues to organizations, and medical expenses would have been the first to be adjusted to demographic composition. But the lack of relative sensitivity of food, an important "necessity, is rather surprising.

Another way to view these effects is to note that, across all six commodity equations, the absolute effects must sum to zero for any demographic category. That is, a negative effect on one commodity group for a given demographic category must be compensated by a positive effect on some other commodity group. In this sense, then, an additional adult in the United States would have induced a large and significant increase in the food share, a large and significant decrease in the share for "Other" goods and services, significant but small negative effects on the housing, clothing and liquor/tobacco shares, and a modest increase in the fuel and lighting expenditure share. Additional children had smaller effects in increasing the food share, and the impact increased directly with the age of the child. An extra child, in contrast to an adult, increased the clothing share, and the effect also varied directly with the age of the child. Extra children reduced the budget shares for housing, liquor and tobacco, and "Other" goods and services. They had little effect on the fuel and lighting share. In sum,

family composition effects were quite important, both via the direct effect on expenditure per capita and via the second-order effects for different age groups.

Several additional groups of dummy variables -- head's industry, occupation, and age -- were included in the models estimated in Tables 3A and 3B. There is no a priori reason to expect industry or occupation to have been significant in determining consumption patterns, especially when such other factors as total expenditure, family size and composition, region, and ethnicity had been taken into account. In both Tables 3A and 3B, the coefficients for industry were largely significant (relative to the omitted dummy variable for the glass industry). Many of these effects probably reflected different prices for different locations. It has already been noted that the budget share for fuel and lighting was significantly less for families with heads employed in coal mining and coke manufacturing. Fuel was quite cheap at these locations and the demand for fuel was likely price inelastic. But why should the food share have been significantly lower in the American woolen and glass industries relative to the other seven industries? Why should the housing share have been significantly less in pig iron, coal, coke, iron ore and cottons? Why should families in the glass industry have had a significantly larger share for liquor and tobacco and a significantly smaller share for clothing? There may have been regional and locational taste effects, but it is difficult to imagine these. The basic conclusion remains that there are important omitted variables, one of which is local prices (see below).

The variable for head's age was introduced to see if any life cycle effect could be discerned on the composition of consumption. For the United States,

at any rate, Tables 3A and 3B show that the food share and the share for "Other" expenditures was smaller, while that for clothing was larger in the middle years of the life cycle relative to the early and late years. These may reflect demographic compositional effects not taken into account elsewhere. That is, the need for clothing for growing children would have necessitated sacrifices in other areas. Since expenditure per capita would have already been taken into account, the life cycle consumption profile (having been highest in the middle years and lowest at the beginning and ending years) (Haines, 1979b) would also have been held constant. These coefficients then reflect adjustments made beyond the basic expenditure elasticities.

Dummy variable categories for occupation of family head were also included in the models presents in Tables 3A and 3B. Relative to the omitted dummy variable, unskilled manual workers, the food share of the other groups were lower. For three groups (semiskilled and skilled manual workers and craftsmen) these differences were statistically significant. Skilled manual workers and white collar/supervisory personnel spent relatively more for housing, while craftsmen spent relatively more for clothing. Unskilled workers had a larger budget share for liquor and tobacco, perhaps reflecting tastes and cultural values. But otherwise, occupation seems to have revealed few systematic patterns.

This brings us to the issue of ethnicity. As is apparent from Tables 3A and 3B, ethnic differences in the composition of consumption remained significant in a number of instances, especially for food. Relative to families with native-born heads and holding constant level of expenditure, family size and composition, region, industry, and occupation and age of

family head, almost all groups of families with foreign-born family heads all spent significantly more on food. Canadians spent over three percentage points more. Only the small sample of slavic families (48 cases) had a statistically significantly lower budget share for food, while the other small Italian (11 cases) and Other Nativity (118 cases) categories were not significantly different from the native born. The foreign born spent significantly more (in all cases) on liquor and tobacco and less on "Other" goods and services, such as taxes, insurance, charity, amusements, reading materials, amusements, etc. British, Irish, and Canadian families spent significantly less on housing than the native born, while German immigrants spent more. Differences in budget shares for housing and for fuel and light were generally small and/or statistically insignificant across ethnic groups. Thus even for these broad expenditure categories and holding constant a number of other factors, ethnic differences seemed to persist for food, liquor and tobacco, "Other" goods and services, and, less extensively, housing.

If consumption behavior at this level of aggregation can describe a dimension of immigrant assimilation, then this sample of immigrants had only partially adjusted to American life. We are, unfortunately, not told how long they had lived in the United States, nor how well they used the English language, nor whether their wives were native or foreign born. The significantly higher food and liquor/tobacco shares and the lower shares for housing and "Other" goods and services (many of the latter being "luxuries" and amenities) point to the possibility of differences in tastes, but this cannot be firmly established, partly because of the chance of important omitted variables.

Regional Price Differences

Previously it was noted that regional price differentials were possible and, indeed, likely. Table 5 confirms this for the twenty four states from which the Commissioner of Labor sample was drawn. Earlier work by Coelho and Shepherd (1979) had used the Aldrich Report (U.S. Congress, 1892) to construct regional price and real wage indices for the United States in 1890. The Aldrich Report of the Finance Committee of the United States Senate contains, among other things, retail price data for 215 commodities taken from a number of establishments in 70 cities over a twenty-eight month period from 1889 through 1891. Using these data, Coelho and Shepherd constructed regional price indices for selected commodity groups (food, clothing, fuel and light, and other) and found substantial variation across space. This was particularly true for bulky, low value-to-weight ratio commodities like fuel, but also occurred for food and clothing. High transport costs, imperfect market development and integration, imperfect competition that varied by region, and disequilibrium are potential explanations. Demand models estimated from cross-section budget data generally assume that buyers face the same prices everywhere. The facts indicate that this is not a good assumption historically for the United States and is indeed often not reasonable for many of today's developing nations (Deaton, 1986).

The price indices in Table 5 were constructed from prices for the same 80 selected commodities used by Coelho and Shepherd, with the addition of two food items, thirteen clothing items, three furniture items, and two additonal "other" items.[18] The weights within and between commodity groups were also taken from Coelho and Shepherd (1979, unpublished appendices). Housing was one area which they did not include, partly because of the difficulty in obtaining good data on rental, mortgage, and homeownership costs. It was

deemed essential to have housing costs for the present study, and consequently average rents per room were collected for each state in the 1889/90 survey. The problems with this are apparent -- most especially the lack of information on size of rooms, quality and condition of dwelling, and availability of amenities. Nonetheless, these numbers constitute at least some index of regional housing cost differences.

A Demand System with Prices

The Almost Ideal Demand System was reestimated using the specification given by equation (11) and the state-level price indices from Table 5. The results appear in Table 6, for the linear specification in expenditure per capita. In comparison with the results in Table 3A, the addition of prices did improve goodness of fit (as measured by adjusted R^2 values) in all cases, although the F-ratio only rose in two of the six equations. The most immediate effects of adding prices should have been expected on the coefficients for region of residence. Comparing Tables 3A and 6, it may be observed that the sizes and levels of significance of the regional coefficients were reduced for food and for "Other" goods and services. The coefficients for clothing were changed only a small amount, while those for housing, fuel/light, and liquor/tobacco were generally increased. Thus, although there are substantial regional effects associated with price differentials, overall regional differences were not eradicated by the inclusion of price variables.[19] Industry and occupation coefficients shifted somewhat, but incidence of statistical significance was not much altered. The impact of demographic composition was also not much changed. More important, the coefficients for nativity of the household head were not greatly affected by the inclusion of prices. In general, families with a

foreign-born head still spent a greater proportion of their budget on food and less on other goods and services. Price variation across space, once included and if properly measured, could not account for the observed ethnic variation in patterns of demand.

Ethnic differentials in demand can be further explored with expenditure and price elasticities. These results are provided in Tables 7 and 8. The elasticities were computed according to equations (10) and (12) through (15), using parameter values from Table 6 and evaluated at the mean budget shares. Table 7 gives expenditure, own-price, and compensated own-price elasticities for the six commodity groups for the whole renter sample in the United States and for five of the major ethnic subgroups (i.e., native-born Americans, British, Irish, Canadians, and Germans). As note above, the expenditure elasticities confirm that food, housing, and fuel and lighting were "necessities" for all groups (i.e., $e_i < 1$), while clothing, liquor and tobacco, and especially "Other" expenditures were all "luxuries" (i.e., $e_i \geq 1$).

The uncompensated (Marshallian) and compensated (Hicksian) own-price elasticities were negative (as theory would predict) with three exceptions -- clothing and liquor/tobacco for the German immigrant subsample and "Other" goods and services for the Canadian immigrant subsample. Housing tended to be price inelastic, as did food, except for the Canadian and German subsamples. Clothing was price elastic. Fuel/lighting was price inelastic for families headed by the native born and British born but price elastic for other immigrant families. The results for liquor and tobacco and for "Other" goods and services were mixed, uncompensated own price elasticities being both above and below one.

It is somewhat discouraging to find some of these results, such as any positive own-price elasticities (implying upward sloping demand curves), price elastic demand for food (among Canadian and German immigrants), and such considerable variation in price elasticities for fuel and lighting, liquor and tobacco, and "Other" goods and services. On the other hand, the expenditure elasticities seem plausible. Almost all the own-price elasticities were negative; and the own-price elasticities for the native-born sample (which was large and widely distributed geographically) were reasonable.

Table 8 provides the uncompensated and compensated own-price and cross-price elasticities for the whole American renter sample. These results, and the underlying estimates, permit examination of whether the restrictions to the demand system given by equations (4) through (6) held for the American sample. As already mentioned, estimation of the Almost Ideal Demand System by ordinary least squares insures that adding up (i.e., that all the marginal propensities to consume must add to unity) is true by construction. This can be calculated from Table 6, and the result will satisfy the equations in (4).

Homogeneity of degree zero in prices and expenditure was not rejected for food, liquor and tobacco, and for "Other" goods and services. It was rejected (in a statistical sense) for housing, clothing, and fuel and lighting.[20] The homogeneity condition implied by equation (5) (i.e., that all the price coefficients within an equation should sum to zero) was relatively close to being met in the cases of clothing and fuel/lighting. The sums of the coefficients in those equations were statistically significantly different from zero only at a five percent level of significance. Only the housing equation showed a deviation from homogeneity at a one percent level of statistical significance. It is the case that consumers are usually not at

their utility maximizing position with respect to current housing purchased because of the significant transactions costs involved in relocating.

Symmetry and negativity (of the Slutsky matrix) can only be properly tested if the Almost Ideal Demand System is reestimated by a system procedure, which was not done here. To see if these regularity conditions would hold on these unrestricted estimates, the tests were performed on the OLS parameters. Symmetry was not true for most of the pairs of cross effects.[21] The negativity condition of the Slutsky matrix also did not hold. That is, the Slutsky matrix was not negative semi-definite.[22] On the other hand, and more importantly, all the uncompensated and compensated own-price elasticities from Table 8 (those along the principal) diagonal were negative. Thus the implied demand curves were indeed downward sloping.

Overall, these results are encouraging, although they exhibit some of the problems of demand system estimation also seen when time series data are used. That is, homogeneity often only holds in part, while symmetry and negativity are not confirmed by the data in the context of the model (Deaton and Muellbauer, 1980a, ch. 3). Nonetheless, considering the fact that the price data used here were only at the level of states and that rental data were not of the best quality, the basic outcomes are not unreasonable.

International Comparisons: Great Britain and Germany

Since the Commissioner of Labor survey also covered five European nations, it is possible to make comparisons of the American experience with that of two nations who sent large numbers of migrants to the United States in the nineteenth century -- Great Britain and Germany. Unfortunately, the European samples did not provide geographic location within each country. Therefore, spatial price variation of that type cannot be included. Engel curves can,

however, be estimated for Britain and Germany.

Tables 9 and 10 present ordinary least squares estimates of the Engel curve version of the Almost Ideal Demand System for the six expenditure categories for Great Britain and Germany respectively. The independent variables included differ somewhat across countries. For example, while there was a good deal of ethnic variation within the British sample (e.g., English, Scots, Welsh, Irish), there was little in the German sample. Almost all workers were noted as German. Thus no ethnic categories were used in the German equations. As already mentioned, no regional variables could be calculated. For Britain, no workers from iron ore mining were represented in the sample. The German sample lacked any workers from pig iron and glass manufacture. (See Table A-1.) The industry variables were configured accordingly. The German renter sample had no household heads below age 20 and no workers who could be classified as white collar or supervisory or in the residual "other" category. The version of the Almost Ideal Demand System estimated for Tables 9 and 10 used only the linear specification in the logarithm of expenditure per capita.[23]

Table 11 provides expenditure elasticities for the six commodity groups calculated for the entire American renter sample, for the British and German renter samples, and for selected nativity groups of renters within the United States. The elasticities were calculated both at group mean budget shares (in the upper panel of Table 11) and at the mean budget shares of the entire American renter sample. The effect of standardizing to the overall American renter sample mean in the lower panel was most often, though not always, to reduce variations across groups. General rankings were altered a bit. In any event, the differences in budget shares across groups had only a limited

impact on calculation of elasticities at sample means. For the United States, results are presented only for the largest nativity groups: native-born Americans, British (English, Scots, Welsh), Irish, Canadians (both English- and French-speaking), and Germans. These foreign-born groups comprised 92.7 percent of all the immigrants in the American sample and, together with the native born, were 96.7 percent of the whole American renter sample. Separate equations were estimated for each of the nativity groups in order to obtain the elasticities. No prices were used in the American equations in order to facilitate comparisons with the British and German samples. Although earlier results demonstrate that prices were indeed important (in the United States), it was felt that the comparisons in Table 11 would be useful, despite the lack of regional prices for Great Britain and Germany.

The overall results in Tables 9 and 10 for Britain and Germany bear many similarities to the Engel curve estimates for the United States given in Table 3A. The British sample showed that, as in the United States, food, housing, and fuel and lighting were "necessities" (with expenditure elasticities less than one), while clothing, liquor and tobacco, and "Other" goods and services were "luxuries" (having expenditure elasticities greater than one). The German sample was, however, unusual in that food was (marginally) a luxury good, while clothing was a necessity. It is notable, however, that the underlying coefficients for the logarithm of expenditure per capita in Table 10 for food and clothing, as well as for liquor and tobacco, were statistically insignificantly different from zero. This implies that the corresponding expenditure elasticities in Table 11 for the German sample were insignificantly different from one. Thus it is impossible to state whether these goods were either luxuries or necessities. The small size of the German

renter sample (only 137 cases) undoubtedly contributed to the inability of the estimation technique to obtain more efficient parameter estimates.

In Britain, quite a few industry coefficients were significant, suggesting regional effects. As with the American sample, the fuel and lighting share was significantly lower for households with the head working in coal mining or coke manufacture. Workers in heavy industry (i.e., mining and metallurgy) and glass manufacture spent proportionately more on liquor and tobacco than those in the textile industry. This was also, with the exception of glass, similar to the American results in Table 3A. The culture of work in these heavy industries, plus the more arduous physical demands on workers, may have induced greater resort to alcohol and nicotine. Relatively few other comprehensible patterns by industry appeared in the British equations.

Family composition effects in British worker demand were rather similar to those in the United States. This may best be viewed by returning to Table 4, where the total effect of an additional individual on budget shares (holding total expenditure constant) is assessed. Separate calculations were made for the American, British, and German samples. From Table 9 it may be seen that many of the second order family composition coefficients for Britain were statistically significant. Table 4 provides comparisons between Great Britain and the United States. For food (a "necessity"), an additional adult raised the food share by more than a child in both countries, and the effect of children generally increased with age. The effect of an extra individual in Britain on a change in the budget share for food was largest in absolute terms among all six commodity groups, but it was much smaller in relative terms. For housing, the pattern was different. Although in both the United States and Great Britain housing was a "necessity" according to expenditure

elasticities (see Table 11), in both countries it was a "luxury" good with respect to demographic composition. The effects were, however, quite small. On the other hand, in Britain an adult had a larger impact than a child, the reverse of the American case. In both nations an older child had a bigger effect than a younger sibling.

The demographic effects on British clothing demand were also similar to those in America. In both cases, clothing was a "luxury" good with respect to family composition for adults but not for children. In Britain, effects by age of child were irregular, unlike the United States. Family composition effects on the demand for fuel and lighting were quite different between Great Britain and America. In Britain, the overall effects were larger and consistently negative, and differences by age of child were decreasing for older children rather than increasing, as was the case for the United States. The demographic influence on budget shares for "Other" goods and services was, on both sides of the Atlantic, large in both absolute and relative terms. This commodity group was a "luxury" which had a roughly increasing age pattern of effects by age of children. Liquor and tobacco, also "luxury" goods, had small absolute demographic effects, much larger relative effects, and unclear age patterns. One would expect few significant child age effects here, and Tables 3A and 9 reveal that the coefficients on age of children were generally insignificant or at a low level of significance for both adults and younger children.

For the British renter sample, household head's occupation and age had overall insignificant and ambiguous effects. One exception was that heads in mid-life course (aged 20-49) generally spent a larger share of their budgets on "Other" goods and services than older workers (aged 50 and over). Since

this consumption category includes such things as insurance and contributions (to such things as friendly societies and burial societies, among others), it can be interpreted as an aspect of savings (Johnson, 1985). This result would then be consistent with the life cycle model of consumption and saving (Modigliani and Brumberg, 1954; Haines, 1985; Ransom and Sutch, 1986). It is also consistent with a permanent income model (Friedman, 1957) in which younger family heads were on their way up and so could "afford" more of these luxuries. This was not, however, the case for the United States where, indeed, the reverse seemed true. American workers were, on the other hand, more likely to have accumulated in the form of housing than was the case in Britain. In the whole Commissioner of Labor survey, 18 percent of the American sample were homeowners, whereas only about two percent of the British working class families in the sample were so identified. Homeownership was indeed strongly related to age in the expected curvilinear fashion in the American portion of the sample (Haines and Goodman, 1989).

Ethnic variation in consumption within the British sample seemed to be significant, although clear patterns were not apparent. Holding expenditure and family composition constant, households with non-English heads (i.e., Scots, Welsh, Irish) spent a significantly larger share for food (the Scots remarkably so) and less for housing, clothing, and liquor and tobacco. Variations by ethnicity for fuel and lighting and for "Other" goods and services was not all in one direction. With the exception of the Irish, it is not known whether these ethnic designations identified migrants in the sense of crossing important cultural boundaries. Industrial establishments in Wales and Scotland which may have been included in the sample. A number of these workers might have been rural to urban migrants, but this was less likely in

1890 in Britain than earlier in the century. In short, it is impossible to interpret the differentials for the Scots and Welsh as having to do with migrants. The Irish, however, were migrants, and these ethnic effects were significant in the cases of food, clothing, and housing. And this takes into account only differences from the dominant ethnic group, the English, not differences from the Scots and Welsh.

Turning to the German renter sample, estimates of the Almost Ideal Demand System are provided in Table 10. Comparisons are given in Tables 4 and 11. The small size of the sample (137 cases) may be the cause of some of the peculiar results. For instance, three of the six coefficients on expenditure per capita (for food, clothing, and liquor and tobacco) were insignificantly different from zero, suggesting unitary expenditure elasticities. As in the United States and Britain, housing and fuel and lighting were "necessities", while "Other" goods and services remained "luxuries." The occupation and age of the household head seemed to have had little predictable effect on demand patterns in Germany, results similar to those for the United States and Britain. No support is forthcoming from the German worker sample for the notion of life cycle saving via the age of household head for the category of "Other" goods and services. One effect of note was that skilled workers and craftsmen spent a significantly lower budget share for food in relation to unskilled and semiskilled workers.

Industry effects in Germany were often statistically insignificant. Workmen in heavy industry had lower budget shares for fuel and light (probably reflecting the concentration of these industries at or near coal fields, such as the Ruhr). They also had generally larger shares for "Other" goods and services. Workers in iron and steel spent significantly less on housing.

Family composition effects for the German sample are given in Table 4. German workers exhibited reasonably similar family composition effects on consumption (both absolutely and relatively) to American and British workers. The signs for the effects for food were positive (with one exception in the German sample), and the impact of an adult was larger than that for a child. The family composition effects on housing, liquor and tobacco, and "Other" expenditures were negative. For clothing expenditure, adults consistently showed a negative effect and children positive effects in all three nations. Effects on spending for fuel and lighting were irregular in Germany as in the United States. Given what was said about the statistical insignificance of the German coefficients on expenditure per capita for food, clothing, and liquor and tobacco, examination of the actual family composition coefficients from Table 10 is more productive in these cases than the numbers in Table 4. From Table 10, it is seen that the effect of an additional individual was to raise the budget share for food, with an adult having more impact than a child. This is, of course, a consequence of Engel's Law, which seems clearly supported in the present data. An extra adult would have lowered the budget shares for clothing and for liquor and tobacco and by more than for an extra child. These outcomes place the German results in line with those for Great Britain and the United States.

Immigrants and Consumer Behavior

Something more can now be said about immigrants and consumption behavior. As already mentioned, Table 11 provides expenditure elasticities for the whole American sample, immigrant subgroups within the United States, and for Great Britain and Germany. These results must be qualified by the fact that regional prices could not be included for the British and the German samples.

A comparison of Table 11 with the expenditure elasticities for the demand system with prices in Table 7 reveals that the basic results across ethnic groups within the United States were not essentially changed by the inclusion of prices.

From Table 11, the British sample revealed expenditure elasticities apparently not too different from those for British (and even Irish) migrants to the United States. But they were also not greatly out of line with those for native-born Americans. The expenditure elasticities for food were very close, and statistically insignificantly different from each other, between the British and British migrant samples. The food elasticities for both British groups were only slightly above those for native-born Americans, although the results were marginally significantly different.[24] The results for clothing, fuel and lighting, and "Other" goods and services were close as between British migrants and native-born Americans; but British migrants were statistically close to the British worker sample only with respect to food and clothing. British migrants to the United States were distinguished by a very high expenditure elasticity for liquor and tobacco products.

Perhaps these similarities between the British and native-born Americans should not be so surprising, since much in American culture at that time was influenced by British culture, history, law, etc. The dummy variable coefficients for nativity in Table 6 (i.e., the full demand model) revealed that British migrants were not significantly different from the native born in the United States for any expenditure categories except food and "Other" goods and services. These results differ from those for expenditure elasticities in that they relate to intercepts rather than particular slopes (i.e., the β_i's,

or their transformed values, expenditure elasticities). The results in Tables 7 and 11 are based on separate estimations for each nativity group in the United States, whereas Tables 3A and 6 are pooled estimates with all ethnic groups in the same equation.

The expenditure elasticity estimates for Irish migrants were not radically different from those for the native born. Nevertheless, in terms of both the dummy variable nativity coefficients in Table 6 and the expenditure elasticities in Table 7, Irish migrants did differ significantly from the native born only with respect to food and housing. These were two of the most important expenditure categories. (The results in Table 11, derived from the Engel curves in Table 3A, also indicate a significant difference for fuel and lighting.) When Canadians were taken as a group, as in Tables 7 and 11, there were relatively fewer significant differences of expenditure elasticities from those of the native born. Only housing and, marginally, clothing and fuel and lighting in Table 7 and only housing and clothing in Table 11 showed statistically significant differences. Tables 3A and 6, however, exhibited more significant differences in the dummy variables for nativity, but more for those identified as French Canadian.

A similar investigation of ethnic differences in demand using the Almost Ideal Demand System has been undertaken for contemporary Australia by Clements and Johnson (1983). They found that expenditure elasticities for food differed by ethnic origin, but that this was not true for housing or other goods and services. The elasticities for immigrants from the United Kingdom and Ireland were, in general, very similar to those for native-born Australians. The greatest differences were found for food (including subcategories of the food budget) and for immigrants from Asia and from

southern Europe (i.e., Italy and Greece). A role for cultural similarities and differences by area of ethnic origin is certainly implied. These results resemble those in the present paper for the comparisons between native-born Americans British (and Irish) migrants, and residents of Great Britain.

The German results present a contrast. Even accepting the notion that the expenditure elasticities for the German sample for food, clothing, and liquor and tobacco were statistically not different from unity (itself rather unusual), German immigrants to the United States exhibited quite different demand patterns in some respects in relation to area of origin. For German immigrants, food was strongly a "necessity", more than among other immigrants, much more than for workers in Germany, and even a bit more than among native-born American workers (although the difference here was statistically insignificant). German migrants were thus similar to native-born Americans with respect to food, but they were more like workers back in Germany regarding housing and fuel and lighting. They were rather more like other immigrants for clothing and liquor/tobacco and seemed to resemble the United States in general with regard to "Other" goods and services. The coefficients in Table 6 show that German migrants were significantly different from the native born in the United States for all six consumption categories.[25] Given the inefficiency of the estimates of elasticities from the German sample, it is difficult to make comparisons between German migrants to the United States and residents of Germany. For the expenditure elasticities from Table 11, however, significant differences appeared for four of the six commodity groups (food, clothing, liquor and tobacco, and "Other" goods and services).

Up to this point, the discussion has focussed on comparisons of

expenditure elasticities between ethnic groups within the United States and also with the British and German samples. The Almost Ideal Demand System is, however, directed to the explanation of budget shares -- the allocation of consumption across various commodities. Some further analysis and experiments were conducted on the budget shares for various groups, and these results appear in Table 12.

The top panel of Table 12 presents the actual budget shares for the United States, British, and German portions of the Commissioner of Labor survey, as well as for five principal nativity groups within the United States. Once again, the larger budget shares of the foreign born for food and their smaller budget shares for "Other" goods and services appear. The same even more true for the British and German samples. The Europeans also tended to spend less on housing and more on liquor and tobacco. The second panel of Table 12 gives the budget shares predicted by the equations in Tables 3A, 9, and 10. For the predicted values and for the ethnic groups within the United States, it was assumed that each family had the average expenditure per capita and family composition as the whole American sample. For Great Britain and Germany, the average values for expenditure and family composition were taken for each of these samples separately. It was assumed that the head of family was a semiskilled steel worker in the age group 30-39 and, for the United States, resident in the Middle Atlantic region. These results amount to standardization to sample mean values and, in the case of the United States, to the separate effects of the ethnic dummy variables from Table 3A. As may be seen, in the second panel (with predicted values using the overall equations) the gaps among ethnic groups within the United States narrowed, since the effects of different levels of expenditure per capita and

differences in demographic composition were eliminated. Also, for Britain, the predicted budget shares fell sharply for food and rose for housing, liquor and tobacco, and "Other" goods and services.

But the different ethnic groups did not enjoy the same level of income or expenditure as the American average and had differing average family composition. The remaining panels of Table 12 examine more complex standardization questions for British, German, and Irish migrants. For the panel label "British -- Migrants to the U.S." the following results are given: the actual average budget shares of British (English, Scots, Welsh) migrants to the United States; the predicted budget shares for these British migrants using parameter values for the actual subsample of British migrants as well as the average variable values for this subsample and assuming a semiskilled steelworker in the age group 30-39 living in the Middle Atlantic region ("U.S. Values"); and, finally, the same as the preceding exercise but with average British values for expenditure per capita and family composition ("British Values"). The next three rows "British -- In Britain" performs the same exercise using the British sample results (Table 9) and gives actual average budget shares in Great Britain ("Average Shares"), predicted shares using average American sample values for expenditure per capita and demographic composition ("U.S. Values"), and predicted shares using average British values for expenditure per capita and family composition ("British Values"). The family head was, again, assumed to be a semi-skilled steel workers in the age group 30-39 years. For the panel in Table 12 labeled "Germans", the same simulation was carried out for the German migrants to the United States as well as the sample of workers in Germany. Finally, the panel labeled "Irish" gives a parallel analysis for Irish migrants to the United States and, in the

last two rows, Irish migrants to Britain. It should be noted that these experiments used parameter values for British, German, and Irish migrants to the United States estimated separately for each subsample. For Irish migrants to Great Britain, parameter values were taken from the overall British equation (Table 9) because the sample of Irish migrants to Britain was so small (41 families in the renter group) as to preclude reasonable estimation of separate parameters.

Taking the British case first, it can be seen immediately that the higher budget share for food among British migrants was not due to lower expenditure per capita or larger family size. Providing British immigrant families with their own sample average expenditure per capita and family composition (the panel labeled "British -- Migrants to U.S." in Table 12) pushes them back down their Engel curves to larger food shares as well as lower shares for housing, clothing, fuel and lighting, and "Other" goods and services. Although average family size was comparable for the British migrant sample (5.23 persons, including boarders and others) relative to the overall American average (5.19 persons), average expenditure per capita was, in fact, higher for the British migrants ($122) than the average for the whole American sample ($117). Normally, as expenditure per capita increases, the standard Engel curve movement for "necessities" (food, housing, fuel and light) would be a decrease in budget shares with the reverse being true for "luxuries" (clothing, liquor and tobacco, and "Other" goods and services). This did not happen systematically in this instance because of the confounding effects of demographic and other compositional variables. This demonstrates the importance of taking family makeup and other covariates into account in demand models. Applying British values for expenditure per capita ($98) and family

composition (family size 4.99 persons) to the British immigrants to the United States resulted in a yet higher food share because of the lower expenditure (and income) level among British workers. The reverse movement along the Engel curves resulted in the expected effects for "necessities" and "luxuries" with the sole exception of liquor and tobacco. Demographic compositional factors were largely dominated here by expenditure effects.

Moving to the last three rows of the "British" panel in Table 12, workers in Britain are shown with their actual average budget shares, predicted budget shares with average values for the American sample for expenditure per capita and family size and composition, and finally predicted shares using average British worker values for the same variables. For other variables, it is assumed that these are semiskilled steel workers born in England and in the age group 30-39 years. These results again testify to the powerful effect of higher American incomes and expenditures and smaller American family sizes (see Table 1), resulting in higher expenditures per capita in the United States and consequently demonstrably smaller budget shares for food, housing, and fuel and light and correspondingly larger shares for the "luxuries" clothing, liquor and tobacco, and "Other" goods and services.

The fourth panel of Table 12 repeats this simulation for German migrants to the United States as well as the sample of workers in Germany. As Table 11 revealed, German immigrants had the same pattern of expenditure elasticities in terms of "necessities" and "luxuries" as other nativity groups in the United States. It is remarkable how relatively much more German immigrants spent on housing and relatively much less they spent on food as compared with their counterparts in Germany. The food share for German migrants was greatly increased if average German sample values for expenditure per capita and

demographic composition were assigned, but these simulations for German groups are not as reliable as indicated by the very low share for "Other" goods and services when the average German sample values were used. The results for German workers produced the previously noted outcomes of much higher food shares but also remarkably low shares for housing and fuel and lighting as well as quite large shares for clothing and for liquor and tobacco. There may well have been a significant proportion of these German workers who were receiving subsidized housing and fuel. Assigning average German sample values to German migrants or American sample values to German workers did not produce very enlightening results.

Finally, the last panel of Table 12 compares Irish immigrants to the United States with Irish immigrants to Great Britain. The Irish in Britain spent relatively more on food and on liquor and tobacco and less on housing, clothing, and "other goods and services than their counterparts in America, despite use of different average sample values.

A problem with the simulations in Table 12 is the difficulty in summarizing the results for comparison across ethnic groups. Table 13 is an effort to condense the findings in Table 12. It gives the index of dissimilarity and the index of relative difference for various combinations of ethnic groups.[26] In general, these indices compare differences in the distributions among expenditure categories (budget shares) across ethnic groups. Since the budget shares are normalized (i.e., sum to one), there is no scale effect of the absolute size of expenditures on the indices. But both indices assign equal weights to large categories like food and housing as well as to small categories like fuel and lighting and liquor and tobacco. In order to assess this effect, the individual differences that make up the index

of dissimilarity were weighted by the average budget shares in the American sample (i.e., the first row of Table 12) to give relatively more importance to food but also to housing, clothing, and "Other" goods and services.

In general, Table 13 tells the story that, along the dimension of consumption behavior, British migrants to the United States were much more like native-born American workers than workers in the country of origin. This was true whether one uses actual budget shares (top panel); predicted budget shares from the overall equations in Tables 3A, 9, and 10 (second panel); or predicted budget shares from the individual migrant sample estimates (lower panel). The results also held whether one uses own or British average variable values; whether the index of dissimilarity or the index of relative difference are employed; or whether unweighted or weighted versions of the index of dissimilarity were calculated. Thus, for example, the weighted index of dissimilarity or the index of relative difference was less when the distribution of consumer expenditure for British migrants was compared to that for native-born American workers than when it was compared to that for workers in Britain. Thus assimilation, though not complete, was certainly far along. The same also held true for immigrant German workers. They much more resembled workers in the area of destination than in the area of origin. Similarly, Irish-born workers in the United States were much more like American-born workers than their counterparts who had left for Great Britain. Finally, across ethnic groups within the United States, British and Irish workers were usually more similar to native-born American workers than were German and Canadian migrants, although the results for the German immigrants depended on the choice of index and sample values.

The Food Budget

Since many of the differences in consumer behavior across ethnic groups in the United States in 1890 originated in food expenditures, a separate analysis was done for the United States of food budgets. The results are given in Table 14. The Almost Ideal Demand System with prices is estimated for five categories of food spending: bread, bakery and cereal products ("Grain Share"); meat, fish, and poultry ("Meat Share"); dairy products ("Dairy Share"); fruits and vegetables ("Fruit/Vegetable Share"); and other food ("Other Food Share").[27] A price index was constructed for each of the food budget categories. A variable for expenditure per capita was derived for food expenditure only. The theoretical justification for this is a two-stage budgeting model (Deaton and Muellbauer, 1980a, ch. 5), which assumes that the first stage of consumer choice allocates expenditure among the major categories (e.g., food, housing, clothing, etc.) and that there is a second stage which allocates expenditure among detailed subcategories once the expenditure constraints are set for the category at the first stage. This requires some assumptions about the separability of preferences, usually weak or quasi separability (Deaton and Muellbauer, 1980a, ch. 5).

An important aspect of differences across ethnic groups in consumer behavior was the larger share of the family budget for food among the foreign born, holding constant level of expenditure, family size and composition, region, industry, family head's age and occupation, and relative prices (Table 6). Table 14 reveals that the differences probably originated in cereal and dairy products. It is important to realize that Table 14 does not explain the share of the food budget in the overall budget (that was done in Table 6), but rather its composition. But Table 14 does show that, relative to the native born, British and German migrants spent significantly more on dairy products,

Irish and Canadian immigrants significant more on both cereal and dairy products, and French Canadian immigrants significantly more on grains and bread. There were virtually no significant ethnic differences in expenditures for meat, fish, and poultry, while the foreign born usually spent less on fruits and vegetables and on "Other" foods (including coffee, tea, sugar, molasses, condiments, eggs, and lard). Potatoes were included in the category of vegetables, and notably the foreign born (including the Irish) did not seem to carry with them a taste for this important part of the Old World diet. Thus, even with comparable levels of spending on food and holding family size and composition constant, the foreign born placed greater emphasis in their diets on breadstuffs and grain products and on dairy staples, and less on fruits and vegetables and on the "frills". They did not scrimp on meat, however. But this analysis cannot answer why this occurred, nor can it exclude the possibility that the foreign born bought qualitatively different food at high prices -- ethnic specialty products. But it seems at least possible that customs from the old country influenced the decision to feed the family as well as possible.

A few other items may be noted in Table 14. Within the food budget, grain, meat, and dairy products, as well as fruits and vegetables, were all "necessities". The only "luxury" food products (i.e., with expenditure elasticities greater than one) were in the "Other" category: coffee, tea, sugar, molasses, condiments, eggs, lard, and other unspecified food -- the "frills". Notably, however, grain and cereal products were considerably less income elastic than meat or dairy products, as one would generally expect for starchy staples. Spending on dairy products, meat, and fruits and vegetables tended to be higher in the North, while expenditures for cereal and grain

products was more dominant in the South. Meat and dairy consumption did not seem uniformly higher for workers in heavy industry than for those in cottons and woolens, although bar iron and steel worker families spent relatively more on meat. The heavy extra protein and calorie requirements for workers in mining and metallurgy were met more with breadstuffs than with meat and cheese. On the other had, workers in iron, steel, and coal spent more on coffee, tea, sugar, eggs, condiments, etc. and less and fruits and vegetables.

Demographic composition was important. An extra child aged 5 and above tended to increase the share of family consumption of cereal products while reducing the shares for meat, dairy, and fruit and vegetable. If the additional individual in the family was an adult, however, the effect was to offset some of the increase in the food budget for grain products and for fruits and vegetables and to have little net additional effect on meat consumption beyond that through reducing expenditure per capita. Overall, children pushed the family diet to bread and cereal products and away from meat, dairy, fresh produce, and the "frills". Older family heads seemed to consume more grain products, while more skilled workers ate more meat and dairy products and less bread and rice.

Concluding Comments

The analysis of family budgets can provide some insight into differential behavior of immigrants relative to individuals native to areas of origin and destination. The Almost Ideal Demand System, both in the Engel curve version and the full model with prices, is a flexible framework in which to explore some of these question. The micro data in the Sixth and Seventh Annual Reports of the U.S. Commissioner of Labor, along with price data from the Aldrich Report of 1892, furnish basic information permitting exploration of

some of these issues for worker families for the period circa 1890.

In terms of consumption behavior, it appears that British immigrant workers in the United States had significantly assimilated. Both their actual and predicted patterns of budget allocation looked much more like those of native-born American workers than of workers in the area of origin. German immigrant workers behaved more differently from the native-born population in both places of origin and destination, but they too were closer to the behavior of native born workers in the United States than to workers in Germany. Irish migrants to America too were much more like the American native workers than they were to Irish migrants to Great Britain.

The ethnic effects in Table 6 were quite a bit smaller than those for location (region) and industry, although they were generally larger than the impact of the age or occupation of the household head. Thus the effects of ethnicity, though often statistically significant, were frequently of a moderate magnitude. Some indication of this may be seen in the β-weights for the nativity dummy variables in Table 6, which often were smaller than the β-weights than for region, industry, and sometimes even age and occupation.[28] Nonetheless, ethnic effects in consumption within the United States did not disappear when prices, expenditure, and other covariates were controlled. Some of the ethnic differences were due to larger relative food expenditures among the foreign born which, in turn, are traceable to larger spending on grain and cereal products and on dairy products. The foreign born were quite similar to the native born in the spending on meat, fish, and poultry.

There remains the problem of explaining why these differences in consumption behavior by ethnic group appeared in the analysis. Those

differences which did exist were not too large and showed that British, Irish, and German migrants were less different from native born workers in the United States than workers in the areas of origin. Nevertheless, while it may be tempting to assign those differentials which did exist to tastes and preferences, and hence to say that immigrant assimilation had not fully taken place in this dimension of behavior, there remains the possibility that omitted variables were important. For example, we have no measure of the duration of residence of the immigrant workers within the United States. Assimilation should be a function of length of residence. We also do not know where the wife was born. Wife's ethnic background, if not the same as the husband's, could have a confounding effect on the analysis. We also know nothing about the literacy, educational attainment, or, in the case of non-English speaking immigrants, English language ability of the immigrants. Hence, the significant dummy variable coefficients for nativity might be due to the effects of omitted variables which were correlated with nativity. But it remains that of the 36 dummy variable coefficients (in Table 6) for the foreign-born groups of any important size (British, Irish, Canadian, French Canadian, German, and Slavic), fully two thirds (24) were significant. The highest incidence of insignificant coefficients came among the groups who spoke English and who were probably more like native-born Americans in other respects, the English, Irish, and Canadians not identified as French Canadians. This latter suggests that immigrant values may indeed have had a role.

FOOTNOTES

1. A utility function is generally chosen to be strictly quasi-concave, non-decreasing in each of its arguments, continuous and differentiable, and to represent ordinal preferences which satisfy the conditions of reflexivity, completeness, and transitivity (see Deaton and Muellbauer, 1980a, ch. 2).

2. Adding up means that $\Sigma_{i=1}^{n} p_i q_i = X$ or $\Sigma_{i=1}^{n} (p_i q_i)/X = 1$, where q_i is quantity of the ith commodity (or commodity group), p_i is its price, and X is total expenditure.

3. Homogeneity is also a property of the budget constraint. It means that $\Sigma(cp_i q_i)/(cX) = \Sigma(p_i q_i)/X$, where c is some constant.

4. More formally, the substitution effect should be

$$(\delta q_i/\delta p_i)_{U=\text{constant}} < 0.$$

If utility is not held constant then there is an income effect because the change in any price changes <u>real</u> income (i.e., purchasing power). This means that observed uncompensated price effects are a combination of the compensated price effect and the income effect:

$$(\delta q_i/\delta p_i) = (\delta q_i/\delta p_i)_{U=\text{constant}} - q_i(\delta q_i/\delta X)$$

This is the Slutsky equation. The symmetry property implies that

$$(\delta q_i/\delta p_j)_{U=\text{constant}} = (\delta q_j/\delta p_i)_{U=\text{constant}}$$

5. The double logarithmic specification is $\log(q_i) = \alpha_i + \beta_i \log(X)$; the semi-logarithmic specification is $q_i = \alpha_i + \beta_i \log(X)$; the hyperbolic specification is $q_i = \alpha_i - (b_i/X)$; and the log-reciprocal specification is $\log(q_i) = \alpha_i - (b_i/X)$.

6. Taking the double logarithmic form $\log(q_i) = \alpha_i + \beta_i \log(X)$, and reworking it into the expenditure version:

$$\log(q_i) + \log(p_i) = \alpha_i + \log(p_i) + \alpha_i \log(X).$$

The expenditure elasticity is defined as

$$e_i = (\delta q_i/\delta X)(X/q_i) = \delta \log(q_i)/\delta \log(X)$$

For the double logarithmic specification, it is easily seen that

$$e_i = \beta_i.$$

It may also be shown that adding up is satisfied only in the case that $e_i = 1$ for all goods, which is empirically a very uninteresting case (see Deaton and Muellbauer, 1980a, ch. 1).

7. The linear expenditure system is based on an expenditure (demand)

function of the form

$$p_i q_i = p_i \tau_i + \beta_i (X - \Sigma p_k \tau_k), \qquad \text{where } \Sigma \beta_k = 1.$$

It satisfies the restrictions of adding up, homogeneity, and symmetry. It is base on a direct utility function

$$u = u(q) = \pi (q_k - \tau_k)^{\beta^k}$$

(where q is a vector of quantities and τ_k and β_k are parameters) and an indirect utility function (i.e., utility as a function of prices and expenditure)

$$u = \Phi(X,p) = (X - \Sigma p_k \tau_k)/\pi p_k^{\beta k}$$

(where p is a vector of prices. Inverting the indirect utility function yields the cost function

$$c(u,p) = \Sigma p_k \tau_k + u \pi p_k^{\beta k}.$$

If this function is minimized subject to the utility constraint (i.e., prices are chosen to minimize the cost of attaining a given level of utility), the same solution is obtained as maximizing the direct utility function subject to the budget constraint. The restrictions of adding up, homogeneity, and symmetry mean that the cost function is concave in prices (i.e., as prices rise, cost increases no more than linearly). If the cost function is not concave in prices, it does not yield demand equations equivalent to those from constrained utility maximization. But even a properly minimized and concave cost function will yield no complements in this system (Deaton and Muellbauer, 1980a, pp. 64-67).

8. Let $w_i = \alpha_i + \beta_i \log(X)$. Create a matrix for T observations $\underline{X} = [\underline{i} \log(\underline{X})]$, where $[\underline{i}]$ is a vector of T ones and $[\log(\underline{X})]$ is a vector of observations on log(X) (i.e., the natural logarithm of expenditure). Let the ordinary least squares estimator of β_i, the parameter vector in the regression for the ith commodity (or commodity group), be $\beta_i = (X'X)^{-1}X'w_i$

for the vector of budget shares w_i. Let $\underline{j}$ be the vector $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$. Then

$$\Sigma_{i=1}^{n} \underline{w}_i = \begin{pmatrix} \Sigma w_{i1} \\ .. \\ \Sigma w_{iT} \end{pmatrix} = \begin{pmatrix} 1 \\ . \\ 1 \end{pmatrix}, \text{ a column vector of T ones, since } \Sigma w_i = 1$$

for any individual. Also,

$$\underline{X}\underline{j} = [\underline{i} \log(\underline{X})] \begin{bmatrix} 1 \\ 0 \end{bmatrix} = \underline{i} = \begin{bmatrix} 1 \\ . \\ 1 \end{bmatrix} = \Sigma \underline{w}_i.$$

The question is whether $\Sigma \underline{w}_i = 1$ for the ordinary least squares estimates, which then satisfies adding up.

$$\Sigma_{i=1}^{n} \hat{\beta}_i = \Sigma(X'X)^{-1}X'w_i = (X'X)^{-1}X'\Sigma_{i=1}^{n} w_i = (X'X)^{-1}(X'X)\underline{i} = I\underline{i} = \underline{i}$$

the model is $w_i = X\hat{\beta}_i$. Therefore,

$$\Sigma_{i=1}^{n} w_i = \Sigma_{i=1}^{n} X\hat{\beta}_i = \Sigma_{i=1}^{n} X\underline{i} = X\underline{i} = \begin{pmatrix} 1 \\ . \\ 1 \end{pmatrix}$$

Thus adding up is automatically satisfied by ordinary least squares for Engel curves. For the full model (i.e., including prices), let

$$w_i = \alpha_i + \beta_i \log(X/P) + \Sigma_{j=1}^{n} \tau_{ij} \log(p_j)$$

where the p_j's are the prices of the n commodities and P is a price index. The adding up result shown above also holds true for the full model.

9. "Normal" families for the 1889/90 survey were defined as having both a husband and a wife; not more than five children, no one of whom was over 14 years of age; no other dependents or boarders; not owning its own dwelling place; and having expenditures for rent, fuel, lighting, food, clothing. For the 1901 survey, "normal families" were defined as having a husband at work; a wife; not more than five children with none over 14 years of age; no other dependents, boarders, lodgers, or servants; and who provided data on rent, clothing, fuel, lighting, clothing, food, and sundries (U.S. Bureau of the Census, 1975, Vol. 1, p. 309).

10. $e_i = \delta \log(q_i)/\delta \log(X) = (X/q_i)/(\delta q_i/\delta X) = (x/q_i)(\delta[(w_i)(X)/p_i]/\delta X)$

$= (X/(q_i p_i))[w_i + (X)(\delta w_i/\delta X)] = (1/w_i)[w_i + (X)(\delta w_i/\delta X)]$

$= 1 + [(\delta w_i/\delta \log(X))/(w_i)] = 1 + (\beta_i/w_i)$

If the quadratic term is present

$$e_i = (1 + \beta_{i0} + 2\beta_{i1} \log(X))/(w_i)$$

11. Ethnicity is determined by the place of birth of the family head.

12. The sample of 8,544 families consisted largely of husband-wife families. Only 92 families (1.1 percent) had only the male head present (i.e., with no wife) and 181 families (2.1 percent) had a female head. The reduction in the sample size from selecting only renters was somewhat larger: 15.4 percent of the overall sample were homeowners.

13. Two-parent families with an American-born had were less likely to have had a child working, holding age and income of family head, demographic composition of the family, and other factors constant (Haines, 1979b, Table A.7).

14. The category of "Other" goods and services contains expenditures for taxes, property and life insurance, union dues, charitable and religious contributions, reading materials, amusements, and medical and death expenses,

as well as unspecified other expenditures.

15. The regions comprised the following states from the Commissioner of Labor survey: New England Region (Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut); Middle Atlantic Region (New York, New Jersey, Pennsylvania, Delaware, Maryland); Southern Region (Virginia, North Carolina, South Carolina, Georgia, Kentucky, Tennessee, Alabama, Mississippi, Missouri, Louisiana); Midwest Region (Ohio, West Virginia, Indiana, Illinois).

16. Since the income elasticity of demand is: $e_i = 1 + (\beta_i/w_i)$, and since $w_i > 0$, if $\beta_i \leq 0$, then $e_i \leq 1$, which defines a commodity as a "necessity". Similarly, if $\beta_i > 0$, then $e_i > 1$, which defines commodity i as a "luxury".

17. Partially differentiating equation (9) with respect to any demographic group N_r:

$$\delta w_i/\delta N_r = \beta_{io}[\delta \log(X/N)/\delta N_r] + T_{ir}(\delta N_r/\delta N_r)$$

$$= (-\beta_{io}/N)(\delta N/\delta N_r) + T_{ir} = (-\beta_{io}/N) + T_{ir}$$

18. The prices actually selected were median values for the 12 months of 1890, across all establishments for one commodity for each city. State values were obtained as simple arithmetic averages of the cities within a state. For the very few instances where no price was available for a particular commodity for a particular state, the price was taken from an adjacent state. For details on the construction of the price index, see Haines (1989).

19. There is also the question as to whether these are the appropriate prices. The Aldrich Report prices are for particular cities within a state, and probably at least some of the Commissioner of Labor survey families in a particular state did not live in those cities. Only the state of residence is known for the survey. Nonetheless, they are the best prices available. One other alternative would be the use of "implicit" prices from the survey itself, ie.e. total expenditure divided by total quantity for each commodity. The obvious problem with this procedure is that it includes quality differences and may reflect discounts. Deaton (1986, 1987) has proposed to use local average prices for small geographic areas, which he terms "clusters." The problem with using this procedure with the Commissioner of Labor survey is that (a) only some commodities (foodstuffs, and, sometimes, fuel and lighting) have quantity data and (b) the "clusters" are geographically large (i.e., states). The treatment of housing in the present paper, however, actually uses something like that procedure.

20. The homogeneity condition is $\Sigma_j \tau_{ij} = 0$. Calculating this from Table 6, the results are:

Commodity	$\Sigma_j \tau_{ij}$	t-ratio	Significance
Food	-.0342	-0.652	---
Housing	.1047	3.010	***
Clothing	-.0840	-2.051	**
Fuel/Lighting	.0334	2.303	**
Liquor/Tobacco	.0167	0.712	---

Other	-.0366	-0.822	---

The t- ratios were calculated according to procedures in Maddala (1977, p. 194). That is, if $\hat{L} = \Sigma_{j=1}^{6} a_j \tau_{ij} = 0$, where the a_j's = 1, and if $Var(\tau_{jj}) = [c_{jj}]\sigma^2$ and $Cov(\tau_{ij}\tau_{ji}) = [c_{ij}]\sigma^2$, where σ^2 is the overall error variance, then $Var(\hat{L}) = \Sigma_i \Sigma_j a_i a_j c_{ij} \sigma^2$. This can be calculated for each equation, i.e., for food, clothing, etc. The significance levels are: *** significant at least at a one percent level, ** significant at least at a five percent level, and --- not significant at least at a ten percent level.

21. The symmetry condition is given by equation (6). It states that $\tau_{ij} = \tau_{ji}$ (for $i \neq j$) for the various categories of expenditures When this was tested directly, the condition was found largely not to be met with this sample. Of the fifteen total possible pairs of τ_{ij}'s, seven were different from each other at a one percent level of significance and three more at a five percent level. Only six pairs were not statistically significantly different at a five percent or better significance level. The test was made on the restriction $L = a_1\tau_{ij} + a_2\tau_{ji} = 0$, where $a_1 = 1$ and $a_2 = -1$. Var(L) was calculated as explained in footnote 20. The results were:

t-ratios of $(\tau_{ij} - \tau_{ji} = 0)$

	Food	Clothing	Housing	Other	Liq/Tob	Fuel/Light
Food	---					
Clothing	2.855	---				
Housing	-1.070	-3.558	---			
Other	-2.165	2.594	3.714	---		
Liq/Tob	-6.532	1.629	-5.111	4.271	---	
Fuel	1.787	1.762	-5.383	-1.347	-2.493	---

It should be noted that this test is approximate. An exact test would require a system estimation of the τ_{ij}'s, and not separate equation by equation estimation. Also, the approximate price index given by equation (3.1) would have to be replaced by the price index in equation (3).

22. The Slutsky matrix of the compensated price effects $(\delta h_i/\delta p_j)$, where h_i is the Hicksian, or compensated, demand for good i, is supposed to be negative semi-definite, thus insuring the concavity of the cost function. In this case, rather than the Slutsky matrix itself, another matrix was evaluated. Its ijth element was

$$k_{ij} = \tau_{ij} + \beta_i\beta_j \log (X/P) - w_i\delta_{ij} + w_iw_j$$

where, in this case, δ_{ij} is the Kronecker delta, with a value of 1 if i=j and 0 otherwise. The 6x6 matrix of τ_{ij}'s was transformed into a 6x6 matrix of k_{ij}'s. This matrix should also be negative semi-definite (Deaton and Muellbauer, 1980b, p. 316; 1980a, p. 76). To test this, the six real eigenvalues of this should be non-positive. In fact, they were not. The four largest real eigenvalues (-.34642, -.12263, -.07613, and -.05083) were negative. The two smallest eigenvalues were, however, positive (.00015 and .01725).

23. The quadratic specification in the logarithm of expenditure per capita

produced such serious collinearity that both the expenditure coefficients were often not significant.

24. The expenditure elasticities in Tables 7 and 11 were compared for the differences of two means. The standard errors for the distribution of the differences of the means were given by [standard error of β_i/mean budget share]. In terms of the tests for differences from native-born Americans, the t-ratios calculated from the expenditure elasticities in Table 7 (for the full demand system) are as follows:

	FOOD	HOUSING	CLOTHING	FUEL	LIQ/TOB	OTHER
U.S. Sample	1.591	-1.666	0.318	0.302	2.117	-0.181
British Migrants	1.693	-3.475	0.610	0.341	3.797	-0.542
Irish Migrants	2.660	-2.693	-0.507	0.681	1.094	0.924
Canadian Migrants	1.126	-3.323	1.922	-1.772	1.587	0.900
German Migrants	-1.055	-2.045	1.930	-0.421	2.993	1.121

The t-ratios calculated from the expenditure elasticities in Table 11 (for Engel curves) are:

	FOOD	HOUSING	CLOTHING	FUEL	LIQ/TOB	OTHER
U.S. Sample	1.225	-1.144	0.095	0.867	1.788	-0.026
British Migrants	1.653	-3.752	0.792	1.576	3.705	-0.721
Irish Migrants	2.561	-3.374	-0.910	2.041	1.173	1.408
Canadian Migrants	1.211	-2.909	1.800	-0.660	1.254	0.610
German Migrants	-1.589	-2.613	1.985	0.849	3.346	1.377
British Sample	1.921	-6.763	1.735	-2.297	1.119	3.071
German Sample	4.991	-1.276	-2.346	0.132	-0.428	-2.774
British Migrants vs. Brit. Sample	-0.148	1.890	-0.779	3.081	2.163	-2.938
German Migrants vs. Ger. Sample	-5.272	-0.049	3.122	0.375	2.674	3.157

For a two-tailed test, the critical values are 10%: 1.645; 5%: 1.960; 1%: 2.575.

25. The results are less dramatic when the expenditure elasticities in Tables 7 and 11 are compared between German migrants and native-born Americans. Only on three dimensions (housing, liquor/tobacco, and clothing) were differences statistically significant.

26. The index of relative difference is defined as

$$IRD = (.5)\ (\Sigma_i^n\ |([r_{2i}/r_{1i}]*100) - 100|)/n$$

where the r's are the proportional shares and n is the number of catergories, in the present case six.

The index of dissimilarity is defined as

$$ID = (.5)\ \Sigma_i\ |r_{2i} - r_{1i}|\ .$$

See U.S. Bureau of the Census (1971), pp.232-233.

27. The categories contained the following expenditure categories from the Commissioner of Labor survey: Bread, Bakery, and Cereal Products (flour, bread, rice); Meat, Fish, and Poultry (beef, pork, meat, poultry, fish); Dairy Products (butter, milk, cheese); Fruits and Vegetables (fruit, vegetables, potatoes); and Other Food (tea, coffee, sugar, molasses, condiments, eggs, lard, food not specified).

28. The beta-weight equals the regression coefficient multiplied by the ratio of the standard deviation of the independent variable to the standard deviation of the dependent variable. It is a measure of how much change is produced in the dependent variable from a standardized change in that independent variable, controlling for the effects of the other covariates.

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TABLE 2. Annual Income, Annual Expenditure, & Family Size. Working Class Families in Nine Industries. United States. 1889/90. By Nativity of Family Head & Region. (Renter Families. Both Parents Present.)

	TOTAL U.S.	NATIVE BORN	FOREIGN BORN	BRITISH BORN	GERMAN BORN
1. New England Region					
Number of Families	1052	302	750	179	63
Total Income (U.S.$)	676	616	701	694	564
Expenditures (U.S.$)					
Total	639	568	666	659	568
Food	308	253	330	308	274
Housing	75	84	71	77	64
Clothing	94	81	99	93	89
Fuel & Lighting	42	42	42	43	36
Drink & Tobacco	14	10	15	14	20
Furniture	22	23	22	29	18
Other	84	75	87	95	67
Percent for					
Food	48.20%	44.54%	49.55%	46.74%	48.24%
Housing	11.74%	14.79%	10.66%	11.68%	11.27%
Clothing	14.71%	14.26%	14.86%	14.11%	15.67%
Fuel & Lighting	6.57%	7.39%	6.31%	6.53%	6.34%
Drink & Tobacco	2.19%	1.76%	2.25%	2.12%	3.52%
Furniture	3.44%	4.05%	3.30%	4.40%	3.17%
Other	13.15%	13.20%	13.06%	14.42%	11.80%
Family Size(1)	5.11	4.20	5.48	4.87	5.21
2. Middle Atlantic Reg.					
Number of Families	2556	1330	1226	421	275
Total Income (U.S.$)	664	652	678	666	656
Expenditures (U.S.$)					
Total	613	599	624	613	590
Food	270	259	281	276	256
Housing	89	89	88	86	97
Clothing	102	95	109	104	98
Fuel & Lighting	33	34	32	31	28
Drink & Tobacco	18	16	20	15	26
Furniture	18	20	15	19	11
Other	83	86	79	82	74
Percent for					
Food	44.05%	43.24%	45.03%	45.02%	43.39%
Housing	14.52%	14.86%	14.10%	14.03%	16.44%
Clothing	16.64%	15.86%	17.47%	16.97%	16.61%
Fuel & Lighting	5.38%	5.68%	5.13%	5.06%	4.75%
Drink & Tobacco	2.94%	2.67%	3.21%	2.45%	4.41%
Furniture	2.94%	3.34%	2.40%	3.10%	1.86%

TABLE 2. Annual Income, Annual Expenditure, & Family Size. Working Class Families in Nine Industries. United States. 1889/90. By Nativity of Family Head & Region. (Renter Families. Both Parents Present.)

	TOTAL U.S.	NATIVE BORN	FOREIGN BORN	BRITISH BORN	GERMAN BORN
Other	13.54%	14.36%	12.66%	13.38%	12.54%
Family Size(1)	4.68	4.55	4.82	4.83	4.47
3. Southern Region					
Number of Families	948	883	65	29	11
Total Income (U.S.$)	547	531	776	746	684
Expenditures (U.S.$)					
Total	515	505	690	656	576
Food	212	208	260	257	246
Housing	61	58	97	83	92
Clothing	92	93	128	131	91
Fuel & Lighting	31	31	32	31	26
Drink & Tobacco	20	19	27	24	24
Furniture	20	20	24	16	11
Other	79	76	122	114	86
Percent for					
Food	41.17%	41.19%	37.68%	39.18%	42.71%
Housing	11.84%	11.49%	14.06%	12.65%	15.97%
Clothing	17.86%	18.42%	18.55%	19.97%	15.80%
Fuel & Lighting	6.02%	6.14%	4.64%	4.73%	4.51%
Drink & Tobacco	3.88%	3.76%	3.91%	3.66%	4.17%
Furniture	3.88%	3.96%	3.48%	2.44%	1.91%
Other	15.34%	15.05%	17.68%	17.38%	14.93%
Family Size(1)	4.73	4.70	5.11	5.10	4.09
4. Midwest Region					
Number of Families	795	448	347	123	102
Total Income (U.S.$)	742	725	763	781	701
Expenditures (U.S.$)					
Total	694	695	696	718	644
Food	268	256	282	298	263
Housing	89	90	89	88	88
Clothing	118	114	124	124	120
Fuel & Lighting	29	27	33	36	28
Drink & Tobacco	35	35	36	31	36
Furniture	31	36	26	34	24
Other	124	137	106	107	85
Percent for					
Food	38.62%	36.83%	40.52%	41.50%	40.84%
Housing	12.82%	12.95%	12.79%	12.26%	13.66%

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TABLE 1. Annual Income, Annual Expenditure, & Demographic Composition. Working Class Families in Nine Industries. United States, Great Britain, & Germany. 1889/90. By Nativity of Family Head. (Renter Families. Both Parents Present.)

		UNITED STATES				EUROPE	
	TOTAL U.S.	NATIVE BORN	FOREIGN BORN	BRITISH BORN	GERMAN BORN	GREAT BRITAIN	GERMANY
Number of Families	5351	2963	2388	752	451	979	137
Expenditures (U.S.$)							
Total	612	583	649	643	599	485	295
Food	266	243	296	286	260	242	152
Housing	81	79	83	84	90	50	23
Clothing	102	96	109	106	102	81	51
Fuel & Lighting	34	33	35	35	29	27	13
Drink & Tobacco	20	19	21	18	27	18	15
Furniture	21	23	19	24	15	6	8
Other	88	90	86	90	76	61	33
Percent for							
Food	43.46%	41.68%	45.61%	44.48%	43.41%	49.90%	51.53%
Housing	13.24%	13.55%	12.79%	13.06%	15.03%	10.31%	7.80%
Clothing	16.67%	16.47%	16.80%	16.49%	17.03%	16.70%	17.29%
Fuel & Lighting	5.56%	5.66%	5.39%	5.44%	4.84%	5.57%	4.41%
Drink & Tobacco	3.27%	3.26%	3.24%	2.80%	4.51%	3.71%	5.08%
Furniture	3.43%	3.95%	2.93%	3.73%	2.50%	1.24%	2.71%
Other	14.38%	15.44%	13.25%	14.00%	12.69%	12.58%	11.19%
Income(U.S.$)							
Total	657	623	699	695	654	526	298
From Husband	507	512	501	522	565	395	228
From Wife	12	10	14	16	6	11	11
From Children	97	66	136	117	57	106	33
From Boarders	31	25	38	32	18	8	19
Other	10	10	10	8	8	6	7
Percent from							
Husband	77.17%	82.18%	71.67%	75.11%	86.39%	75.10%	76.51%
Wife	1.83%	1.61%	2.00%	2.30%	0.92%	2.09%	3.69%
Children	14.76%	10.59%	19.46%	16.83%	8.72%	20.15%	11.07%
Boarders	4.72%	4.01%	5.44%	4.60%	2.75%	1.52%	6.38%
Other	1.52%	1.61%	1.43%	1.15%	1.22%	1.14%	2.35%
Av. Family Size(1)	4.76	4.54	5.03	4.89	4.58	4.93	5.19
Children (per 100 families)							
Aged 0-4	77.9	76.8	79.3	74.2	79.4	65.1	105.8
Aged 5-9	75.5	72.6	79.1	77.0	76.7	88.9	89.8
Aged 10-14	63.9	58.3	70.8	69.8	56.5	67.9	70.1
Aged 15+	57.8	45.8	72.6	67.4	41.2	71.5	50.4
Boarders & Others (per 100 families)	44.1	46.0	41.8	34.6	19.7	5.5	40.9

(1) Not including boarders & others.

SOURCE: U.S. Commissioner of Labor [1890, 1891].

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TABLE 2. Annual Income, Annual Expenditure, & Family Size. Working Class Families in Nine Industries. United States. 1889/90. By Nativity of Family Head & Region. (Renter Families. Both Parents Present.)

	TOTAL U.S.	NATIVE BORN	FOREIGN BORN	BRITISH BORN	GERMAN BORN
Clothing	17.00%	16.40%	17.82%	17.27%	18.63%
Fuel & Lighting	4.18%	3.88%	4.74%	5.01%	4.35%
Drink & Tobacco	5.04%	5.04%	5.17%	4.32%	5.59%
Furniture	4.47%	5.18%	3.74%	4.74%	3.73%
Other	17.87%	19.71%	15.23%	14.90%	13.20%
Family Size(1)	4.61	4.45	4.82	5.09	4.53

(1) Not including boarders & others.

SOURCE: U.S. Commissioner of Labor [1890, 1891].

TABLE 3A. Regressions with Commodity Budget Shares as the Dependent Variable. Working Class Families in Nine Industries. United States. 1889/90. (Renter Families. Both Parents Present.)

	(1)			(2)			(3)		
	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight
Dependent Variable	Food Share			Housing Share			Clothing Share		
Independent Variables									
Constant	0.8481	***	NC	0.2839	***	NC	0.0386	**	NC
LN(Expenditure PC)	-0.0829	***	-0.4310	-0.0206	***	-0.1559	0.0156	***	0.1066
Region									
New England	0.0443	***	0.2072	0.0063	**	0.0440	-0.0326	***	-0.2017
Mid Atlantic	0.0260	***	0.1524	0.0166	***	0.1458	-0.0162	***	-0.1256
South	-0.0287	***	-0.1290	-0.0075	***	-0.0505	0.0053	*	0.0313
Midwest	NI	NI	NI	NI	NI	NI	NI	NI	NI
Industry									
Pig Iron	0.0220	***	0.0794	-0.0305	***	-0.1653	0.0351	***	0.1671
Bar Iron	0.0254	***	0.0876	0.0124	***	0.0640	0.0052	---	0.0238
Steel	0.0338	***	0.0659	0.0012	---	0.0036	0.0129	***	0.0331
Coal	0.0175	***	0.0524	-0.0362	***	-0.1626	0.0342	***	0.1351
Coke	0.0292	***	0.0669	-0.0368	***	-0.1264	0.0828	***	0.2497
Iron Ore	0.0251	***	0.0436	-0.0861	***	-0.2233	0.0563	***	0.1284
Cottons	0.0298	***	0.1646	-0.0245	***	-0.2025	0.0077	**	0.0562
Woolens	-0.0044	---	-0.0174	0.0029	---	0.0175	0.0207	***	0.1086
Glass	NI	NI	NI	NI	NI	NI	NI	NI	NI
Family Composition									
Adults	-0.0008	---	-0.0119	-0.0046	***	-0.1046	-0.0018	***	-0.0363
Children 0-4	-0.0076	***	-0.0770	-0.0094	***	-0.1422	0.0041	***	0.0544
Children 5-9	-0.0034	**	-0.0360	-0.0090	***	-0.1399	0.0078	***	0.1071
Children 10-14	-0.0034	**	-0.0347	-0.0097	***	-0.1500	0.0133	***	0.1798
Children 15+	-0.0024	***	-0.0285	-0.0136	***	-0.2433	0.0223	***	0.3518
HH Head's Nativity									
Native born	NI	NI	NI	NI	NI	NI	NI	NI	NI
British	0.0121	***	0.0494	-0.0015	---	-0.0091	-0.0039	---	-0.0210
Irish	0.0162	***	0.0637	-0.0062	***	-0.0369	0.0023	---	0.0118
Canadian	0.0365	***	0.0564	-0.0260	***	-0.0602	-0.0043	---	-0.0088
French Canadian	0.0320	***	0.0757	-0.0081	**	-0.0285	-0.0139	***	-0.0432
German	0.0121	***	0.0396	0.0024	---	0.0116	0.0036	---	0.0154
Slavic	-0.0387	***	-0.0420	0.0145	*	0.0235	-0.0158	*	-0.0225
Italian	0.0215	---	0.0114	-0.0024	---	-0.0019	-0.0224	---	-0.0157
Other	-0.0070	---	-0.0122	-0.0015	---	-0.0039	0.0062	---	0.0141
HH Head's Age									
Below 20	-0.0137	---	-0.0044	-0.0534	**	-0.0257	-0.0017	---	-0.0007
20-29	-0.0204	***	-0.0996	-0.0015	---	-0.0112	0.0322	***	0.2065
30-39	-0.0228	***	-0.1288	0.0031	---	0.0266	0.0302	***	0.2246
40-49	-0.0150	***	-0.0770	0.0070	*	0.0539	0.0187	***	0.1268
50-59	-0.0066	---	-0.0250	0.0042	---	0.0241	0.0086	*	0.0427
60 & over	NI	NI	NI	NI	NI	NI	NI	NI	NI

TABLE 3A. Regressions with Commodity Budget Shares as the Dependent Variable. Working Class Families in Nine Industries. United States. 1889/90. (Renter Families. Both Parents Present.)

	(1)			(2)			(3)		
	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight
Dependent Variable	Food Share			Housing Share			Clothing Share		
HH Head's Occupation									
Unskilled	NI	NI	NI	NI	NI	NI	NI	NI	NI
Semiskilled	-0.0081	***	-0.0428	-0.0012	---	-0.0097	0.0026	---	0.0183
Skilled	-0.0068	**	-0.0321	0.0057	***	0.0402	0.0002	---	0.0016
Craftsman	-0.0138	***	-0.0486	0.0027	---	0.0144	0.0141	***	0.0649
Wh. Collar, Superv.	-0.0031	---	-0.0065	0.0143	***	0.0445	-0.0067	---	-0.0183
Helper, Apprentice	-0.0011	---	-0.0024	-0.0049	---	-0.0156	0.0053	---	0.0148
Other	-0.0061	---	-0.0111	-0.0002	---	-0.0006	-0.0004	---	-0.0009
Adjusted R-squared	0.295			0.267			0.275		
F-ratio	63.258	***		55.110	***		57.332	***	
N	5351			5351			5351		

TABLE 3A.

	(4)			(5)			(6)		
	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight
Dependent Variable	Fuel/Light Share			Liquor/Tobacco Sh.			Other Share		
Independent Variables									
Constant	0.2014	***	NC	0.0079	---	NC	-0.3799	***	NC
LN(Expenditure PC)	-0.0267	***	-0.4461	0.0091	***	0.1162	0.1055	***	0.6151
Region									
New England	0.0036	***	0.0547	-0.0093	***	-0.1071	-0.0121	***	-0.0636
Mid Atlantic	0.0013	---	0.0238	-0.0126	***	-0.1826	-0.0149	***	-0.0981
South	-0.0012	---	-0.0171	0.0092	***	0.1014	0.0229	***	0.1155
Midwest	NI	NI	NI	NI	NI	NI	NI	NI	NI
Industry									
Pig Iron	0.0038	***	0.0439	-0.0094	***	-0.0836	-0.0209	***	-0.0849
Bar Iron	0.0122	***	0.1356	-0.0164	***	-0.1392	-0.0389	***	-0.1503
Steel	0.0087	***	0.0546	-0.0143	***	-0.0686	-0.0423	***	-0.0926
Coal	-0.0141	***	-0.1359	-0.0076	***	-0.0562	0.0062	---	0.0210
Coke	-0.0320	***	-0.2360	-0.0114	***	-0.0645	-0.0316	***	-0.0814
Iron Ore	0.0050	**	0.0281	-0.0084	**	-0.0358	0.0080	---	0.0156
Cottons	0.0204	***	0.3628	-0.0228	***	-0.3101	-0.0106	***	-0.0659
Woolens	0.0231	***	0.2970	-0.0205	***	-0.2018	-0.0218	***	-0.0979
Glass	NI	NI	NI	NI	NI	NI	NI	NI	NI
Family Composition									
Adults	-0.0028	***	-0.1369	0.0010	***	0.0394	0.0089	***	0.1527
Children 0-4	-0.0055	***	-0.1804	-0.0001	---	-0.0022	0.0185	***	0.2106
Children 5-9	-0.0048	***	-0.1606	0.0006	---	0.0146	0.0088	***	0.1033
Children 10-14	-0.0051	***	-0.1690	-0.0011	*	-0.0281	0.0060	***	0.0697
Children 15+	-0.0063	***	-0.2432	-0.0023	***	-0.0666	0.0022	**	0.0297
HH Head's Nativity									
Native born	NI	NI	NI	NI	NI	NI	NI	NI	NI
British	-0.0014	---	-0.0183	0.0023	*	0.0236	-0.0076	***	-0.0350
Irish	-0.0008	---	-0.0105	0.0056	***	0.0547	-0.0170	***	-0.0752
Canadian	0.0023	---	0.0113	0.0064	*	0.0243	-0.0148	**	-0.0257
French Canadian	-0.0017	---	-0.0130	0.0055	**	0.0321	-0.0139	***	-0.0368
German	-0.0053	***	-0.0555	0.0112	***	0.0898	-0.0240	***	-0.0879
Slavic	-0.0026	---	-0.0090	0.0573	***	0.1529	-0.0147	---	-0.0179
Italian	0.0079	---	0.0134	0.0238	**	0.0311	-0.0284	---	-0.0170
Other	-0.0028	---	-0.0155	0.0060	**	0.0256	-0.0009	---	-0.0017
HH Head's Age									
Below 20	-0.0155	---	-0.0160	0.0100	---	0.0079	0.0469	---	0.0169
20-29	-0.0027	---	-0.0424	0.0015	---	0.0183	-0.0091	*	-0.0495
30-39	-0.0019	---	-0.0346	0.0001	---	0.0001	-0.0087	*	-0.0553
40-49	0.0000	---	0.0000	-0.0006	---	-0.0073	-0.0102	**	-0.0587
50-59	0.0020	---	0.0244	0.0003	---	0.0030	-0.0086	---	-0.0364
60 & over	NI	NI	NI	NI	NI	NI	NI	NI	NI

TABLE 3A.

	(4)			(5)			(6)		
	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight
Dependent Variable		Fuel/Light Share			Liquor/Tobacco Sh.			Other Share	
HH Head's Occupation									
Unskilled	NI	NI	NI	NI	NI	NI	NI	NI	NI
Semiskilled	0.0011	---	0.0188	0.0014	---	0.0181	0.0042	*	0.0247
Skilled	-0.0019	**	-0.0284	-0.0032	**	-0.0363	0.0059	**	0.0310
Craftsman	0.0002	---	0.0028	-0.0046	***	-0.0401	0.0014	---	0.0056
Wh. Collar, Superv.	0.0000	---	0.0001	-0.0045	*	-0.0231	0.0000	---	0.0000
Helper, Apprentice	0.0020	---	0.0133	-0.0002	---	-0.0011	-0.0010	---	-0.0023
Other	-0.0001	---	-0.0005	-0.0046	---	-0.0205	0.0115	*	0.0232
Adjusted R-squared	0.422			0.180			0.281		
F-ratio	109.430	***		33.563	***		59.058	***	
N	5351			5351			5351		

TABLE 3B Regressions with Commodity Budget Shares as the Dependent Variable. Working Class Families in Nine Industries. United States. 1889/90. (Renter Families. Both Parents Present.)

	(1)			(2)			(3)		
	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight
Dependent Variable	Food Share			Housing Share			Clothing Share		
Independent Variables									
Constant	0.1415	*	NC	0.1934	***	NC	0.1657	**	NC
LN(Expenditure PC)	0.2050	***	1.0654	0.0163	---	0.1268	-0.0362	---	-0.2473
LN(Expend. PC) Sqrd.	-0.0294	***	-1.4693	-0.0038	---	-0.2815	0.0053	**	0.3475
Region									
New England	0.0412	***	0.1925	0.0058	*	0.0412	-0.0323	***	-0.1982
Mid Atlantic	0.0238	***	0.1395	0.0163	***	0.1434	-0.0159	***	-0.1226
South	-0.0283	***	-0.1268	-0.0074	***	-0.0500	0.0052	---	0.0308
Midwest	NI	NI	NI	NI	NI	NI	NI	NI	NI
Industry									
Pig Iron	0.0204	***	0.0738	-0.0307	***	-0.1663	0.0354	***	0.1684
Bar Iron	0.0244	***	0.0841	0.0123	***	0.0634	0.0054	*	0.0246
Steel	0.0320	***	0.0624	0.0010	---	0.0029	0.0132	***	0.0339
Coal	0.0176	***	0.0529	-0.0362	***	-0.1625	0.0342	***	0.1350
Coke	0.0298	***	0.0683	-0.0368	***	-0.1261	0.0827	***	0.2494
Iron Ore	0.0299	***	0.0518	-0.0855	***	-0.2217	0.0554	***	0.1264
Cottons	0.0286	***	0.1585	-0.0246	***	-0.2037	0.0079	**	0.0576
Woolens	-0.0044	---	-0.0176	0.0029	---	0.0175	0.0207	***	0.1087
Glass	NI	NI	NI	NI	NI	NI	NI	NI	NI
Family Composition									
Adults	0.0027	***	0.0406	-0.0042	***	-0.0947	-0.0024	***	-0.0487
Children 0-4	-0.0065	***	-0.0664	-0.0092	***	-0.1402	0.0039	***	0.0519
Children 5-9	-0.0019	---	-0.0195	-0.0088	***	-0.1367	0.0075	***	0.1032
Children 10-14	-0.0023	---	-0.0239	-0.0096	***	-0.1479	0.0131	***	0.1773
Children 15+	-0.0032	***	-0.0382	-0.0137	***	-0.2452	0.0225	***	0.3541
HH Head's Nativity									
Native born	NI	NI	NI	NI	NI	NI	NI	NI	NI
British	0.0111	***	0.0453	-0.0016	---	-0.0099	-0.0037	---	-0.0200
Irish	0.0152	***	0.0597	-0.0064	***	-0.0376	0.0024	---	0.0127
Canadian	0.0373	***	0.0576	-0.0259	***	-0.0599	-0.0045	---	-0.0091
French Canadian	0.0310	***	0.0733	-0.0082	**	-0.0290	-0.0137	***	-0.0426
German	0.0116	***	0.0379	0.0023	---	0.0113	0.0037	---	0.0158
Slavic	-0.0381	***	-0.0413	0.0146	*	0.0236	-0.0159	*	-0.0227
Italian	0.0211	---	0.0112	-0.0024	---	-0.0019	-0.0223	---	-0.0156
Other	-0.0068	---	-0.0117	-0.0015	---	-0.0038	0.0062	---	0.0140
HH Head's Age									
Below 20	0.0180	---	0.0058	-0.0528	**	-0.0254	-0.0025	---	-0.0011
20-29	-0.0208	***	-0.1014	-0.0016	---	-0.0116	0.0323	***	0.2069
30-39	-0.0232	***	-0.1312	0.0031	---	0.0261	0.0303	***	0.2252
40-49	-0.0151	***	-0.0778	0.0070	*	0.0537	0.0188	***	0.1270
50-59	-0.0065	---	-0.0248	0.0042	---	0.0242	0.0086	*	0.0427

TABLE 3B Regressions with Commodity Budget Shares as the Dependent Variable. Working Class Families in Nine Industries. United States. 1889/90. (Renter Families. Both Parents Present.)

	(1)			(2)			(3)		
	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight
Dependent Variable	Food Share			Housing Share			Clothing Share		
60 & over	NI	NI	NI	NI	NI	NI	NI	NI	NI
HH Head's Occupation									
Unskilled	NI	NI	NI	NI	NI	NI	NI	NI	NI
Semiskilled	-0.0084	***	-0.0446	-0.0013	---	-0.0100	0.0027	---	0.0187
Skilled	-0.0070	**	-0.0320	0.0057	***	0.0400	0.0003	---	0.0018
Craftsman	-0.0153	***	-0.0536	0.0026	---	0.0134	0.0143	***	0.0661
Wh. Collar, Superv.	-0.0050	---	-0.0104	0.0141	***	0.0438	-0.0064	---	-0.0174
Helper, Apprentice	-0.0010	---	-0.0034	-0.0050	---	-0.0158	0.0054	---	0.0150
Other	-0.0058	---	-0.0105	-0.0002	---	-0.0005	-0.0004	---	-0.0010
Adjusted R-squared	0.305			0.267			0.275		
F-ratio	64.492	***		53.710	***		55.926	***	
N	5351			5351			5351		

TABLE 3B

	(4)			(5)			(6)		
	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight
Dependent Variable		Fuel/Light Share			Liquor/Tobacco Sh.			Other Share	
Independent Variables									
Constant	0.3204	***	NC	0.1052	***	NC	0.0738	---	NC
LN(Expenditure PC)	-0.0752	***	-1.2552	-0.0305	**	-0.3900	-0.0794	***	-0.4626
LN(Expend. PC) Sqrd.	0.0050	***	0.7945	0.0040	***	0.4971	0.0189	***	1.0582
Region									
New England	0.0042	***	0.0626	-0.0089	***	-0.1022	-0.0102	**	-0.0530
Mid Atlantic	0.0016	*	0.0308	-0.0124	***	-0.1782	-0.0135	***	-0.0888
South	-0.0013	---	-0.0183	0.0091	***	0.1006	0.0226	***	0.1140
Midwest	NI	NI	NI	NI	NI	NI	NI	NI	NI
Industry									
Pig Iron	0.0040	***	0.0470	-0.0092	***	-0.0816	-0.0199	***	-0.0809
Bar Iron	0.0124	***	0.1375	-0.0163	***	-0.1381	-0.0382	***	-0.1478
Steel	0.0090	***	0.0565	-0.0140	***	-0.0674	-0.0412	***	-0.0901
Coal	-0.0141	***	-0.1361	-0.0076	***	-0.0563	0.0061	---	0.0206
Coke	-0.0320	***	-0.2367	-0.0115	***	-0.0649	-0.0320	***	-0.0824
Iron Ore	0.0042	**	0.0236	-0.0091	***	-0.0386	0.0050	---	0.0097
Cottons	0.0206	***	0.3660	-0.0227	***	-0.3081	-0.0099	***	-0.0615
Woolens	0.0232	***	0.2971	-0.0205	***	-0.2018	-0.0218	***	-0.0978
Glass	NI	NI	NI	NI	NI	NI	NI	NI	NI
Family Composition									
Adults	-0.0034	***	-0.1653	0.0006	---	0.0216	0.0067	***	0.1148
Children 0-4	-0.0057	***	-0.1862	-0.0002	---	-0.0058	0.0178	***	0.2029
Children 5-9	-0.0051	***	-0.1695	0.0004	---	0.0091	0.0078	***	0.0915
Children 10-14	-0.0053	***	-0.1748	-0.0012	**	-0.0317	0.0054	***	0.0620
Children 15+	-0.0062	***	-0.2379	-0.0022	***	-0.0633	0.0027	**	0.0367
HH Head's Nativity									
Native born	NI	NI	NI	NI	NI	NI	NI	NI	NI
British	-0.0012	---	-0.0161	0.0025	*	0.0250	-0.0070	**	-0.0321
Irish	-0.0006	---	-0.0083	0.0058	***	0.0561	-0.0164	***	-0.0722
Canadian	0.0022	---	0.0106	0.0063	*	0.0239	-0.0154	**	-0.0266
French Canadian	-0.0015	---	-0.0117	0.0057	**	0.0329	-0.0132	***	-0.0350
German	-0.0052	***	-0.0546	0.0113	***	0.0904	-0.0236	***	-0.0866
Slavic	-0.0027	---	-0.0094	0.0572	***	0.1526	-0.0151	---	-0.0184
Italian	0.0079	---	0.0135	0.0238	**	0.0312	-0.0282	---	-0.0168
Other	-0.0028	---	-0.0157	0.0060	**	0.0255	-0.0010	---	-0.0020
HH Head's Age									
Below 20	-0.0163	---	-0.0168	0.0094	---	0.0075	0.0441	---	0.0159
20-29	-0.0026	---	-0.0414	0.0016	---	0.0190	-0.0088	*	-0.0482
30-39	-0.0018	---	-0.0333	0.0001	---	0.0017	-0.0084	*	-0.0535
40-49	0.0000	---	0.0003	-0.0006	---	-0.0071	-0.0101	**	-0.0581
50-59	0.0020	---	0.0243	0.0003	---	0.0030	-0.0086	*	-0.0365

TABLE 3B

	(4) Coeff.	Signi.	B-Weight	Coeff.	(5) Signi.	B-Weight	Coeff.	(6) Signi.	B-Weight
Dependent Variable		Fuel/Light Share			Liquor/Tobacco Sh.			Other Share	
60 & over	NI	NI	NI	NI	NI	NI	NI	NI	NI
HH Head's Occupation									
Unskilled	NI	NI	NI	NI	NI	NI	NI	NI	NI
Semiskilled	0.0012	---	0.0198	0.0014	---	0.0188	0.0044	*	0.0261
Skilled	-0.0019	**	-0.0280	-0.0031	**	-0.0361	0.0060	**	0.0316
Craftsman	0.0005	---	0.0056	-0.0044	***	-0.0384	0.0023	---	0.0092
Wh. Collar, Superv.	0.0003	---	0.0022	-0.0043	*	-0.0218	0.0012	---	0.0028
Helper, Apprentice	0.0020	---	0.0139	-0.0002	---	-0.0008	-0.0007	---	-0.0016
Other	-0.0001	---	-0.0009	-0.0047	---	-0.0207	0.0112	*	0.0228
Adjusted R-squared	0.425			0.181			0.286		
F-ratio	107.724	***		32.896	***		58.914	***	
N	5351			5351			5351		

TABLE 4. Change in Commodity Budget Shares for an Additional Individual in a Given Demographic Category. U.S., Britain, and Germany. 1889/90.

Demographic Category	Budget Category					
	Food	Housing	Clothing	Fuel/Light	Liq/Tob.	Other
			Absolute Changes			
U.S.						
1. Adult	0.0152	-0.0006	-0.0048	0.0023	-0.0008	-0.0114
2. Child 0-4	0.0084	-0.0054	0.0011	-0.0004	-0.0019	-0.0018
3. Child 5-9	0.0126	-0.0050	0.0048	0.0003	-0.0012	-0.0115
4. Child 10-14	0.0126	-0.0057	0.0103	0.0000	-0.0029	-0.0143
5. Child 15+	0.0136	-0.0096	0.0193	-0.0012	-0.0041	-0.0181
Britain						
1. Adult	0.0300	-0.0072	-0.0102	-0.0018	-0.0072	-0.0037
2. Child 0-4	0.0035	0.0006	0.0038	-0.0028	0.0013	-0.0065
3. Child 5-9	0.0118	-0.0025	0.0095	-0.0021	-0.0053	-0.0115
4. Child 10-14	0.0165	-0.0030	0.0083	-0.0014	-0.0036	-0.0168
5. Child 15+	0.0131	-0.0055	0.0062	-0.0015	-0.0052	-0.0071
Germany						
1. Adult	0.0241	-0.0022	-0.0063	0.0001	-0.0088	-0.0070
2. Child 0-4	0.0010	-0.0014	0.0028	0.0042	-0.0065	-0.0001
3. Child 5-9	0.0203	-0.0036	0.0038	-0.0013	-0.0090	-0.0101
4. Child 10-14	0.0151	-0.0024	0.0040	-0.0008	-0.0068	-0.0090
5. Child 15+	-0.0125	-0.0008	0.0181	0.0005	-0.0039	-0.0014
			Relative Changes			
U.S.						
1. Adult	0.0332	-0.0045	-0.0286	0.0384	-0.0221	-0.0822
2. Child 0-4	0.0183	-0.0383	0.0065	-0.0059	-0.0545	-0.0131
3. Child 5-9	0.0275	-0.0354	0.0285	0.0056	-0.0339	-0.0829
4. Child 10-14	0.0275	-0.0404	0.0613	0.0007	-0.0839	-0.1030
5. Child 15+	0.0297	-0.0678	0.1149	-0.0190	-0.1192	-0.1304
Britain						
1. Adult	0.0592	-0.0646	-0.0625	-0.0285	-0.1791	-0.0317
2. Child 0-4	0.0070	0.0050	0.0234	-0.0446	0.0334	-0.0558
3. Child 5-9	0.0233	-0.0227	0.0583	-0.0333	-0.1316	-0.0989
4. Child 10-14	0.0326	-0.0271	0.0510	-0.0220	-0.0891	-0.1446
5. Child 15+	0.0259	-0.0495	0.0381	-0.0236	-0.1291	-0.0610
Germany						
1. Adult	0.0462	-0.0271	-0.0357	0.0012	-0.1569	-0.0608
2. Child 0-4	0.0019	-0.0172	0.0158	0.0867	-0.1158	-0.0008
3. Child 5-9	0.0389	-0.0444	0.0214	-0.0279	-0.1604	-0.0877
4. Child 10-14	0.0289	-0.0296	0.0225	-0.0175	-0.1212	-0.0782
5. Child 15+	-0.0239	-0.0098	0.1022	0.0096	-0.0694	-0.0121

SOURCE: Calculated from Tables 3a, 9, and 10. The absolute net effect of an additional individual is equal to the negative of the coefficient on expenditure per capita divided by mean family size and plus the coefficient for the age group considered. Relative effects are the absolute effects divided by average budget shares.

TABLE 5. State Price Indices by Commodity Groups. Selected States. United States, 1890.

STATE	COMMODITY GROUPS							
	Food	Cloth-ing	Hous-ing	Fuel & Light	Liquor & Tobacco	Furni-ture	Other	Total
Alabama	102.8	94.8	133.9	96.2	97.3	95.4	91.0	102.638
Connecticut	112.8	93.6	58.2	125.5	93.8	98.3	106.3	98.722
Delaware	91.1	95.6	56.5	93.6	120.3	112.6	99.6	88.569
Georgia	109.9	99.0	98.1	97.0	112.7	93.8	95.8	103.218
Illinois	97.5	97.2	118.2	85.1	91.5	83.1	102.0	99.118
Indiana	96.0	87.9	130.8	79.8	79.3	115.7	98.8	98.022
Kentucky	87.6	94.0	110.9	75.8	88.9	77.5	93.8	91.250
Louisiana	96.4	101.4	127.0	105.3	108.5	109.4	91.5	101.545
Maine	100.4	97.9	85.2	103.1	126.2	85.0	103.4	98.490
Maryland	102.0	98.9	80.6	86.7	88.8	93.0	91.5	95.187
Massachusetts	107.0	93.9	96.0	101.2	102.6	110.1	107.0	102.837
Mississippi	99.0	85.6	91.0	86.4	104.6	83.9	86.9	92.836
Missouri	91.4	91.4	117.0	90.5	69.1	96.8	103.6	95.383
New Hampshire	99.9	86.1	86.6	113.4	88.8	96.3	113.7	97.544
New Jersey	104.1	99.8	88.6	104.3	107.7	92.5	107.5	101.298
New York	103.7	97.9	95.4	99.7	98.5	100.1	94.6	99.780
North Carolina	104.3	95.1	82.7	85.1	129.8	141.2	91.0	98.198
Ohio	99.7	91.8	110.4	66.2	86.4	104.1	97.7	96.771
Pennsylvania	104.2	98.5	104.8	109.3	87.9	108.4	98.0	102.317
Rhode Island	113.6	91.1	81.6	109.4	90.2	119.3	94.1	101.296
South Carolina	99.9	97.0	61.9	75.8	125.6	88.0	87.9	90.328
Tennessee	100.2	100.5	126.5	82.3	102.2	90.4	92.6	100.968
Virginia	101.7	107.6	103.1	68.3	136.3	81.3	95.0	99.757
West Virginia	94.4	103.3	116.8	59.1	97.3	91.4	84.1	94.442
UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

SOURCE: (1) Prices for food, clothing, fuel & light, liquor & tobacco, furniture, and other goods were obtained from price data for 70 cities in the Aldrich Report [U.S. Senate, 1892]. Within a state, prices were taken as simple arithmetic averages for the 83 individual commodities. The commodities chosen and the price weights to construct the commodity group indices were taken from Coelho and Shepherd [1979].
(2) Housing prices were calculated from data on total rent per room in the 1889/90 U.S. Commissioner of Labor Survey [U.S. Commissioner of Labor, 1890, 1891]. Louisiana and Missouri were assigned values from the East North Central and the East South Central regions respectively because of very small N's.
(3) The overall price index was calculated using as weights the average budget shares for renter families with both husband and wife present living in the United States in the 1889/90 U.S. Commissioner of Labor Survey. The weights are: food (.442), clothing (.162), housing (.137), fuel & light (.059), liquor & tobacco (.033), furniture (.032), and other goods (.135). The total price index is the exponential of the weighted sum of the logarithms of the price indices of the seven commodity groups.

TABLE 6. Ordinary Least Squares Estimates of the Almost Ideal Demand System. Working Class Families in Nine Industries. United States. 1889/90. (Renter Families. Both Parents Present.)

	(1)			(2)			(3)		
	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight
Dependent Variable	Food Share			Housing Share			Clothing Share		
Independent Variables									
Constant	0.8862	***	NC	0.2733	***	NC	0.0201	---	NC
LN(Real Expend. PC)	-0.0868	***	-0.4501	-0.0244	***	-0.1894	0.0193	***	0.1317
Region									
New England	0.0169	**	0.0790	0.0629	***	0.4394	-0.0397	***	-0.2440
Mid Atlantic	-0.0084	---	-0.0493	0.0548	***	0.4812	-0.0120	**	-0.0926
South	-0.0264	***	-0.1187	0.0205	***	0.1378	-0.0070	---	-0.0416
Midwest	NI	NI	NI	NI	NI	NI	NI	NI	NI
Industry									
Pig Iron	0.0154	***	0.0558	-0.0377	***	-0.2040	0.0414	***	0.1971
Bar Iron	0.0209	***	0.0719	0.0074	***	0.0384	0.0097	***	0.0440
Steel	0.0313	***	0.0611	-0.0008	---	-0.0024	0.0152	***	0.0390
Coal	0.0110	**	0.0330	-0.0436	***	-0.1959	0.0404	***	0.1595
Coke	0.0210	***	0.0481	-0.0462	***	-0.1584	0.0909	***	0.2742
Iron Ore	0.0191	**	0.0332	-0.0927	**	-0.2405	0.0619	***	0.1412
Cottons	0.0264	***	0.1458	-0.0218	***	-0.1800	0.0079	**	0.0572
Woolens	-0.0095	**	-0.0379	0.0130	***	0.0781	0.0190	***	0.0998
Glass	NI	NI	NI	NI	NI	NI	NI	NI	NI
Family Composition									
Adults	-0.0002	---	-0.0026	-0.0044	***	-0.0994	-0.0022	***	-0.0443
Children 0-4	-0.0085	***	-0.0860	-0.0098	***	-0.1482	0.0047	***	0.0626
Children 5-9	-0.0038	***	-0.0398	-0.0093	***	-0.1458	0.0082	***	0.1125
Children 10-14	-0.0038	***	-0.0390	-0.0100	***	-0.1548	0.0136	***	0.1848
Children 15+	-0.0035	***	-0.0419	-0.0127	***	-0.2270	0.0225	***	0.3551
HH Head's Nativity									
Native born	NI	NI	NI	NI	NI	NI	NI	NI	NI
British	0.0128	***	0.0522	-0.0032	---	-0.0194	-0.0035	---	-0.0188
Irish	0.0164	***	0.0648	-0.0077	***	-0.0455	0.0026	---	0.0137
Canadian	0.0121	---	0.0186	-0.0085	---	-0.0195	0.0015	---	0.0030
French Canadian	0.0348	***	0.0822	-0.0089	**	-0.0315	-0.0150	***	-0.0465
German	0.0060	---	0.0194	0.0053	**	0.0257	0.0057	**	0.0245
Slavic	-0.0392	***	-0.0426	0.0175	**	0.0285	-0.0169	**	-0.0241
Italian	0.0215	---	0.0114	0.0056	---	0.0044	-0.0256	---	-0.0179
Other	-0.0006	---	-0.0011	-0.0040	---	-0.0104	0.0040	---	0.0091
HH Head's Age									
Below 20	0.0208	---	0.0067	-0.0458	*	-0.0220	-0.0090	---	-0.0038
20-29	-0.0154	***	-0.0750	-0.0032	---	-0.0233	0.0302	***	0.1936
30-39	-0.0184	***	-0.1042	0.0011	---	0.0096	0.0288	***	0.2137
40-49	-0.0100	*	-0.0513	0.0043	---	0.0334	0.0172	***	0.1167
50-59	-0.0037	---	-0.0142	0.0037	---	0.0212	0.0073	---	0.0365
60 & over	NI	NI	NI	NI	NI	NI	NI	NI	NI

TABLE 6. Ordinary Least Squares Estimates of the Almost Ideal Demand System. Working Class Families in Nine Industries. United States. 1889/90. (Renter Families. Both Parents Present.)

	(1)			(2)			(3)		
	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight
Dependent Variable	Food Share			Housing Share			Clothing Share		
HH Head's Occupation									
Unskilled	NI	NI	NI	NI	NI	NI	NI	NI	NI
Semiskilled	-0.0083	***	-0.0439	-0.0017	---	-0.0133	0.0029	---	0.0203
Skilled	-0.0082	***	-0.0387	0.0069	***	0.0485	0.0005	---	0.0032
Craftsman	-0.0144	***	-0.0503	0.0039	---	0.0204	0.0138	***	0.0636
Wh. Collar, Superv.	-0.0044	---	-0.0091	0.0124	***	0.0385	-0.0052	---	-0.0142
Helper, Apprentice	-0.0012	---	-0.0026	-0.0047	---	-0.0148	0.0053	---	0.0148
Other	-0.0088	---	-0.0158	0.0003	---	0.0009	0.0010	---	0.0023
Prices									
Food	0.0708	*	0.0330	-0.0594	**	-0.0415	-0.0198	---	-0.0122
Housing	-0.0842	***	-0.1835	0.0880	***	0.2871	0.0034	---	0.0097
Clothing	0.1405	***	0.0683	0.1078	***	0.0784	-0.1430	***	-0.0915
Fuel & Light	0.0387	***	0.0775	-0.0715	***	-0.2145	0.0034	---	0.0090
Liquor & Tobacco	-0.1321	***	-0.1967	-0.0489	***	-0.1089	0.0905	***	0.1772
Other	-0.0679	**	-0.0459	0.0888	***	0.0899	-0.0185	---	-0.0165
Adjusted R-squared	0.323			0.330			0.285		
F-ratio	61.896	***		63.709	***		51.827	***	
N	5351			5351			5351		

TABLE 6.

	(4)			(5)			(6)		
	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight
Dependent Variable	Fuel/Light Share			Liquor/Tobacco Sh.			Other Share		
Independent Variables									
Constant	0.1905	***	NC	0.0326	***	NC	-0.4026	***	NC
LN(Real Expend. PC)	-0.0228	***	-0.3802	0.0071	***	0.0909	0.1076	***	0.6258
Region									
New England	-0.0115	***	-0.1731	-0.0203	***	-0.2335	-0.0082	---	-0.0429
Mid Atlantic	-0.0054	***	-0.1012	-0.0281	***	-0.4060	-0.0009	---	-0.0058
South	-0.0130	***	-0.1880	-0.0020	---	-0.0136	0.0272	***	0.1371
Midwest	NI	NI	NI	NI	NI	NI	NI	NI	NI
Industry									
Pig Iron	0.0092	***	0.1074	-0.0125	***	-0.1109	-0.0160	***	-0.0647
Bar Iron	0.0154	***	0.1704	-0.0185	***	-0.1567	-0.0349	***	-0.1350
Steel	0.0102	***	0.0640	-0.0181	***	-0.0870	-0.0377	***	-0.0826
Coal	-0.0077	***	-0.0744	-0.0103	***	-0.0759	0.0102	**	0.0345
Coke	-0.0250	***	-0.1844	-0.0153	***	-0.0865	-0.0253	***	-0.0652
Iron Ore	0.0101	***	0.0561	-0.0106	***	-0.0454	0.0122	*	0.0237
Cottons	0.0210	***	0.3733	-0.0234	***	-0.3182	-0.0101	***	-0.0626
Woolens	0.0218	***	0.2794	-0.0223	***	-0.2194	-0.0220	***	-0.0986
Glass	NI	NI	NI	NI	NI	NI	NI	NI	NI
Family Composition									
Adults	-0.0029	***	-0.1425	0.0011	***	0.0408	0.0086	***	0.1464
Children 0-4	-0.0048	***	-0.1578	-0.0004	---	-0.0095	0.0188	***	0.2136
Children 5-9	-0.0044	***	-0.1476	0.0003	---	0.0085	0.0090	***	0.1057
Children 10-14	-0.0047	***	-0.1562	-0.0013	**	-0.0327	0.0062	***	0.0717
Children 15+	-0.0064	***	-0.2443	-0.0024	***	-0.0710	0.0024	**	0.0320
HH Head's Nativity									
Native born	NI	NI	NI	NI	NI	NI	NI	NI	NI
British	-0.0010	---	-0.0126	0.0020	---	0.0199	-0.0071	**	-0.0326
Irish	-0.0002	---	-0.0021	0.0054	***	0.0525	-0.0166	***	-0.0734
Canadian	0.0035	---	0.0173	0.0035	---	0.0132	-0.0120	*	-0.0208
French Canadian	-0.0013	---	-0.0102	0.0052	**	0.0304	-0.0148	***	-0.0392
German	-0.0046	***	-0.0480	0.0098	***	0.0790	-0.0222	***	-0.0813
Slavic	-0.0036	---	-0.0124	0.0577	***	0.1538	-0.0155	---	-0.0189
Italian	0.0056	---	0.0095	0.0239	**	0.0312	-0.0309	---	-0.0185
Other	-0.0036	---	-0.0197	0.0059	**	0.0252	-0.0018	---	-0.0034
HH Head's Age									
Below 20	-0.0204	**	-0.0210	0.0108	---	0.0085	0.0437	---	0.0158
20-29	-0.0035	**	-0.0552	0.0022	---	0.0258	-0.0102	*	-0.0560
30-39	-0.0025	*	-0.0461	0.0006	---	0.0080	-0.0095	*	-0.0601
40-49	-0.0006	---	-0.0095	-0.0001	---	-0.0007	-0.0110	**	-0.0634
50-59	0.0012	---	0.0148	0.0008	---	0.0070	-0.0093	---	-0.0395
60 & over	NI	NI	NI	NI	NI	NI	NI	NI	NI

TABLE 6.

	(4)			(5)			(6)		
	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight
Dependent Variable	Fuel/Light Share			Liquor/Tobacco Sh.			Other Share		
HH Head's Occupation									
Unskilled	NI	NI	NI	NI	NI	NI	NI	NI	NI
Semiskilled	0.0012	---	0.0206	0.0013	---	0.0173	0.0045	*	0.0268
Skilled	-0.0022	***	-0.0339	-0.0031	**	-0.0354	0.0061	**	0.0323
Craftsman	-0.0002	---	-0.0025	-0.0046	***	-0.0400	0.0015	---	0.0060
Wh. Collar, Superv.	0.0009	---	0.0059	-0.0047	*	-0.0238	0.0010	---	0.0023
Helper, Apprentice	0.0019	---	0.0127	-0.0000	---	-0.0001	-0.0012	---	-0.0029
Other	-0.0001	---	-0.0008	-0.0048	---	-0.0212	0.0124	**	0.0251
Prices									
Food	-0.0020	---	-0.0030	-0.0099	---	-0.0114	0.0204	---	0.0107
Housing	-0.0171	***	-0.1197	-0.0019	---	-0.0103	0.0118	---	0.0290
Clothing	-0.0205	*	-0.0321	0.0458	**	0.0547	-0.1305	***	-0.0712
Fuel & Light	0.0037	---	0.0238	0.0369	***	0.1818	-0.0112	---	-0.0251
Liquor & Tobacco	0.0535	***	0.2558	-0.0064	---	-0.0234	0.0434	***	0.0724
Other	0.0159	**	0.0345	-0.0477	***	-0.0793	0.0294	---	0.0223
Adjusted R-squared	0.464			0.186			0.284		
F-ratio	111.423	***		30.104	***		51.417	***	
N	5351			5351			5351		

TABLE 7. Price & Expenditure Elasticities. Worker Families in Nine Industries. By Nativity. United States. 1889/90. (a)

	Food	Housing	Clothing	Fuel/ Light	Liq./ Tobacco	Other	N
	EXPENDITURE ELASTICITIES						
U.S.	0.8101	0.8281	1.1150	0.6256	1.2098	1.7741	5351
Native	0.7885	0.8773	1.1062	0.6167	1.0464	1.7808	2963
British	0.8287	0.7083	1.1380	0.6336	1.6696	1.7391	752
Irish	0.8536	0.7352	1.0807	0.6502	1.2167	1.8566	690
Canadian	0.8299	0.6198	1.2984	0.4859	1.4974	1.8889	320
German	0.7559	0.7406	1.2332	0.5894	1.5853	1.8947	451
	OWN PRICE ELASTICITIES						
U.S.	-0.7584	-0.3558	-1.8704	-0.9164	-1.1956	-0.8959	
Native	-0.5828	-0.4407	-1.6293	-0.7579	-1.8891	-1.0922	
British	-1.0662	-0.4060	-1.7758	-0.9504	-0.4327	-0.6514	
Irish	-0.4944	-0.4097	-2.1846	-1.0383	-0.3368	-1.3891	
Canadian	-1.9735	-0.3607	-2.2490	-2.6038	-2.5062	2.4479	
German	-1.9731	-0.1367	1.4338	-1.0891	1.4546	-2.3771	
	COMPENSATED PRICE ELASTICITIES						
U.S.	-0.3882	-0.2382	-1.6831	-0.8783	-1.1544	-0.6493	
Native	-0.2343	-0.3153	-1.4413	-0.7191	-1.8535	-0.8286	
British	-0.6784	-0.3047	-1.5880	-0.9130	-0.3859	-0.4114	
Irish	-0.0872	-0.3097	-1.9987	-0.9993	-0.2991	-1.1589	
Canadian	-1.5378	-0.2925	-2.0595	-2.5703	-2.4703	2.6841	
German	-1.6300	-0.0189	1.6422	-1.0585	1.5243	-2.1478	

(a) Elasticities are calculated for the Almost Ideal Demand System with prices, evaluated at mean budget share values.

Source: U.S. Commissioner of Labor [1890, 1891].

TABLE 8. Price & Expenditure Elasticities. Worker Families in Nine Indust United States. 1889/90. (a)

	PRICE ELASTICITIES						EXPENDITURE ELASTICITY
	Food	Housing	Clothing	Fuel/ Light	Liq./ Tobacco	Other	
Food	-0.7584	-0.1573	0.3393	0.0962	-0.2826	-0.1221	0.8101
Housing	-0.3399	-0.3558	0.7878	-0.4931	-0.3385	0.6489	0.8281
Clothing	-0.1704	0.0038	-1.8704	0.0133	0.5348	-0.1262	1.1150
Fuel/Light	0.1384	-0.2273	-0.2739	-0.9164	0.8900	0.3123	0.6256
Liq./Tob.	-0.3879	-0.0865	1.3102	1.0721	-1.1956	-1.4314	1.2098
Other	-0.2069	-0.0247	-1.0686	-0.1275	0.2858	-0.8959	1.7741
	COMPENSATED PRICE ELASTICITIES						
Food	-0.3882	-0.0422	0.4754	0.1456	-0.2551	-0.0095	
Housing	0.0385	-0.2382	0.9270	-0.4426	-0.3103	0.7640	
Clothing	0.3391	0.1621	-1.6831	0.0813	0.5727	0.0288	
Fuel/Light	0.4243	-0.1384	-0.1688	-0.8783	0.9113	0.3993	
Liq./Tob.	0.1650	0.0852	1.5134	1.1459	-1.1544	-1.2633	
Other	0.6039	0.2272	-0.7706	-0.0193	0.3461	-0.6493	

(a) Elasticities are calculated for the Almost Ideal Demand System with prices, evaluated at mean budget share values.

Source: U.S. Commissioner of Labor [1890, 1891].

TABLE 9. Regressions with Commodity Budget Shares as the Dependent Variable. Working Class Families in Nine Industries. Great Britain. 1889/90. (Renter Families. Both Parents Present.)

	(1)			(2)			(3)		
	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight
Dependent Variable	Food Share			Housing Share			Clothing Share		
Independent Variables									
Constant	0.8725	***	NC	0.3899	***	NC	0.0072	---	NC
LN(Expenditure PC)	-0.0785	***	-0.3676	-0.0447	***	-0.4333	0.0299	***	0.1816
Industry									
Pig Iron	-0.0375	***	-0.1181	-0.0129	***	-0.0840	0.0220	**	0.0900
Bar Iron	-0.0416	***	-0.1676	0.0146	***	0.1219	-0.0012	---	-0.0063
Steel	-0.0344	***	-0.1582	0.0021	---	0.0203	0.0025	---	0.0147
Coal	0.0206	***	0.0968	0.0035	---	0.0336	-0.0362	***	-0.2202
Coke	0.0242	---	0.0351	-0.0148	*	-0.0445	-0.0236	---	-0.0444
Cottons	NI	NI	NI	NI	NI	NI	NI	NI	NI
Woolens	-0.0501	***	-0.2073	0.0175	***	0.1502	-0.0135	**	-0.0724
Glass	0.0016	---	0.0033	0.0027	---	0.0114	-0.0302	***	-0.0797
Family Composition									
Adults	0.0143	*	0.0509	-0.0162	***	-0.1191	-0.0042	---	-0.0194
Children 0-4	-0.0122	***	-0.1186	-0.0084	***	-0.1684	0.0098	***	0.1231
Children 5-9	-0.0039	---	-0.0440	-0.0115	***	-0.2722	0.0155	***	0.2300
Children 10-14	0.0008	---	0.0090	-0.0120	***	-0.2607	0.0143	***	0.1932
Children 15+	-0.0026	---	-0.0350	-0.0145	***	-0.4100	0.0122	***	0.2154
HH Head's Nativity									
British	NI	NI	NI	NI	NI	NI	NI	NI	NI
Welsh	0.0240	**	0.0812	-0.0246	***	-0.1726	-0.0040	---	-0.0175
Scots	0.1018	***	0.4210	-0.0136	***	-0.1169	-0.0193	**	-0.1036
Irish	0.0388	***	0.0985	-0.0096	**	-0.0502	-0.0230	**	-0.0756
Other	NI	NI	NI	NI	NI	NI	NI	NI	NI
HH Head's Age									
Below 20	0.0094	---	0.0038	-0.0311	---	-0.0260	0.0207	---	0.0108
20-29	-0.0200	---	-0.0942	0.0024	---	0.0235	-0.0052	---	-0.0320
30-39	-0.0327	**	-0.2024	-0.0055	---	-0.0702	-0.0019	---	-0.0151
40-49	-0.0107	---	-0.0594	-0.0057	---	-0.0660	-0.0146	---	-0.1056
50-59	-0.0072	---	-0.0321	-0.0086	---	-0.0792	-0.0047	---	-0.0269
60 & over	NI	NI	NI	NI	NI	NI	NI	NI	NI
HH Head's Occupation									
Unskilled	NI	NI	NI	NI	NI	NI	NI	NI	NI
Semiskilled	-0.0031	---	-0.0192	-0.0021	---	-0.0266	0.0011	---	0.0089
Skilled	-0.0011	---	-0.0054	-0.0016	---	-0.0153	0.0122	**	0.0751
Craftsman	-0.0139	*	-0.0604	0.0042	---	0.0376	0.0101	---	0.0571
Wh. Collar, Superv.	-0.0262	*	-0.0513	-0.0048	---	-0.0196	0.0519	***	0.1317
Helper, Apprentice	0.0099	---	0.0234	-0.0004	---	-0.0024	0.0067	---	0.0206
Other	0.0177	---	0.0257	0.0118	---	0.0353	0.0050	---	0.0095
Adjusted R-squared	0.253			0.484			0.165		
F-ratio	13.282	***		35.038	***		8.142	***	
N	979			979			979		

TABLE 9.

	(4)			(5)			(6)		
	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight
Dependent Variable		Fuel/Light Share			Liquor/Tobacco Sh.			Other Share	
Independent Variables									
Constant	0.2771	***	NC	-0.0122	---	NC	-0.5345	***	NC
LN(Expenditure PC)	-0.0351	***	-0.4947	0.0118	**	0.1079	0.1166	***	0.6130
Industry									
Pig Iron	-0.0016	---	-0.0152	0.0338	***	0.2074	-0.0039	---	-0.0138
Bar Iron	0.0127	***	0.1546	0.0241	***	0.1890	-0.0087	---	-0.0392
Steel	-0.0011	---	-0.0158	0.0293	***	0.2617	0.0017	---	0.0088
Coal	-0.0231	***	-0.3260	0.0417	***	0.3806	-0.0065	---	-0.0343
Coke	-0.0145	***	-0.0633	0.0433	***	0.1220	-0.0145	---	-0.0236
Cottons	NI	NI	NI	NI	NI	NI	NI	NI	NI
Woolens	-0.0122	***	-0.1522	0.0061	---	0.0488	0.0522	***	0.2427
Glass	-0.0090	**	-0.0551	0.0428	***	0.1694	-0.0079	---	-0.0181
Family Composition									
Adults	-0.0088	***	-0.0944	-0.0048	---	-0.0329	0.0197	***	0.0785
Children 0-4	-0.0098	***	-0.2867	0.0037	*	0.0704	0.0169	***	0.1842
Children 5-9	-0.0091	***	-0.3134	-0.0029	*	-0.0653	0.0119	***	0.1525
Children 10-14	-0.0084	***	-0.2662	-0.0012	---	-0.0251	0.0066	**	0.0778
Children 15+	-0.0085	***	-0.3502	-0.0028	*	-0.0746	0.0163	***	0.2490
HH Head's Nativity									
British	NI	NI	NI	NI	NI	NI	NI	NI	NI
Welsh	0.0101	***	0.1030	-0.0021	---	-0.0370	-0.0034	---	-0.0129
Scots	-0.0181	***	-0.2257	-0.0312	***	-0.2508	-0.0195	**	-0.0908
Irish	0.0003	---	0.0026	-0.0071	---	-0.0351	0.0005	---	0.0014
Other	NI	NI	NI	NI	NI	NI	NI	NI	NI
HH Head's Age									
Below 20	0.0335	*	0.0408	-0.0769	**	-0.0605	0.0444	---	0.0202
20-29	0.0010	---	0.0138	-0.0133	*	-0.1222	0.0352	***	0.1862
30-39	-0.0027	---	-0.0510	-0.0003	---	-0.0041	0.0431	***	0.3000
40-49	-0.0035	---	-0.0593	0.0011	---	0.0122	0.0334	***	0.2092
50-59	-0.0045	---	-0.0606	0.0024	---	0.0206	0.0227	*	0.1130
60 & over	NI	NI	NI	NI	NI	NI	NI	NI	NI
HH Head's Occupation									
Unskilled	NI	NI	NI	NI	NI	NI	NI	NI	NI
Semiskilled	-0.0012	---	-0.0231	-0.0002	---	-0.0026	0.0056	---	0.0385
Skilled	-0.0003	---	-0.0050	-0.0050	---	-0.0462	-0.0042	---	-0.0222
Craftsman	-0.0026	---	-0.0335	-0.0065	---	-0.0553	0.0087	---	0.0424
Wh. Collar, Superv.	0.0038	---	0.0225	-0.0157	*	-0.0599	-0.0089	---	-0.0197
Helper, Apprentice	-0.0094	***	-0.0669	-0.0001	---	-0.0003	-0.0067	---	-0.0177
Other	-0.0002	---	-0.0010	-0.0102	---	-0.0288	-0.0241	---	-0.0393
Adjusted R-squared	0.584			0.187			0.284		
F-ratio	51.821	***		9.334	***		15.363	***	
N	979			979			979		

TABLE 10. Regressions with Commodity Budget Shares as the Dependent Variable. Working Class Families in Nine Industries. Germany. 1889/90. (Renter Families. Both Parents Present.)

	(1)			(2)			(3)		
	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight
Dependent Variable	Food Share			Housing Share			Clothing Share		
Independent Variables									
Constant	0.3462	***	NC	0.2118	***	NC	0.2817	***	NC
LN(Expenditure PC)	0.0334	---	0.1689	-0.0223	**	-0.2219	-0.0289	---	-0.2176
Industry									
Bar Iron	0.0091	---	0.0440	-0.0365	***	-0.3484	-0.0058	---	-0.0421
Steel	0.0232	---	0.1361	-0.0628	***	-0.7248	-0.0033	---	-0.0292
Coal	0.0608	---	0.0270	0.0189	**	0.1654	-0.0231	---	-0.1528
Coke	-0.0545	*	-0.1909	0.0124	---	0.0854	0.0006	---	0.0032
Iron Ore	0.0377	---	0.1118	0.0158	---	0.0922	-0.0261	---	-0.1152
Cottons	0.0113	---	0.0615	0.0031	---	0.0328	-0.0406	---	-0.3275
Woolens	NI	NI	NI	NI	NI	NI	NI	NI	NI
Family Composition									
Adults	0.0301	***	0.3481	-0.0062	*	-0.1398	-0.0115	*	-0.1977
Children 0-4	0.0070	---	0.0874	-0.0054	---	-0.1329	-0.0024	---	-0.0453
Children 5-9	0.0263	***	0.3530	-0.0076	**	-0.2015	-0.0014	---	-0.0278
Children 10-14	0.0211	**	0.2689	-0.0064	*	-0.1612	-0.0012	---	-0.0228
Children 15+	-0.0065	---	-0.0799	-0.0048	---	-0.1174	0.0129	**	0.2355
HH Head's Age									
20-29	-0.0430	---	-0.2396	-0.0009	---	-0.0103	0.0480	**	0.3976
30-39	-0.0599	*	-0.3900	0.0053	---	0.0677	0.0423	*	0.4099
40-49	-0.0397	---	-0.2393	0.0098	---	0.1157	0.0377	*	0.3377
50-59	-0.0099	---	-0.0346	0.0072	---	0.0498	0.0314	-	0.1637
60 & over	NI	NI	NI	NI	NI	NI	NI	NI	NI
HH Head's Occupation									
Unskilled	NI	NI	NI	NI	NI	NI	NI	NI	NI
Semiskilled	-0.0264	---	-0.1614	0.0073	---	0.0879	0.0084	---	0.0766
Skilled	-0.0587	***	-0.3819	0.0032	---	0.0417	0.0183	---	0.1768
Craftsman	-0.0692	***	-0.2823	0.0058	---	0.0462	0.0279	*	0.1692
Helper, Apprentice	-0.0864	---	-0.0990	0.0376	---	0.0848	-0.0170	---	-0.0290
Adjusted R-squared	0.197			0.548			0.127		
F-ratio	2.669	***		9.231	***		1.992	**	
N	137			137			137		

TABLE 10.

	(4)			(5)			(6)		
	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight
Dependent Variable	Fuel/Light Share			Liq./Tob. Share			Other Share		
Independent Variables									
Constant	0.1804	***	NC	0.0550	---	NC	-0.0750	---	NC
LN(Expenditure PC)	-0.0215	***	-0.4596	0.0027	---	0.0325	0.0367	**	0.2686
Industry									
Bar Iron	-0.0362	***	-0.7411	0.0132	---	0.1543	0.0563	***	0.3952
Steel	-0.0293	***	-0.7258	-0.0016	---	-0.0226	0.0738	***	0.6270
Coal	-0.0275	***	-0.5141	-0.0054	---	-0.0579	0.0310	*	0.1989
Coke	-0.0284	***	-0.4187	0.0154	---	0.1297	0.0545	***	0.2761
Iron Ore	-0.0354	***	-0.4431	-0.0070	---	-0.0500	0.0150	---	0.0645
Cottons	-0.0141	***	-0.3222	-0.0101	---	-0.1325	0.0503	***	0.3953
Woolens	NI	NI	NI	NI	NI	NI	NI	NI	NI
Family Composition									
Adults	-0.0038	**	-0.1840	-0.0083	**	-0.2310	-0.0004	---	-0.0069
Children 0-4	0.0003	---	0.0184	-0.0060	---	-0.1817	0.0065	---	0.1179
Children 5-9	-0.0052	***	-0.2939	-0.0085	***	-0.2770	-0.0035	---	-0.0686
Children 10-14	-0.0047	***	-0.2548	-0.0063	*	-0.1937	-0.0024	---	-0.0448
Children 15+	-0.0034	**	-0.1749	-0.0034	---	-0.1001	0.0052	---	0.0930
HH Head's Age									
20-29	-0.0055	---	-0.1299	0.0083	---	0.1121	-0.0068	---	-0.0551
30-39	-0.0066	---	-0.1813	0.0304	**	0.4779	-0.0115	---	-0.1084
40-49	-0.0028	---	-0.0708	0.0241	*	0.3507	-0.0290	---	-0.2532
50-59	-0.0036	---	-0.0531	0.0229	---	0.1934	-0.0480	**	-0.2434
60 & over	NI	NI	NI	NI	NI	NI	NI	NI	NI
HH Head's Occupation									
Unskilled	NI	NI	NI	NI	NI	NI	NI	NI	NI
Semiskilled	-0.0031	---	-0.0797	0.0167	**	0.2467	-0.0029	---	-0.0260
Skilled	0.0022	---	0.0619	0.0071	---	0.1116	0.0278	**	0.2618
Craftsman	0.0036	---	0.0616	0.0152	---	0.1501	0.0167	---	0.0987
Helper, Apprentice	-0.0073	---	-0.0353	0.0393	---	0.1087	0.0338	---	0.0560
Adjusted R-squared	0.570			0.240			0.243		
F-ratio	10.033	***		3.153	***		3.181	***	
N	137			137			137		

TABLE 11. Expenditure Elasticities. Worker Families in Nine Industries. By Nativity. United States, Great Britain, & Germany. 1889/90.

	Food	Housing	Clothing	Fuel/ Light	Liquor/ Tobacco	Other	N
	EXPENDITURE ELASTICITIES I						
United States	0.8187	0.8412	1.0982	0.5691	1.2628	1.7642	5351
(a) Native born	0.8026	0.8886	1.0900	0.5379	1.1343	1.7596	2963
(b) British	0.8413	0.7052	1.1307	0.6145	1.7280	1.7046	752
(c) Irish	0.8658	0.7082	1.0447	0.6376	1.3128	1.8715	690
(d) Canadian	0.8522	0.6205	1.2668	0.4905	1.4871	1.8308	320
(e) German	0.7541	0.7161	1.2202	0.5947	1.7304	1.8965	451
Great Britain	0.8451	0.6006	1.1837	0.4342	1.2962	2.0048	979
Germany	1.0640	0.7248	0.8367	0.5512	1.0475	1.3191	137
	EXPENDITURE ELASTICITIES II						
	Food	Housing	Clothing	Fuel/ Light	Liquor/ Tobacco	Other	
United States	0.8187	0.8412	1.0982	0.5691	1.2628	1.7642	
(a) Native born	0.8091	0.8878	1.0910	0.5228	1.1343	1.8087	
(b) British	0.8374	0.7031	1.1284	0.6272	1.5995	1.6995	
(c) Irish	0.8599	0.7205	1.0458	0.6436	1.2852	1.7774	
(d) Canadian	0.8302	0.7060	1.2319	0.4237	1.3439	1.7471	
(e) German	0.7558	0.6821	1.2215	0.6545	1.9452	1.7804	
Great Britain	0.8282	0.6850	1.1782	0.4249	1.3484	1.8385	
Germany	1.0731	0.8430	0.8280	0.6468	1.0782	1.2640	

(a) Expenditure elasticities are calculated for the Almost Ideal Demand System without prices. Elasticities I are calculated at group mean budget shares. Elasticities II are calculated at the mean budget shares for the whole U.S. renter sample.

Source: U.S. Commissioner of Labor [1890, 1891].

TABLE 12. Actual and Predicted Commodity Budget Shares. Working Class Families in Nine Industries. United States. 1889/90. (Renter Families. Both Parents Present.) (a)

	Food	Housing	Clothing	Fuel/ Light	Liquor/ Tobacco	Other	N
	ACTUAL AVERAGE BUDGET SHARES						
United States	0.457	0.142	0.168	0.061	0.034	0.139	5351
(a) Native born	0.442	0.143	0.170	0.063	0.034	0.148	2963
(b) British	0.468	0.143	0.165	0.059	0.028	0.138	752
(c) Irish	0.477	0.136	0.172	0.060	0.031	0.124	690
(d) Canadian	0.525	0.110	0.146	0.069	0.024	0.125	320
(e) German	0.454	0.159	0.169	0.052	0.044	0.121	451
Great Britain	0.507	0.112	0.163	0.062	0.040	0.116	979
Germany	0.522	0.081	0.177	0.048	0.056	0.115	137
	PREDICTED BUDGET SHARES (b)						
United States							
(a) Native born	0.468	0.166	0.169	0.062	0.027	0.109	
(b) British	0.480	0.165	0.165	0.060	0.029	0.101	
(c) Irish	0.484	0.160	0.171	0.061	0.032	0.092	
(d) Canadian	0.536	0.132	0.150	0.062	0.039	0.080	
(e) German	0.480	0.168	0.172	0.056	0.038	0.085	
Great Britain	0.459	0.112	0.176	0.067	0.058	0.128	
Germany	0.531	0.038	0.188	0.037	0.071	0.134	
BRITISH (c)							
Migrants to U.S.							
Average Shares	0.468	0.143	0.165	0.059	0.028	0.138	
U.S. Values	0.500	0.139	0.156	0.055	0.036	0.114	
British Values	0.514	0.150	0.154	0.061	0.031	0.090	
In Britain							
Average Shares	0.507	0.112	0.163	0.062	0.040	0.116	
U.S. Values	0.450	0.101	0.177	0.059	0.059	0.155	
British Values	0.459	0.112	0.176	0.067	0.058	0.128	
GERMANS (c)							
Migrants to U.S.							
Average Shares	0.454	0.159	0.169	0.052	0.044	0.121	
U.S. Values	0.443	0.214	0.176	0.065	0.023	0.080	
German Values	0.532	0.240	0.151	0.078	0.000	0.001	
In Germany							
Average Shares	0.522	0.081	0.177	0.048	0.056	0.115	
U.S. Values	0.551	0.023	0.167	0.021	0.076	0.016	
German Values	0.531	0.038	0.188	0.037	0.071	0.134	
IRISH (d)							
Migrants to U.S.							
Average Shares	0.477	0.136	0.172	0.060	0.031	0.124	
U.S. Values	0.463	0.150	0.180	0.061	0.032	0.113	
British Values	0.473	0.168	0.176	0.068	0.031	0.084	

Migrants to Britain						
British Values	0.498	0.102	0.153	0.067	0.051	0.129
U.S. Values	0.488	0.091	0.154	0.059	0.052	0.156

(a) Predicted budget shares are calculated using the Engel curve version of the Almost Ideal Demand System.

(b) The predicted budget shares for different ethnic groups in this panel are calculated using the dummy variable values from the overall equation for the United States using average sample values and assuming a semiskilled worker aged 30-39 in the steel industry in the Middle Atlantic region. Expenditure and family composition are taken as the sample means for the U.S. The British and German predicted budget shares are computed from the separate equations for the German and British samples, assuming sample mean values for expenditure per capita and family composition and a semiskilled worker in the steel industry aged 30-39.

(c) The actual and predicted budget shares for the British and German migrants in these panels were calculated using the subsamples of British and German migrants in the American sample.

(d) The actual and predicted shares for Irish migrants to the U.S. were computed from the Irish subsample of the U.S. sample. For Irish migrants to Britain, budget shares were calculated from the British sample using the dummy variable value for Irish.

TABLE 13. Indices of Dissimilarity for Consumer Budget Shares. Working Class Families in Nine Industries. United States. 1889/90. (Renter Families. Both Parents Present.)

	INDEX OF DISSIMILARITY Unweighted (a)	Weighted (b)	INDEX OF RELATIVE DIFFERENCE (a)
ACTUAL BUDGET SHARES			
British Migrants vs. U.S. Native	0.0255	0.00728	3.298
Irish Migrants vs. U.S. Native	0.0370	0.01047	3.649
Canadian Migrants vs. U.S. Native	0.0895	0.02528	9.204
German Migrants vs. U.S. Native	0.0385	0.00634	6.634
British Residents vs. U.S. Native	0.0710	0.02000	6.780
German Residents vs. U.S. Native	0.1095	0.02640	14.699
British Migrants vs. British Residents	0.0545	0.01310	7.534
German Migrants vs. German Residents	0.0880	0.02249	12.402
PREDICTED BUDGET SHARES			
British Migrants vs. U.S. Native	0.0144	0.00381	1.972
Irish Migrants vs. U.S. Native	0.0240	0.00564	3.871
Canadian Migrants vs. U.S. Native	0.0810	0.02182	9.825
German Migrants vs. U.S. Native	0.0293	0.00526	6.565
British Residents vs. U.S. Native	0.0628	0.00844	15.145
German Residents vs. U.S. Native	0.1525	0.02845	27.661
British Migrants vs. British Residents	0.0734	0.01196	11.536
German Migrants vs. German Residents	0.1496	0.02687	41.054
PREDICTED BUDGET SHARES- MIGRANT SAMPLES			
BRITISH			
British Migrants vs. Native U.S.--Own Values	0.0464	0.01110	6.655
British Migrants vs. Native U.S.--British Values	0.0511	0.01442	5.456
British Migrants vs. British Residents--Own Values	0.0682	0.01470	9.347
British Migrants vs. British Residents--British Values	0.0930	0.02042	11.923
GERMANS			
German Migrants vs. Native U.S.--Own Values	0.0581	0.01187	7.106
German Migrants vs. Native U.S.--German Values	0.1583	0.02975	24.552
German Migrants vs. German Residents--Own Values	0.2032	0.03909	55.297
German Migrants vs. German Residents--German Values	0.2423	0.03788	71.237
IRISH			
Irish Migrants to U.S. vs. Native U.S.--Own Values	0.0208	0.00355	3.449
Irish Migrants to U.S. vs. Native U.S.--Brit. Values	0.0246	0.00383	4.537
Irish Migrants to U.S. vs. Irish Migrants to Brit. --Own Values	0.0758	0.01534	10.891
Irish Migrants to U.S. vs. Irish Migrants to Brit. --Brit. Values	0.0898	0.01585	13.320

(a) For a definition of the index of dissimilarity and the index of relative difference, see text.
(b) The weighted version of the index of dissimilarity uses the American sample mean budget shares as weights.

TABLE 14. Ordinary Least Squares Estimates of the Almost Ideal Demand System. Working Class Families in Nine Industries. United States. 1889/90. Food Budget Only. (Renter Families. Both Parents Present.)

	(1)			(2)			(3)		
	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight
Dependent Variable	Grain Share			Meat Share			Dairy Share		
Independent Variables									
Constant	0.3885	***	NC	0.4326	***	NC	0.1760	***	NC
LN(Real Expend. PC)	-0.0613	***	-0.3938	-0.0283	***	-0.1373	-0.0098	***	-0.0528
Region									
New England	-0.0046	---	-0.2880	-0.0108	---	-0.0513	0.0274	***	0.1450
Mid Atlantic	0.0039	---	0.0311	0.0008	---	0.0051	0.0376	***	0.2499
South	0.0558	***	0.3378	-0.0293	***	0.1338	-0.0587	***	-0.2986
Midwest	NI	NI	NI	NI	NI	NI	NI	NI	NI
Industry									
Pig Iron	0.0038	---	0.0186	-0.0297	***	-0.1095	-0.0202	***	-0.0828
Bar Iron	-0.0156	***	-0.0723	0.0022	---	0.0078	-0.0242	***	-0.0945
Steel	-0.0087	**	-0.0228	0.0076	---	0.0152	-0.0175	***	-0.0388
Coal	0.0204	***	0.0826	-0.0214	***	-0.0656	-0.0336	***	-0.1143
Coke	0.0174	***	0.0537	-0.0288	***	-0.0672	-0.0130	**	-0.0339
Iron Ore	0.0592	***	0.1382	-0.0050	---	-0.0088	-0.0558	***	-0.1096
Cottons	0.0093	***	0.0692	-0.0265	***	-0.1492	0.0004	---	0.0022
Woolens	-0.0065	**	-0.0350	0.0006	---	0.0023	-0.0134	***	-0.0609
Glass	NI	NI	NI	NI	NI	NI	NI	NI	NI
Family Composition									
Adults	-0.0041	***	-0.0842	0.0002	---	0.0035	-0.0009	---	-0.0162
Children 0-4	-0.0034	***	-0.0459	-0.0076	***	-0.0782	-0.0013	---	-0.0146
Children 5-9	0.0035	***	0.0489	-0.0039	**	-0.0416	-0.0034	***	-0.0396
Children 10-14	0.0041	***	0.0576	-0.0060	***	-0.0626	-0.0033	***	-0.0386
Children 15+	0.0070	***	0.1127	-0.0012	---	-0.0146	0.0011	---	0.0146
HH Head's Nativity									
Native born	NI	NI	NI	NI	NI	NI	NI	NI	NI
British	-0.0025	---	-0.0136	-0.0022	---	-0.0093	0.0132	***	0.0610
Irish	0.0063	***	0.0333	-0.0002	---	-0.0009	0.0142	***	0.0636
Canadian	0.0153	***	0.0318	0.0123	---	0.0194	0.0155	**	0.0270
French Canadian	0.0302	***	0.0963	0.0051	---	0.0122	-0.0088	*	-0.0237
German	-0.0029	---	-0.0129	-0.0074	*	-0.0246	0.0208	***	0.0771
Slavic	-0.0029	---	-0.0043	0.0171	---	0.0189	-0.0012	---	-0.0015
Italian	0.0002	---	0.0001	0.0024	---	0.0013	0.0070	---	0.0042
Other	0.0154	***	0.0357	0.0042	---	0.0073	0.0064	---	0.0126
HH Head's Age									
Below 20	-0.0334	---	-0.0145	-0.0144	---	-0.0047	0.0468	---	0.0170
20-29	-0.0101	***	-0.0662	0.0024	---	0.0121	0.0073	---	0.0402
30-39	-0.0140	***	-0.1062	0.0046	---	0.0263	0.0096	*	0.0616
40-49	-0.0117	***	-0.0810	0.0026	---	0.0135	0.0050	---	0.0293
50-59	-0.0108	***	-0.0555	0.0068	---	0.0263	0.0008	---	0.0033
60 & over	NI	NI	NI	NI	NI	NI	NI	NI	NI

TABLE 14.

	(4) Coeff.	Signi.	B-Weight	(5) Coeff.	Signi.	B-Weight
Dependent Variable	Fruit/Vegetable Share			Other Food Share		
Independent Variables						
Constant	0.1025	***	NC	0.3403	***	NC
LN(Real Expend. PC)	-0.0118	***	-0.0972	0.0134	*	0.0347
Region						
New England	0.0643	***	0.5208	-0.0346	**	-0.0876
Mid Atlantic	0.0507	***	0.5160	-0.0638	***	-0.2032
South	-0.0033	---	-0.0255	0.0113	---	0.0274
Midwest	NI	NI	NI	NI	NI	NI
Industry						
Pig Iron	-0.0101	***	-0.0634	0.0359	***	0.0704
Bar Iron	-0.0030	---	-0.0179	0.0353	***	0.0660
Steel	-0.0127	***	-0.0431	0.0151	---	0.0160
Coal	-0.0190	***	-0.0987	0.0256	**	0.0417
Coke	0.0052	---	0.0206	-0.0185	---	-0.0230
Iron Ore	-0.0234	***	-0.0702	-0.0155	---	-0.0146
Cottons	0.0163	***	0.1563	-0.0206	**	-0.0617
Woolens	0.0092	***	0.0636	-0.0010	---	-0.0090
Glass	NI	NI	NI	NI	NI	NI
Family Composition						
Adults	-0.0011	**	-0.0086	-0.0001	---	-0.0011
Children 0-4	-0.0007	---	-0.0131	-0.0068	**	-0.0374
Children 5-9	-0.0028	***	-0.0498	-0.0033	---	-0.0188
Children 10-14	-0.0003	---	-0.0052	-0.0039	---	-0.0220
Children 15+	-0.0013	*	-0.0273	-0.0089	***	-0.0579
HH Head's Nativity						
Native born	NI	NI	NI	NI	NI	NI
British	-0.0039	**	-0.0274	-0.0043	---	-0.0095
Irish	-0.0036	*	-0.0245	-0.0139	**	-0.0296
Canadian	-0.0095	**	-0.0253	-0.0120	---	-0.0101
French Canadian	0.0045	---	0.0186	-0.0172	---	-0.0220
German	-0.0000	---	-0.0000	-0.0132	*	-0.0234
Slavic	0.0201	***	0.0377	-0.0526	**	-0.0309
Italian	-0.0011	---	-0.0010	-0.0254	---	-0.0073
Other	-0.0042	---	-0.0125	-0.0212	---	-0.0198
HH Head's Age						
Below 20	-0.0237	---	-0.0132	-0.0094	---	-0.0016
20-29	0.0050	---	0.0418	-0.0038	---	-0.0101
30-39	0.0045	---	0.0444	-0.0021	---	-0.0064
40-49	0.0051	---	0.0457	-0.0004	---	-0.0010
50-59	0.0024	---	0.0160	0.0034	---	0.0070
60 & over	NI	NI	NI	NI	NI	NI

TABLE 14. Ordinary Least Squares Estimates of the Almost Ideal Demand System. Working Class Families in Nine Industries. United States. 1889/90. Food Budget Only. (Renter Families. Both Parents Present.)

	(1)			(2)			(3)		
	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight
Dependent Variable	Grain Share			Meat Share			Dairy Share		
HH Head's Occupation									
Unskilled	NI	NI	NI	NI	NI	NI	NI	NI	NI
Semiskilled	-0.0006	---	-0.0046	0.0058	*	0.0311	0.0070	***	0.0417
Skilled	-0.0010	---	-0.0062	0.0049	---	0.0235	0.0078	***	0.0414
Craftsman	-0.0107	***	-0.0505	0.0014	---	0.0048	0.0152	***	0.0606
Wh. Collar, Superv.	-0.0069	*	-0.0194	-0.0117	*	-0.0248	0.0146	***	0.0343
Helper, Apprentice	-0.0015	---	-0.0110	-0.0061	---	-0.0131	0.0000	---	0.0001
Other	-0.0051	---	-0.0124	0.0090	---	0.0166	0.0060	---	0.0123
Prices									
Grain Products	-0.1492	***	-0.1085	0.0504	---	0.0277	-0.0345	---	-0.0211
Meat	0.0306	**	0.0413	0.0159	---	0.0162	-0.0256	---	-0.0290
Dairy Products	-0.0793	***	-0.0945	-0.1144	***	-0.1030	-0.1314	***	-0.1315
Fruits & Vegetables	0.0753	***	0.0970	0.1466	***	0.1426	0.0402	*	0.0435
Other Food	0.1976	***	0.1083	-0.0674	---	-0.0279	0.0651	---	0.0300
Adjusted R-squared	0.446			0.059			0.318		
F-ratio	106.204	***		9.201	***		61.967	***	
N	5351			5351			5351		

TABLE 14.

	(4)			(5)		
	Coeff.	Signi.	B-Weight	Coeff.	Signi.	B-Weight
Dependent Variable	Fruit/Vegetable Share			Other Food Share		
HH Head's Occupation						
Unskilled	NI	NI	NI	NI	NI	NI
Semiskilled	-0.0007	---	-0.0065	-0.0086	---	-0.0248
Skilled	-0.0001	---	-0.0008	-0.0119	*	-0.0303
Craftsman	-0.0013	---	-0.0082	0.0002	---	0.0004
Wh. Collar, Superv.	-0.0019	---	-0.0070	-0.0013	---	-0.0015
Helper, Apprentice	-0.0024	---	-0.0089	0.0021	---	0.0024
Other	-0.0016	---	-0.0051	-0.0041	---	-0.0040
Prices						
Grain Products	0.2918	***	0.2729	-0.2404	***	-0.0703
Meat	-0.1204	***	-0.2089	-0.0392	---	-0.0212
Dairy Products	0.0140	---	0.0215	0.3706	***	0.1776
Fruits & Vegetables	0.0756	***	0.1251	-0.3748	***	-0.1941
Other Food	-0.6450	***	-0.4547	0.2323	**	0.0512
Adjusted R-squared	0.286			0.099		
F-ratio	53.386	***		15.302	***	
N	5351			5351		

TABLE A-1. Families Classified by Industry and Place of Residence. U.S. Commissioner of Labor Survey, 1889/90. (All Families.)

	Residence	Industry: Pig Iron	Bar Iron	Steel	Coal	Coke	Iron Ore	Cottons	Woolens	Glass	Total
1	Alabama	143	39	2	60	30	--	43	--	--	317
2	Georgia	25	--	--	--	--	--	199	--	--	224
3	Illinois	40	68	38	--	--	--	--	--	106	252
4	Indiana	--	--	--	36	--	--	--	--	178	214
5	New York	56	41	62	--	--	38	187	214	152	750
6	Ohio	98	140	8	103	--	29	--	--	245	623
7	Pennsylvania	313	277	48	301	187	73	213	213	252	1877
8	Tennessee	51	17	--	--	15	9	69	--	--	161
9	Virginia	27	35	--	--	--	16	124	--	--	202
10	West Virginia	9	6	25	8	17	--	--	--	--	65
11	Connecticut	--	--	--	--	--	--	150	146	--	296
12	Kentucky	--	--	--	--	--	--	20	--	--	20
13	Louisiana	--	--	--	--	--	--	10	--	--	10
14	Maine	--	--	--	--	--	--	164	111	--	275
15	Maryland	--	--	--	--	--	--	164	--	47	211
16	Massachusetts	--	--	--	--	--	--	400	18	--	418
17	Mississippi	--	--	--	--	--	--	34	--	--	34
18	New Hampshire	--	--	--	--	--	--	119	36	--	155
19	North Carolina	--	--	--	--	--	--	148	--	--	148
20	Rhode Island	--	--	--	--	--	--	55	40	--	95
21	South Carolina	--	--	--	--	--	--	33	--	--	33
22	Missouri	--	--	--	--	--	--	--	--	18	18
23	New Jersey	--	--	--	--	--	--	--	85	278	363
24	Delaware	--	--	--	--	--	--	--	48	--	48
	U.S. TOTAL	762	623	183	508	249	165	2132	911	1276	6809
25	Belgium	11	75	--	10	4	--	--	--	24	124
26	France	--	40	--	--	--	--	116	179	--	335
27	Germany	--	22	35	18	10	19	72	24	--	200
28	Great Britain	66	114	166	166	14	--	341	131	26	1024
29	Switzerland	--	--	--	--	--	--	52	--	--	52
	EUROPE TOTAL	77	251	201	194	28	19	581	334	50	1735
	OVERALL TOTAL	839	874	384	702	277	184	2713	1245	1326	8544

Source: U.S. Commissioner of Labor [1890, 1891].

Table A-2

Information Coded from the 1889/90 U.S. Commissioner of Labor Survey of Worker Families in Nine Industries in the United States and Five European Countries

1. State or country of residence
2. Industry
3. Nationality of family head
4. Number of children at school
5. Number of children at home
6. Number of children at work
7. Presence of boarders
8. Number of boarders and others in the household
9. Occupation of husband
10. Age of husband
11. Age of wife
12. Total number of children
13. Age of each child
14. Sex of each child above age 10
15. Does the family own its home or rent?
16. Husband's income
17. Wife's income
18. Children's income
19. Income from boarders
20. Other income
21. Total income
22. Number of rooms in the house or apartment (if rented)
23. Total expenditures

24. Food expenditures
    of which expenditures for:
    (a) Beef
    (b) Hog products
    (c) Meat (not specified)
    (d) Eggs
    (e) Lard
    (f) Butter
    (g) Tea
    (h) Coffee
    (i) Sugar
    (j) Molasses
    (k) Potatoes
    (l) Poultry
    (m) Fish
    (n) Milk
    (o) Flour and meal
    (p) Bread
    (q) Rice
    (r) Cheese
    (s) Fruit
    (t) Vinegar, Pickles, and condiments
    (u) Vegetables (not specified)

(v) Food (not specified)

25. Fuel
    (a) Type
    (b) Quantity
    (c) Expenditure

26. Lighting
    (a) Type
    (b) Expenditure

27. Clothing expenditure
    (a) Husband's
    (b) Wife's
    (c) Children's

28. Other expenditures
    of which expenditures for:
    (a) Furniture and utensils
    (b) Taxes
    (c) Property insurance
    (d) Life insurance
    (e) Labor organization contributions
    (f) Other organizational contributions
    (g) Religion
    (h) Charity
    (i) Books and newspapers
    (j) Amusements and vacation
    (k) Intoxicating liquor
    (l) Tobacco
    (m) Sickness and death
    (n) Unspecified other expenditures