PARENTS, CHILDREN, GENDER, AND HOUSEHOLD ALLOCATION: THE VIEW FROM HISTORY

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Abstract

Children of different genders had different earnings potential in the labor market in the nineteenth century. It is not known, however, if intrahousehold allocation took such differentials into account, where children on one gender would be favored over another at young ages before they entered the labor force. I use the 1888 Cost of Living Survey to estimate the different earnings profiles of boys and girls, and also to test for the presence of resource allocation differences by gender for young children. The income profiles reveal that the gap between the earnings of boys and girls was large and grew with age. Despite the different earnings profiles for boys and girls, and some narrative evidence of female maltreatment in the industrial household, neither American nor European households exhibited gender bias in the allocation of resources to young children. Furthermore, I am unable to reject the hypothesis that the resource allocation in these households was efficient. Using the efficiency and the lack of gender discrimination results, I estimate that European boys age 12-16 were twice as likely as Europeans girls to leave the household, and American boys age 12-16 were 25% more prone to leave home than American girls of the same age.

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I. Introduction

The allocation of resources within the household has a large impact on children who will one day form households of their own. Differences in intrahousehold allocation may lead to differentials later in life in areas such as education, health, and mortality. Differentials in household allocation may take many forms. The most obvious differential would be the systematic favoring of one type of family member over another. Another is the favoring of one type over another at particular ages (usually in favor of the type that provides income to the household). Still another is favoring the type that is responsible for old age support. These differentials may be for goods (food, clothing, etc.), services (education, health, etc.) or both. The canonical unitary model of the household, however, does not allow us to consider the implications of multi-person interactions, which include resource allocations. When the household is looked upon as a collection of individuals the inherent dynamics that arise due to members' differing contributions to and demand for household resources come to the fore.

One of the reasons the inner workings of the household have been neglected in research is the difficulty of constructing a useful methodological approach to them. In recent years, economists have made a number of advances in this regard, and this paper is an attempt to use the methods that are currently available to economists to look at intrahousehold allocation in the nineteenth century. This paper takes the narrative and quantitative approach to analyze household allocation in the late nineteenth century in the United States and Western Europe, focusing on allocations to children not yet in the labor force. It is important to state at the outset that any systematic approach to intrahousehold allocation in the past should incorporate both narrative and quantitative evidence. The

empirical investigation should be motivated by the narrative evidence, and quantitative evidence should be used to establish empirical regularities where appropriate. Narrative evidence should be used to further investigate the ways in which the empirical regularity manifest itself in particular cases. This approach is especially useful in analyzing the household, as a total dependence on either method may fail to capture many of the features of the process.

The existing scholarship about household allocations in the past is promising but has not, for the most part, taken advantage of the advances in the economic theory of the household when considering young children in the household. Horrell and Oxley do not find gender discrimination among British households in the late nineteenth century, but they do not test whether gender neutral allocations were efficient. Smith (1994) has taken the novel approach of analyzing fertility and its interaction with household consumption in the late nineteenth century. He found that the consumption of the wife was more responsive to fertility differentials than the consumption of the husband, arguing that husbands needed clothing and other consumption goods for work and other social purposes, while women did not. Moehling (2005) looks at the allocation of resources that takes place when children are working outside of the home in the early twentieth century and finds that expenditures on clothing increase for children working in the labor market, which she takes as evidence that there were incentives for children to work.

There is also evidence that parents had choices in terms of their household income strategies. Angus and Mirel (1985) describe the differing rates of schooling in the US and while they conclude that sending your children to school was most surely a choice in

the US, they argue that children's participation in the labor force in Europe was not the result of financial hardship, as they believe that it was in the US. Rotella and Alter (1993) find that household debt and surplus were linked to household demography. Families who spent more than they earned were found to have children near working ages. They argue that parents smoothed consumption over the lifecycle, taking into account the expected future earnings of household members when making current consumption decisions. Haines (1979) finds that household income peaked once children begin working in the labor market, a finding that appears to agree with Rotella and Alter. Haines (1981) also finds that the income of children was extremely important for families who were close to the poverty threshold.

In contrast to these findings, Goldin and Parsons (1989) look at savings behavior in the late nineteenth century and find that the shares devoted to savings are invariant to the presence of working children. Goldin (1981) argues implicitly that Europeans had a different type of household political economy in the late nineteenth and early twentieth centuries. She analyzes immigrant and native white child labor force participation rates and finds that older immigrant stocks do not exhibit large differences when compared to the native white rates, while newer stocks of immigrants did. Goldin (1980) also finds that the work of single women, usually still living at home, were the vast majority of working women in the late nineteenth century.

With this as the background we must ask: If parents are forward looking, and if children of one gender are to contribute more than another as they age, does the allocation of resources respond in kind? In other words, since boys earn more than girls do families allocate more resources to the boy? Do parents increase their own

consumption more when a boy is nearing working age? To that end, this paper has two goals. The first is to estimate the earnings of boys and girls in industrial households in a manner that would allow us to form inferences about the expected earnings of children in the household. I find that boys and girls had similar earnings at young ages, but that the growth of boys' earnings is faster than those for girls. These income differentials imply that forward looking parents would be more likely to favor boys over girls. Next, we consider the pattern of intrahousehold allocation to see if it differs by gender at young ages. I cannot reject the hypothesis that the allocation of resources to young children are equal by gender and, furthermore, cannot reject the hypothesis that the allocation of resources in the household are efficient.

We are left with a puzzle. Parents do not favor one gender over another and household allocations are efficient, yet we know that boys will earn more than girls when they enter the labor market with parents who are forward looking consumption smoothers. There are two explanations plausibly consistent with this finding. The first and simplest is that parental egalitarianism dominates any strategic, forward-looking behavior. The narrative record allows us to refine this statement since wives controlled the allocation of resources in the household. This explanation contradicts the efficiency of household allocation, however, and must be rejected. The second explanation hinges on forward looking behavior. If parental allocations are efficient and parents are forward looking, then it must hold that parents perceive the expected income flows from sons and daughters to be equal. Using this insight, we can use the income profiles to derive the probability that boys will leave home relative to girls. I find that boys age 12-16 in the

US are30% more likely than girls age 12-16 to leave home, and that European boys age 12-16 are twice as likely as girls age 12-16 to leave home.

II. Household Allocation in the Literature

Contemporaneous discussions of the industrial household are fragmentary, but when taken together a clear picture emerges. As the evidence comes from a variety of sources, each individual piece of narrative evidence should be viewed with caution. When this evidence is taken as a whole, however, the picture of the industrial household in the late nineteenth century will be clear.

Poverty was common among households in the early industrial period. Chapin (1909) collected and analyzed the budgets of 642 families, collected primarily between June and August of 1907, and noted that "malnourished" status was more common for households with composite income, that is, households whose total income came from more than one source. Byington (1910) performed intensive interviews of 97 families living in a steel mill town outside of Pittsburgh, Pennsylvania. She observed that families who were impoverished lacked the time and income necessary to partake in significant home production. This also suggests that the in-house requirements of children were not significant in poor households.

Overall, the changes brought about by industrialization changed traditional familial relationships. Children of both genders were working outside of the household to supplement their father's income. As Glenn (1990) points out:

> While their mothers labored at home and confined themselves largely to domestic tasks, daughters along with their brothers entered the industrial workforce and took on the major burden of supplementing their father's earnings. In the process of resettlement and adaptation to American conditions, this pattern was a shift

> from the traditional way that… [Europeans] had defined the economic role of women…This redistribution of economic responsibility was a behavioral shift more than a shift in values, but it represented the first in a series of changes that would redefine the nature of … womanhood. (Glenn, p. 89)

In short, this change was momentous, and changed the way the family functioned and was structured.

Streightoff (1911) summarizes many of the general findings of contemporaneous reports of livings standards in the late nineteenth century. He further supports Chapin's claims about the poverty of composite income when he looks at the other surveys of industrial families from the late nineteenth century onward. Although this work does not explicitly analyze European households, they allude to the fact that industrial households in Europe are worse off than those of the United States at the time.

Streightoff additionally notes that young working women seem to be particularly affected by fatigue brought about by undernourishment. He finds that

> The reason for this pitifully insufficient diet is well expressed by Mrs. Van Vorst in describing her own experience as a working woman: "I am beginning to understand why the meager lunches of preserves, sandwiches, and pickles more than satisfy the girls whom I was prepared to accuse of spending their money on gewgaws rather than on nourishment. It is a fatigue that steals the appetite. I can hardly taste what I put in my mouth; the food sticks in my throat. I do not want wholesome food…"(p.91)

This plainly points to mistreatment in the household. Haines (1980) similarly concludes that the highest earning members of the household could be expected to receive better treatment than others, and from this we can infer that boys would be treated better than girls in the household. Goldin (1980) hints that this could be the result of implicit investment choices by parents, where boys, because they would be expected to participate in the labor market their entire lives, would receive a larger share of parental resources. In an analysis of Philadelphia households in the late nineteenth century she surmises that

"Sons and daughters had differing relative productivities in the household and in the market and required differing training for their future occupations inside or outside the home" (p.293). There is further narrative evidence to support such claims. As Glenn notes:

> In families where the father had employment, working daughters provided approximately a third of the family income, roughly the same as the father's average contribution. So important were a daughter's wages to the family that in some instances her marriage would be postponed until another child could earn enough to replace her…The economic needs and priorities of immigrant families frequently required daughters to drop out of school in order to become wage earners. (pp. 84-86).

Glenn further notes that until 1903 New York law required only four years of schooling before a child could work, and "working papers" were easy to forge.

This situation would be exasperated in Europe, where industrial families were poorer than those in the United States. Johnson (1985) notes that working class families in Britain did not seem to take a lifecycle approach to savings:

> The insecurity of working-class income prevented the adoption of long-term saving plans that might conform to middle-class models of saving over the life-cycle. There was little point in thinking about saving for retirement when there were more immediate calls on funds—payment of the quarterly rent or purchase of new boots. Nor was there much point in attempting to save for a goal beyond the financial means of a typical working class wage—as, for instance, was the purchase of an old-age annuity. (p. 219)

This seems to suggest that the findings of Goldin and Parsons could be explained by poor savings of industrial households in general, which would naturally be invariant to the presence of working children. This also supports the idea that if parents were forward looking they may not save current income as much as they would spend out of expected future income, especially if they knew that children would soon go to work.

When social observers turned their attention to young women in the household, however, their observations were striking. Unlike the implicit investments that parents made in sons, daughters were seen solely as a source of income. Parents, it seems, were disinterested in the particulars of the daughters work life.

> The family sense of responsibility for the girl who goes to work is universally admitted to be greatly underdeveloped, and the majority of parents are careless concerning the place and conditions under which the daughter works. Bad influences are accepted as the responsibility of the boss or of government. At best, parents are only occasionally anxious or a little puzzled. The struggle for a living is so keen that everything else is unimportant. The vital question is that of putting the girl at work; her safety is merely incidental. "I do not know where she works, but I know what she gets a week," fairly represents the attitude of the average parent…Few parents inquire into the moral conditions surrounding the daughter's employment, or the type of workpeople with whom she is associated. (Woods and Kennedy, pp.59-60)

This lack of concern could spill over to other areas as well. Young women could be made to do a large portion of the house chores in addition to working, and parents were often likely to deny young women free time for recreation, or large amounts of spending money. This created conflict in the household, and Goldin (1980) claims that this conflict could explain why young women who lived in boarding houses earned more than those who were still at home.

This is further supported by evidence on female work environments. Metzker (1971) details several accounts of young working women in precarious situations with morally questionable or abusive supervisors. Woods and Kennedy (1913) lament the fact that many young women worked in and near "red light" districts where they were routinely solicited for prostitution. Even without these literal moral hazards, the working conditions of young women were nearly as demanding as those of young men. One young woman described her working conditions as a young weaver in the following way:

> When I came in 1900, we worked from six in the morning till six at night. I worked solid. My aunt, she wouldn't allow any gallivanting around. Even on the weekends I worked…The colors are hard on your eyes…You had to watch your pattern…We didn't mind the noise—once you're in here you never mind; the only thing is when you happen to be out and go back in, then you hear the volume of all that noise…If I had my life all over again, I wouldn't be in the mill. No, I wouldn't be in the mill. I'd rather be outside. It wasn't long till I did see where I was wrong. It was drudgery there; of course, it paid well, but it's regular drudgery. (Hareven and Langenbach, pp.44-48)

Such mistreatment of young women interacted strongly with social norms. Since there was, at the time, a strong taboo against young women living on their own and against married women working, the only range of escape would be through marriage. Furthermore, once the daughter married she was no longer a "member" of the household, as she would now belong to the husband's family. Parents could take advantage of this situation:

> Exploitation is rather family than personal. The tradition that the daughter is a family possession to be relinquished only at marriage is as strong among working people as it is among the well-to-do. Exploitation for family purposes is universal among the Italians, with whom the children are definitely considered an economic asset; and the same is largely true in the case of the Irish…The evil is not at all in what is done, but rather in the spirit which prompts it. Most girls rejoice to be able to contribute to the family…[but] No individual likes to be merely a pawn in another's game, with the feeling that as soon as some coveted end is secured and paid for she n longer counts, and is in a way to be cast aside. (Woods and Kennedy, pp. 46-47).

Taken together, this narrative evidence supports the idea that parents understood the different earnings profiles of their sons and daughters, and that they made decisions about their children and their activities that took such realities into account.

This review of the literature establishes a number of facts which clarify the questions asked of the empirical analysis. Parents, to a certain extent, exploited their children, taking advantage of their income to secure goods for the household, and

potentially more for the parents as well. It is well known that young men earned higher wages than young women in late nineteenth century labor markets in both Europe and the United States. And while we know that parents were forward looking, they were not life-cycle savers in the traditional sense. Parents could also take advantage of existing taboos regarding gender and independent living. Since children of different genders had different economic values in the labor market we should now ask: Did allocation of household goods follow the same pattern?

III. Data and Methodology

A. Theoretical Considerations

To conceptualize these issues I take and extend the two-member household model of Browning, et. al. (1994) and Browning and Chiappori (1998). The largest benefit of this model is that the unitary and bargaining approaches to household decision making are special cases of this theory. The model has important implications for the household without assuming that preferences are aggregated or that decisions are reached through an explicit bargaining process. To improve the exposition, I will first present the two-adult model and then extend the model for the purpose of the paper along the lines of the extension provided by Deaton (1997).

In the two-adult model, the household consist of two adults, A and B, and no children. We assume that some goods are non-public and that each household member has caring preferences, where they take the utility of the other member as an argument in their utility function. It is further assumed that the subutility of each member of the household is separable for private goods. For the household we have a utility function

(1) $$U^i = F^i\left(\upsilon^A\left(q^A, Q\right), \upsilon^B\left(q^B, Q\right)\right);$$

where Q is a vector of public goods and q^A and q^B are vectors of private goods going to each household member. The budget constraint is

(2) $$y = p^A q^A + p^B q^B + PQ \Rightarrow p'\left(q^A + q^B\right) + P'Q$$

The model further assumes that outcomes are efficient because the people in the household have a long term relationship with one another that does not vary much over time.[1] The key assumption, however, is that there is a private good that is assignable (or if we can identify two exclusive goods, one for each member of the household). Given this framework, the allocation takes place as a two-step procedure. In the first stage, household income is allocated to savings, public goods, and to each household member for their private consumption. In the second stage, the maximization becomes, for each member

(3) $$\max \upsilon^i\left(q, \tilde{z}\right) \quad \text{s.t.} \quad p^i q = \theta^i\left(p, p_z, y\right); \ \text{i=A,B}$$

where $\tilde{z}$ is the optimal choice of the public goods from the first stage of the maximization process, p is the price vector of all goods, p_z is the price vector of public goods, and $\theta^i\left(p, p_z, y\right)$is the sharing rule, which is the division of total expenditure on private goods between the two household members. Because the rule is determined by demand, we can use cross sectional evidence to estimate the rule.

The solution to the second stage maximization problem is a set of demand functions for each private good j

(4) $$q_j = g_j^A\left[\theta^A\left(y^A, y^B, y\right)\right] + g_j^B\left[y - \theta^A\left(y^A, y^B, y\right)\right]$$

[1] As will be shown later, this assumption can be tested directly.

The main result of Chiappori and Browning is that if good j is assignable (and differentiable with respect to the income of each member) then

$$\frac{\partial q_j / \partial y^A}{\partial q_j / \partial y^B} = \frac{\partial \theta^A / \partial y^A}{\partial \theta^A / \partial y^B} \tag{5}$$

Notice that the right hand side is not a function of each good. This expression says that changes in demand for changes in income (for member A relative to member B) reduce to changes in the sharing rule for changes in the income of each household member. In this way, we can test for both the presence of a sharing rule, and test whether it is the same for each good. Testing whether the derivative quotient is the same for each good becomes a test of efficiency as equation 5 is a direct result of that assumption.[2]

We can extend this model to children by making a few changes. First, we can assume that all income is earned by and accrues to adults. Since our focus here is on allocations to children not yet in the labor market, and since provisions for them are made out of the household's income (that is, net of any portion retained by working children) this is not a strong assumption. We still assume that all allocations are efficient, and since the household now contains children this is a strong assumption that should be tested as the inability of children and parents to enter into formal contracts may lead to inefficient outcomes (Becker 1981). The number and characteristics of children will influence adult consumption through the share of total income that will be devoted to children. We can therefore modify the demand function in (4) to be

$$q_j^A = g_j^A\left[\theta^A\left(y\ , z^C, z^A\right), z^C, z^A\right] \tag{6}$$

where A and C now stand for adults and children, and where z are characteristics and x is the share of expenditure given to adults by the sharing rule

[2] See Browning and Chiappori (1998) for the proof of the existence of the sharing rule and its dependence on efficiency.

(7) $$x^A = \theta\left(y, p, z^C, z^A\right)$$

In a cross-section, the prices are fixed, and this is what Chiappori and Browning use to derive the sharing rule for two adult households. This same approach can be extended to parents and children, where the characteristics of children have the same effect as income from the other partner. As in the two-adult case, we need to have assignable goods, in this case assignable to adults. The sharing rule result now applies to the characteristics of children such that the result given in equation 5 is now

(8) $$\frac{\partial q_j^A / \partial z^C}{\partial q_j^A / \partial y} = \frac{\partial \theta / \partial z^C}{\partial \theta / \partial y}$$

where once again the result is the same for all assignable goods j. What is measured in this ratio is the effect of child characteristics on the adult's share of expenditure, such that all demand changes for adult goods can be understood through the sharing rule. The test for efficiency is the same as in the two adult case—namely, that the left hand side of equation 8 is the same for all adult goods. We can further test whether, for two different demographic characteristics, c and c', whether

(9) $$\partial q_i^A / \partial z^C = \partial q_i^A / \partial z^{C'}$$

So this theory gives us two test, one for the efficiency of household allocation, and secondly for the same allocations across different characteristics.

B. Econometric Model

To capture gender differentials I use a parametric method advanced by Deaton (1997). Deaton uses a Rothbarth curve to attribute the distribution of goods in the household by age and gender. This Rothbarth curve modifies the traditional Engel curve

(as extended by Working in 1943) by including household size and age-sex categories that is, for each adult good in the data, *w*, I estimate

$$w_i = \alpha_i + \beta_i \ln\left(\frac{x}{n}\right) + \eta_i \ln(n) + \sum_{k=1}^{K-1} \gamma_{ik}\left(\frac{n_k}{n}\right) + \varepsilon_i \tag{10}$$

where *w* is the share of the total budget (expenditure) devoted to a particular good, *n* is the size of the family, *x* is total expenditure, and *k* is 5-year age sex categories (e.g. males 5-9, females 15-19, etc.).[3]

As Deaton notes, the "transformation of expenditures to budget shares and of total outlay to its logarithm induces an approximate normality in the joint density of the transformed variables, so that the regression function is approximately normal" (p. 231). I therefore estimate the model above using OLS If *w* is an "adult good" (a good consumed only by the mother and/or father, for example), the size and sign of the γ coefficients gives the substitution away from (if negative) or towards (if positive) the consumption of that adult good if a given share of the household lies in that age-sex category.

If the coefficients are significantly different across genders for the same adult good and age grouping, then the adults can be said to sacrifice more of their consumption for one gender than for another. The basis of the type of gender differential is not child consumption, but parental *willingness to forgo consumption* in the presence of children. It can, therefore, be thought of as a "top down" measure of gender allocation, which follows directly from the theoretical discussion above since it relates to private (adult) goods. As such, it does have limitations--since this is a test based upon parental

[3] Horrell and Oxley (1999) use a similar econometric strategy to test for gender discrimination amongst the British households in the 1888CEX.

consumption it will not capture different access by gender to services such as education and healthcare, for example. Even with these limitations I believe that the allocation rules captured here are powerful, and useful for thinking about allocation of goods within the household, particularly in light of the theory.

Another important use of this approach is that it fits quite well with the historical era under consideration. In contemporary populations, it is unwise to think of household size and composition as exogenous. As Behrman (1997) has correctly noted, Rothbarth-type regressions may fail to reject the hypothesis of gender equality even when there is substantial evidence that women are mistreated in the home. If parents are taking part in activity which eliminates young women from the household (e.g. sex-selective abortion, infanticide, skewed sex ratios at birth), then the failure to find gender differentials in household allocation is not on a firm footing.

Historically, there is little evidence of these types of desires and practices for parents in the US and Western Europe. Indeed, there is no evidence of excess infant female mortality in the late nineteenth century. For example, lifetables from the time suggest that the probability of dying in the first year of life was .155 for females and .185 for males in Western Europe, with similar probabilities in the United States.[4] Furthermore, given the relatively high infant mortality environment and the lack of a strong income-infant mortality relationship at the time (as well as a high total fertility rate), we can safely say that household size and composition were exogenous in the past. As such, the historical circumstances give us a time and place where we can test for the presence of gender differentials in household allocation, or for efficiency more generally,

[4] For more see the Human Mortality Database (http://www.mortality.org)

without having to worry about the results being biased by parental attempts to control household composition.

C. Data

The data analyzed in this paper comes from the "Cost of Living of Industrial Workers in the United States and Europe 1888-1890" survey published by the United States Department of Labor. When Wright was appointed the U.S. Commissioner of Labor in 1885 one of his goals was to conduct the first national expenditure survey. At the time, there was a great deal of political interest in protecting American workers from what was deemed the "cheap labor of Europe." In particular, the findings of the 1888CEX, as well as studies of the costs of production, would inform the Congressional debate on the McKinley Tariff. This is one of the reasons why the survey includes households from both the United States and Western Europe, and why the survey is restricted to households employed in the industrial sector.[5]

The 1888CEX data set contains a sample of 8,544 families working in iron, steel, coal, textile, and glass industries in both Western Europe and the United States. Nearly 80% of the sample, 6,809 households, is from the United States. The European sub-sample comes from Germany, Switzerland, Belgium, Great Britain, and France, although the vast majority, 1,024, come from Great Britain. In the American sample, homes from 24 states in the Northeast, Midwest, Midatlantic and South were surveyed.

For the American households surveyed, enumerators from the Department of Labor were sent to firms in the nine selected industries and collected information on the costs of production and the standard of living of the workers in the firms surveyed for

[5] For more on the historical forces shaping the 1888CEX see US Department of Labor *How American Buying Habits Change* (1959).

costs of production. As Haines (1979) notes, how the household sample was chosen remains unclear. Despite these potentially limiting features, Haines (1979) notes that, in comparison to the age distributions for each industry in the Census of 1890 that "the broad similarities were more striking than the differences, and the case for the representativeness of the survey is strengthened [by the comparison]" (pp. 294-295).

Lees (1979) notes that a similar sampling procedure was used for the British households included in the 1888CEX, and this sampling procedure was most likely used for the rest of the European sample. She found that "the head of the traveling commissioners later said that employers supplied wage data and that home visits to workers were made in the company of trusted local people to ask for information when regular accounts were not kept" (p.170). Lees goes on to argue that the timing of the survey, taken when there was a marked increase in industrial output and mild unemployment, paints a positive portrait of the living standards of British families in the late nineteenth century. All told, Lees holds that the British households in the 1888CEX are from "a large segment of the British labor force, one underrepresented in all other analyses of workers' standards of living in the late nineteenth century" (p. 171).

The data set contains detailed annual expenditure information for both food and non-food items and annual income information for all members of the household (father, mother, and children). In addition, the data also contains demographic information on the household's age and sex composition, as well as a detailed enumeration of the husband's occupation. Unfortunately, the occupations of children and wives are not included in this study, although their labor force status is coded in the data. Table 1 list the means and standard deviations of the variables used in the regressions discussed in this paper. As

Table 1 makes clear, the two samples are quite similar, especially in terms of household demography shares.

IV. Results

A. Earnings profiles by Gender

Before turning to the tests of gender equity and efficiency, it is important to establish the size and type of gender differentials in income for children. Determining the income differential between young men and young women is complicated by the fact that the 1888 Cost of Living Survey does not list income for each child separately. It is necessary, then, to adopt a parametric method to capture the income differential. Since we posited that children of different genders earned different incomes, we should seek to verify that fact in this data. Also, since we are supposing that parents are forward looking, it is best to use a method to determine child income that smoothes the earnings profiles so that they are consistent with an expectation framework.

If one had information on individual child earnings (and the age and sex of the child), a simple age profile based on each child's age and earnings could be constructed from an equation such as

$$y_i = \sum_{n=0}^{4} \left[\alpha_n age_i^n \right] + \varepsilon_i \tag{11}$$

where income would be a function of age. One could add a term that would designate the gender of the child in the household to capture potential gender differentials as well. Since the income from children is pooled and it is impossible to assign income from the data itself, I aggregate the right hand side of equation 11 because child income is aggregated in the data. Further, I adopt a method that allows us to estimate earnings

profiles for each gender one procedure. I gauge the income of young men and young women in the following specification

$$ChildIncome_i = \sum_s \left[\sum_{n=0}^{4} \alpha_{n_s} age_{s_i}^n \right] + \varepsilon_i \tag{12}$$

where child income is regressed on a polynomial aggregated for the ages of all children in the household above the age of 12, with separate coefficients for each sex.[6] The estimated α's are then used to generate an income profile for young men and young women. These profiles show significant differences in the income that young men and young women bring to the household when employed.

Table 2 lists the earnings of boys and girls at selected ages in both the European and American samples. From the table two facts are clear. First, the earnings of young boys and young girls are similar, but the earnings of young men grow faster with age than the earnings of young women. For example, in the United States 15 year old young women earn 80% of what 15 year old young men earn, but by the age of 20 young women earn only 70% of what young men earn. A similar income pattern exists in Europe. In a broad sense, this result agrees with Goldin's (1980) observation that the earnings of young women plateau faster than the earnings of men. Secondly, the earnings of young men in the household are substantially lower than the earnings of men of the same age who are heads of their household.

B. Intrahousehold Allocation

In the 1888CEX I identified six expenditure items that can be thought of as adult goods. I further aggregate these goods to create a total of eight specifications upon which

[6] Specifications with age minimums of 9, 10, and 11 were also specified, and the income profiles were robust to the age cutoff. There is little narrative evidence that children below the age of 10 worked outside of the household in either the United States or Western Europe at the time, and the vast majority who entered the workforce did so at the age of 12 or shortly thereafter.

to test for differential gender allocation. Tobacco, alcohol, husband's clothing, wife's clothing, charity, and religious expenditures are most likely made by and for adults. Of these six, tobacco, alcohol, husband's clothing and wife's clothing expenditures are surely not made for children, especially young children, and as such these four items are the most likely adult goods. I use these goods in my tests for gender equity in household allocation, with each being the dependent variable in the regression form specified in equation 10. I also combine the four most likely adult goods mentioned above and name them "4 Adult" in the analysis that follows.[7] To test for differences in gender allocation I test the null hypothesis that the age category coefficients are equal to one another across gender for each Rothbarth regression. The regression results for the American households are listed in Table 3, and for the European sample in Table 4.[8]

The regression results on their own are somewhat instructive. Parents in Europe and the US appear to substitute away from the consumption of adult goods in the presence of young children, as can be seen by the negative regression coefficients. Similarly, it appears that the substitution lessens with age, although this certainly does not hold in a strict sense. We should expect such a result—as children age parents are more likely to increase their intake of adult goods, possibly because the earnings of children in the labor market could be devoted, in part, to securing more adult goods. When looking at the aggregate of the four most likely adult goods it does appear that

[7] I also used savings, savings as a share of total income and expenditure, the share of protein in the diet, and the share of protein from animal sources as potential adult goods. As the results for these goods were the same as the most likely adult goods from the data, these results are not reported.

[8] Since I use the Eicker-White variance-covariance matrix, the F-test for a set of linear restrictions for the regression is not appropriate. Fortunately, the Wald test (which must be used when employing the Eicker-White variance-covariance matrix) reduces to a standard F-test for my hypotheses. Under the null of gender equality the Wald statistic has a chi-squared distribution with degrees of freedom equal to the number of linear restrictions imposed by the null hypothesisSince I test each age category separately, each test has one degree of freedom.

there is statistically significant variation with the age and sex composition of the household with respect to adult consumption.

The primary focus, however, is the comparison between genders in the same age-sex category. Table 5 lists the Wald test statistics for the hypothesis of gender equality by age group for each of the regressions presented in Tables 3 and 4. The most striking feature of Table 5 is that in only one instance is the hypothesis of gender equality rejected. On the whole the general finding is that the hypothesis of gender equality was not rejected in this data for either sample. Looking closer, however, several patterns emerge from the data that are worth noting. For the most part the Wald test statistics grow larger as one moves up age groups for a particular good. The size of the Wald statistics for the 0-4 and 5-9 age groups are usually smaller than those for the 10-14 or 15-19 age groups.[9] This pattern also suggests that gender differentials did become more pronounced as children contributed more to the household. This suggests an allocation in favor of males at older ages in the household, probably due to their greater wage earning potential relative to their sisters.

The second trend is that the European Wald statistics are, for the most part, larger than their American counterparts. For example, for the "All Adult" and "4 Adult" specifications, the European Wald statistics are greater for every age group up to the 15-19 age category. This is striking for two reasons. First, the European sample is smaller than the American sample, and this would imply that, all else equal, the European sample should have larger variances than the American sample, and lower Wald statistics. Secondly, the Wald statistics are greater at every age, and this suggests a systematic difference between American and British families. These statistics are consistent with

Angus and Mirel insofar as they paint a picture of European children playing a different role in their household, and that role leads European families to choose a path that is less gender-equitable than American patterns, although neither pattern is pronounced enough as to be statistically significant.

Test for efficiency in household allocation hinge on the hypothesis that $\frac{\partial q_j^A / \partial z^C}{\partial q_j^A / \partial y} = \frac{\partial \theta / \partial z^C}{\partial \theta / \partial y}$ where z is the demographic category. Since the theoretical model deals with parents and children, we can estimate the sharing rule directly if we assume that allocations to children take place in the sphere of public goods. A weaker but related condition would be that expenditures on non-adult items are enjoyed by the parents as well. In this way, these expenditures are public and made, more or less, for the entire family. If adults are the only ones to take part in the private consumption (where their goods are theirs and theirs alone) then θ would be the share of total adult-only consumption, and would be a function of household income and demographics.

Using this estimate of θ, which depends on household characteristics and income, $\partial\theta / \partial z^C$ and $\partial\theta / \partial y$ can be computed. Additionally, an estimate of θ unique to each household because of its income and demography can be used in the demand equations such that $\frac{\partial q_j / \partial z^C}{\partial q_j / \partial y}$ can be estimated while taking into account the fact that the demand function itself has the sharing rule as an argument $q_i^A = g_i^A\left[\theta\left(y, z^C, z^A\right), z^C, z^A\right]$. Since these parameters can be estimated directly I bootstrap the sharing rule regressions to obtain a standard error for the estimate of $\frac{\partial \theta / \partial z^C}{\partial \theta / \partial y}$ for each demographic category that

can then be compared to the estimate of $\frac{\partial q_j / \partial z^C}{\partial q_j / \partial y}$ from the demand equation. The hypothesis that the two values are equal to one another is the test of efficiency that was outlined above. Since I do not bootstrap the demand-equation estimates, the test here is conservative (e.g. if I fail to reject the hypothesis of equality here I would surely fail to reject it in a test where the demand-equation estimate also had a standard error).

For all of the adult goods in Tables 3 and 4 the hypothesis that household allocations are efficient cannot be rejected. Table 6 shows the results. Even when expanding the number of potential adult goods to include savings and savings as a share of total income and expenditure, as well as the amount of protein in the diet the hypothesis is not rejected. The robustness of the result to an expanded definition of adult goods adds further strength to the claim that household allocations were efficient. These results tell us that there was very little, if any, gender differentials in household allocations, and that the allocation of resources in the household appears to be efficient.

V. Explaining the finding

Given the lack of gender differentials and the efficiency of household allocations, we should seek to explain such a finding. If children of different genders had different earnings potential then why do efficient allocations coincide with gender equality in allocations to young children, particularly if we know that parents were forward looking? Indeed, given the narrative evidence it would appear that either efficiency or gender equality would hold, but not both. In this section we describe two possible explanations

for the lack of gender differentials in household allocation and how they would be consistent with the efficiency of household resource allocation.

A. A Mother's Love

One explanation would be that parents desire to have gender equity in the household, and the substitution away from adult consumption is the same for both genders as their preferences ensure gender equity in the household. We can, however, say more than this about the desire for gender equity. It is important to note that this explanation hinges on the distinction between the desire for gender equity in household allocation and the mechanism through which it would be achieved. If we have additional information about the mechanism, our explanation can be more precise than a general statement about parental desire for gender equity. If we how allocations were made in the household—that is, who controlled the budget and purchased the items that the household consumed—we can say something more.

To do so, we must deal with the realities of the nineteenth century industrial household. The narrative record is clear—even if father's were as egalitarian as mothers, they would not know how to actualize that through expenditures because those were the realm of the wife. Byington (1910) notes that wives were the ones who insured that all was well in the household in good and lean times, managing the household budget to achieve the best possible living standard. Lees (1979), Haines (1979), Goldin (1980), Moehling (2005), Smith (1994) and others have all noted that mother's controlled the household's budget. In some households, the income was blindly turned over to the wife:

> Few Jewish daughters considered their wages their own; rather they understood them to be part of the family fund…And Nettie Licht, who began working as a milliner in 1910, faithfully gave her pay envelope to her parents without even bothering to open it…Many other Jewish daughters did the same: as one 1916

> report noted, the majority of women in the New York shirtwaist factories gave their "untouched and unopened" pay envelopes to their parents. (Glenn, p.84)

There is additional evidence that the lack of gender differences is more of the wife's altruism dominating the motives of the husband.

> The working-class father fails in interest and sympathy with his children. Such interest as he manifests is rather general than particular and individual; he has no deep desire to share the experience of the child; he does not appreciate his daughters as personalities…He takes little active part in the family life; he has small influence compared with the mother, though in a crisis his word prevails. (Woods and Kennedy, pp. 44-45).

The mother, it seems was a buffer between the father and the children, and since mothers controlled the household purse they would be the ones to ensure gender equity. As the comptroller of the home, many mothers had to play the role of go-between in household negotiations.

> While middle class women lost control over their family economy, immigrant women and working class women created the machinery of the family economy…Her importance to the family was indispensable; she controlled and directed the family's ability to navigate its way through an industrial economy…The divorce between production and consumption and the reliance upon wages as the sole means to survival made money and its control a dominate imperative …Since the wife was the center of household affairs, it was her responsibility to manage the conversion of wages into necessities. (Ewen, pp. 119-122)

Indeed, mother's were responsible for the payment of rent, the buying of food and sundries, the making of clothes, the preparation and cleaning of the home, and other activities. The morality surrounding this situation also bound male household heads—the "good man" was one who turned over his entire pay to his wife. Failure of husbands to do so could be met with an intervention by neighbors and in some instances children. In rare cases, wives would punish their husbands upon learning that all wages had not been turned over into the household coffers.

We are now able, then, to be more specific than we were before about who was more altruistic. Furthermore, we can say something more about what altruism would mean in this circumstance. What we know now is that the attitude of the husband matters less than the attitude of the wife, in terms of household allocations to children. And given this narrative record, we could say that the altruism of the wife dominated the husband's preferences, no matter what they were. Furthermore, this result agrees with the host of income pooling test performed in development economics. In those studies it was found that child outcomes improve dramatically with the mother's income. This narrative evidence tells us that, even in households that do, through historical circumstance, pool their resources it may matter a great deal how much control the female head has over those resources.

We must be mindful, however, of what altruism means in this context. In simple Becker-type models of altruism, altruistic parents seek to ensure that children are equally well off, and this is achieved by allocating more resources to the child with the greater marginal utility of consumption. This supposes, then, that parents would allocate resources differentially to children by type insofar as that type signifies differing marginal utilities of consumption. In our empirical test, however, we do not look at allocations to children directly, only substitution away from adult consumption. While it could certainly be the case that substitution differentials would be highly correlated with allocation differentials, it need not be the case per se. For this reason, "altruism" here is equality of allocations-- household egalitarianism.

The strongest evidence that if there was altruism it would come from the wife is in the design of the survey itself. Husband's knew little of the household expenditures,

and therefore enumerators had to consult with wives to complete the survey, on both sides of the Atlantic.[10] This itself points to husband's knowing little about the allocation of resources directly, although it is silent of the extent to which husbands were egalitarian. It also open the possibility that it may not matter who earns the income, but the preferences of the person in charge of the resources. If this narrative evidence is any indication, wives had a fair deal of freedom in the nineteenth century household, or at least husbands were not actively involved in the minutia of household budgeting.

This explanation, however, is inconsistent with the theoretical model and the econometric test, and therefore parental altruism or egalitarianism cannot explain this finding. The econometric method employed here looks at parental substitution away from adult consumption, so we are not looking at allocations to children directly. Since the test is indirect, parents, altruistic or not, could make themselves better off by increasing the consumption of adult goods when children who earn more are present in the household. There could still be gender equity in allocations to children, but increased consumption by adults when young men were in the home.

To see the inconsistency of the parental altruism explanation, consider the following example. Suppose that parents are egalitarian, but also that they value their own consumption. We can further assume that parents are forward looking and desire to smooth consumption over the lifecycle. If parents know that children of one gender have a greater earnings potential than another, parents could go further into debt to increase their own consumption in the present while still ensuring gender equity in actual allocations to children, and if they were smoothing consumption over the lifecycle this is what we would expect. But this would imply that parents could be made better off

[10] See Haines (1979), Lees (1979), and Modell (1978).

(through additional consumption) while leaving the utility of children unchanged, and this does not agree with the efficiency finding. In our test, we would find that parents were substituting away from their consumption equally for future high and low earning children. In other words, while the finding of gender equality seems to be consistent with parental altruism, the efficiency finding contradicts this explanation.

B. Forward Looking Non-Cooperation

Since parental altruism cannot explain this result we must return to the theory outlined earlier to see what these results imply for parents and their decision making process. If this result cannot be explained by altruism, then it must be explained by another feature, all the while keeping in mind that the allocation of the household is efficient. If parents are forward looking and there is no differential allocation by gender it must hold that parents view the income coming from sons and daughters similarly. This is the only explanation that is consistent with the indirect tests of child allocation that were performed in the previous section. In order for both efficiency and equality to hold parents would have to believe that the future income of children of different genders would be the same. If not, they could substitute more (less) away from their own consumption for the child who would earn less (more) in the future.

There are three ways to quantify this explanation.[11] All of these methods use, in part, the idea that household members cooperate, but that future cooperation is not known. Children may not live up to their parents expectations, and they may not stay in the home once they begin working. This means that parents must look not only at earnings, but also the probability that their child will contribute to the income of the

[11] It is important to note that discounting would matter, but since these two methods hinge on differences between young men and women, and that it is unlikely that parents had different discount factor for the earnings of children of different genders, these are suppressed here.

household. While nineteenth century parents were able to hedge against non-cooperation with social taboos there was still the possibility that the earnings of children will not pan out as expected.

In the first case, parents view equalized future income from children in a probabilistic setting. There are two things that parents must consider: 1) The possibility that a child of type k will leave in the home, p_k, and 2) the earnings of the child of type k, w_k. So parents must take into account $p_k w_k$ where $p_{boy} > p_{girl}$ and $w_{boy} > w_{girl}$. In fact, Moehling (2005), Woods and Kennedy (1913), Ewen (1979), and others tells us that parents would negotiate with children to keep them in the home once they began to work, so parents did not view the income of working children as a extra boon to the household coffers. Parents negotiating with their children can be taken as evidence that parents were unsure about the future earnings stream coming from children. Combining these two facts with the absence of any gender differentials and it must hold that parents assume that $p_{boy} w_{boy} = p_{girl} w_{girl}$. If not, parents could increase their current consumption more dependent on the gender of the child, and this would mean a differential in substitution away from (or towards) adult goods dependent on gender, which has been rejected.

Since these probabilistic earnings are equal, at least in the parents forward-thinking mind, we can use this conclusion to derive an estimate of p_{boy} / p_{girl}, which would tell us the relative probability that a daughter will stay in the home (cooperate) relative to a son. We can estimate this over a number of ages since we have estimates of the wages of children by gender, but to be the most concrete we should estimate it for

younger ages when children are more likely, in general, to stay in the home and a time horizon that is short enough to represent the time horizon that parents can be said to be reasonable about. In other words, you would not want to estimate this up to the age of 30, but from the age when children begin to work and for a few years afterwards. Therefore we will calculate the ratio for 13-14, and 13-17. Table 7 lists the results. The relative probabilities in the US suggest that boys were around 30% more likely, according to their parents, to leave (not cooperate) as their daughters. In Europe, sons were twice as likely, according to their wages, to leave (not cooperate) as their daughters. Given the fact that European immigration at the time was tilted heavily towards males this finding is consistent with that result.

It is important to note that this forward looking hedging was a very real feature of industrial households at the time. In fact, it explains the degree to which the household political economy would change when children began to work outside of the home. Parents were willing to make concessions, in part, because they needed the income of the children, but also because they understood that the threat of their children leaving the home was very real. Even in the comments of the 1888CEX, there are notes that older sons had abandoned the family or no longer contributed to the home. Parents, then, had to take this into account when banking on the future income to the household that would be provided by children.

This leads to the second quantification of this explanation. Parents may treat children equally despite their unequal earnings, if the wages retained by parents were equal. In other words, if sons kept a larger portion of their income than their sisters, the additional income into the household's coffers could be equal (or nearly so). In fact,

parents may be forced to let the higher earning child retain more of their earnings if that would keep the child in the household. In this way, parents may have been forced to provide incentives to work in the way that Moehling (2005) describes. In this way, the percentages reported in Table 7 would also refer to the relative percentage of income that boys were able to retain relative to girls (that is, boys in the US could retain 30% more of their earnings than their sisters, and boys in Europe could retain 100% more of their earnings than their sisters).

There is narrative evidence that suggest such a situation was the case. Ewen notes that:

> Boy children, in general, were allowed greater access to social life outside of the domain of family life than girl children…In a study of Italian working class life, the social workers observed that "it was assumed as a matter of course that the girl's pay envelope should be turned over to the mother intact," because "it wouldn't look nice to pay board to the mother who raised you…while the question as to whether the brothers also contributed everything to the home received the answer, 'Oh no, he's a boy.'" (Ewen, p. 131)

Woods and Kennedy (1913) note the same phenomenon. This speaks to the fact that parents did treat their children differently once they began working. But allowing the son more freedom may have been the only way to keep sons, and their earnings, in the household.

There is a third, but related, way in which parents' actions would be consistent with both efficiency and gender equality. If daughters were indeed captive in the household until marriage, and with the (weakening) social taboo against women living alone, parents could see the earnings as equal because daughters would stay in the home longer. This is, obviously, the same as daughters having a lower non-cooperation probability, but the calculation is a bit different. If women stay in the home until

married, we can use her earnings up to that point to calculate the number of years that her brother would have to stay in the home for the payoff to the parents to be equal. Using the singulate mean age at (first) marriage (SMAM) for women in 1890, we can estimate the number of years a boy, beginning work at age 12, would have to stay in the home. Since Europeans had a slightly higher SMAM I use the American estimate as it will understate the US-Europe differential.[12] In the United States, sons could leave at the age of twenty, two years before their sisters, and earn as much as their sisters by her expected age at marriage. In Europe, sons could leave at the age of nineteen, three years before their sister's expected marriage age.

These related explanations agree not only with the gender equity result, but also with the efficiency result. But this does not mean that the allocation was Pareto optimal. As Becker (1991) has noted, if parents and children were able to enter into an agreement before children entered the labor market, where parents agreed to give children a larger share of their income in exchange for children agreeing to stay in the household for a given number of years, both parties (parents and children) could have been better off. Since this was not possible, the efficient allocation was gender equal because parents were unsure of how much more cooperative higher earning sons would be relative to their lower earning sisters.

VI. Conclusion

The relationship between parents and children in the late nineteenth century was in a state of flux. Many families were, for the first time, dealing with the reality of the

[12] There is the issue of discounting here as well, but since the incomes for children of both genders would be discounted equally this is suppressed here also.

industrial world. Children of both genders were entering the workforce, and the earnings of working children were essential to the survival of the household. Parents were faced with a choice in how they allocated resources within the household both before and during their children's participation in the workforce. This paper found that, rather than allocating resources to the children who would earn more in the labor market, parents chose to allocate resources equally to both genders. While that result itself conflicts with some narrative evidence, new theoretical models of the household allow us to discern the motivations behind such allocation strategies.

The gender equity in resource allocation was not altruistic or egalitarian. Pure economic altruism would predict that parents would allocate more resources to the child who would earn less, and that is not the case. Egalitarianism would predict that parents would allocate resources equally, but even when doing so they could increase their own consumption more when young boys were present in the household, and that has been rejected as well. Since we know parents were forward looking, the elimination of altruistic or egalitarian motives implies that parents were strategic. Parents treated children of different genders equally because, in the probabilistic setting, the future higher earnings of boys were offset by their higher probability of leaving the household. This explanation is also consistent with parents letting boys keep a larger share of their earnings, and letting boys have more freedom and/or fewer responsibilities in the household. As the record shows, each of these possibilities is supported by the narrative record. Parents were forced to treat children of different genders equally because of an uncertain future. Parents knew boys would earn more than girls, but they also knew that boys could leave the household behind—the net result was gender equality in allocations.

References

Angus, David L. and Jeffrey E. Mirel (1985). "From Spellers to Spindles: Work Force Entry by the Children of Textile Workers, 1888-1890." *Social Science History* 9: 123-142.

Becker, Gary S. (1991). *A Treatise on the Family*. Enlarged Edition. London: Harvard University Press.

Browning, Martin, et. al. (1994). "Incomes and Outcomes: A Structural Model of Intrahousehold Allocation." *Journal of Political Economy* 102: 1067-1096.

Browning, Martin and Chiappori, Pierre-Andre (1998). "Efficient Intra-Household Allocations: A General Characterization and Empirical Tests." Econometrica 66: 1241-1278.

Byington, Margaret F. (1910). *Homestead: The Households of a Mill Town*. Philadelphia: W.M. Fell Co.

Chapin, Robert Coit (1909). *The Standard of Living Among Workingmen's Families in New York City*. New York: Charities Publication.

Deaton, Angus. (1997). *The Analysis of Household Surveys: A Microeconometric Approach to Development Policy*. Baltimore: Johns Hopkins.

Ewen, Elizabeth (1979). *Immigrant Women in the Land of Dollars, 1890-1920*. Ph.D. Dissertation, State University of New York at Stonybrook.

Glenn, Susan A. (1990). *Daughters of the Shtetl: Life and Labor in the Immigrant Generation*. Ithaca, NY: Cornell.

Goldin, Claudia (1980). "The Work and Wages of Single Women: 1870-1920." *Journal of Economic History* 40: 81-88.

Goldin, Claudia (1981). "Family Strategies and the Family Economy in the Late Nineteenth Century: The Role of Secondary Workers." in Theodore Hershberg, ed. *Philadelphia: Work, Space, Family, and Group Experience in the Nineteenth Century*. New York: Oxford: 277-310.

Goldin, Claudia and Parsons, Donald (1989). "Parental Altruism and Self-Interest: Child Labor Among Late Nineteenth-Century American Families." *Economic Inquiry* 27: 637-659.

Haines, Michael R. (1979). "Industrial Work and the Family Life Cycle." *Research in Economic History* 4: 289-356.

_____. (1981). "Poverty, Economic Stress, and the Family in a Late Nineteenth-Century American City: Whites in Philadelphia, 1880." in Theodore Hershberg, ed. *Philadelphia: Work, Space, Family, and Group Experience in the Nineteenth Century*. New York: Oxford: 240-276.

_____. (1994). "Estimated Life Tables for the United States, 1850-1900." NBER Working Paper No. h0059.

Haines, Michael R. and Richard H. Steckel (2000). "Childhood Mortality and Nutritional Status as Indicators of Standard of Living: Evidence from World War I Recruits in the United States." NBER Working Paper No. h0121.

Hareven, Tamara K. and Langenbach, Randolph (1978). *Amoskeag: Life and Work in an American Factory-City*. New York: Pantheon.

Horan, Patrick M. and Peggy G. Hargis (1991). "Children's Work and Schooling in the Late Nineteenth Century Family." *American Sociological Review* 56: 583-596.

Horrell, Sara and Deborah Oxley (1999). "Crust or Crumb?: Intrahousehold Resource Allocation and Male Breadwinning in Late Victorian Britain." *Economic History Review* 52: 494-522.

Johnson, Paul (1985). *Saving and Spending: The Working-Class Economy in Britain 1870-1939*. Oxford: Clarendon.

Johnston, Jack and John DiNardo (1997). *Econometric Methods*. 4th Edition. New York: McGraw-Hill.

Lees, Lynn H. (1979). "Getting and Spending: The family Budgets of English Industrial Workers in 1890." in John Merriman, ed. *Consciousness and Class Experience in Nineteenth Century Europe*. New York: Holmes and Meier: 169-186.

Metzker, Issac, ed. (1971). *A Bintel Brief: Sixty Years of Letters from the Lower East Side to the* Jewish Daily Forward. Garden City, NY: Doubleday.

Modell, John (1978). "Patterns of Consumption, Acculturation, and Family Income Strategies in Late Nineteenth-Century America." in Tamara K. Hareven and Maris A. Vinovskis, eds. *Family and Population in Nineteenth Century America.* Princeton, NJ: Princeton: 206-240.

Moehling, Carolyn (2005). "'She has Suddenly Become Powerful': Youth Employment and Household Decision Making in the Early Twentieth Century." *Journal of Economic History* 65: 414-438.

Rotella, Elyce and George Alter (1993). "Working Class Debt in the Late Nineteenth Century United States." *Journal of Family History* 18: 111-134.

Shergold, Peter R. (1982). *Working-Class Life: The "American Standard" in Comparative Perspective 1899-1913*. Pittsburgh, PA: Pittsburgh University Press.

Smith, Daniel Scott (1994). "A Higher Quality of Life for Whom? Mouths to Feed and Clothes to Wear in the Families of Late Nineteenth-Century American Workers." *Journal of Family History* 19: 1-33.

Stigler, George J. (1954) "The Early History of Empirical Studies of Consumer Behavior." *Journal of Political Economy* 42: 95-113.

Strauss, John and Duncan Thomas. (1995) "Human Resources: Empirical Modeling of Household and Family Decisions." in Jere Behrman and T.N. Srinivasan, eds., *Handbook of Development Economics*. Amsterdam: Elsevier, 1883-2023.

Streightoff, Frank Hatch (1911). *The Standard of Living Among the Industrial People of America*. New York: Houghton Mifflin.

U.S. Department of Labor. "Cost of Living of Industrial Workers in the United States and Europe 1888-1890 [Computer File]." ICPSR Study No. 7711. Ann Arbor, MI: Inter-University Consortium for Political and Social Research [distributor].

_____. (1959) *How American Buying Habits Change*. Washington, DC: Government Printing Office.

Woods, Robert A. and Kennedy, Albert J. (1913). *Young Working Girls*. New York: Houghton Mifflin.

Table 1
Means and Standard Errors of Variables Used in Gender Allocation Regressions

	American		Europe	
Variable*	Mean	Standard Error	Mean	Standard Error
Tobacco	0.016	0.014	0.013	0.013
Liquor	0.019	0.121	0.040	0.249
Hub Cloth	0.054	0.031	0.054	0.030
Wife Cloth	0.040	0.026	0.043	0.025
Religion	0.013	0.264	0.020	0.686
Charity	0.004	0.007	0.024	0.729
All	0.146	0.298	0.195	1.459
Adult 4	0.128	0.134	0.150	0.253
ln (x/n)	9.491	0.461	9.069	0.456
ln (n)	1.464	0.454	1.514	0.440
Male 0-4	0.073	0.125	0.064	0.116
Male 5-9	0.065	0.107	0.070	0.111
Male 10-14	0.056	0.100	0.059	0.100
Male 15-19	0.037	0.087	0.047	0.097
Male 20-24	0.025	0.088	0.027	0.086
Male 25+	0.234	0.132	0.233	0.126
Female 0-4	0.073	0.125	0.067	0.117
Female 5-9	0.063	0.107	0.068	0.108
Female 10-14	0.051	0.096	0.055	0.098
Female 15-19	0.050	0.107	0.042	0.093
Female 20-24	0.057	0.126	0.043	0.111
Female 25+	0.211	0.147	0.218	0.133
N	6809		1735	

* Unless other wise noted, non-logged variables are the share of either total household expenditure (for consumption goods) or total number of persons in the household (for age-sex categories).

Table 2
Estimated Annual Earnings of Children by Gender, 1888 Cost of Living Survey

Age	United States		Europe	
	Male	Female	Male	Female
13	36.17	30.95	32.63	14.75
14	80.09	59.04	61.81	30.02
15	117.43	82.82	89.00	45.27
16	148.68	102.67	113.70	60.08
17	174.35	118.99	135.50	74.08
18	194.89	132.13	154.08	86.94
19	210.77	142.45	169.22	98.39
20	222.45	150.27	180.80	108.20
21	230.36	155.91	188.76	116.19
22	234.94	159.66	193.17	122.24
23	236.60	161.82	194.18	126.25

Estimated Annual Earnings of Male Household Head, 1888 Cost of Living Survey

Age	United States	Europe
18	409.24	244.62
19	425.62	255.21
20	441.35	265.40
21	456.37	275.17
22	470.65	284.49
23	484.16	293.36

Note: See the text for an explantion of the income estimation procedure.

Table 3
Gender Allocation Regression Results for the American Sample, 1888 Cost of Living Survey

	Tobacco	Liquor	Husb Cloth	Wife Cloth	Religion	Charity	All Adult	4 Adult
Intercept	0.117	-0.250	0.193	0.044	-0.049	-0.031	0.023	0.103
	(.00602)	(.04670)	(.01165)	(.00997)	(.01609)	(.00415)	(.05444)	(.05161)
ln (x/n)	-0.009	0.027	-0.006	0.004	0.004	0.004	0.026	0.018
	(.00056)	(.00411)	(.00107)	(.00094)	(.00091)	(.00039)	(.00471)	(.00459)
ln (n)	-0.010	0.017	-0.029	-0.027	-0.003	0.001	-0.052	-0.050
	(.00076)	(.01358)	(.00161)	(.00134)	(.01034)	(.00032)	(.01729)	(.01385)
Male 0-4	-0.009	-0.010	-0.024	0.006	0.003	0.001	-0.032	-0.037
	(.00235)	(.02184)	(.00527)	(.00412)	(.01364)	(.00108)	(.02751)	(.02368)
Male 5-9	-0.006	0.008	-0.031	0.010	0.032	0.000	0.013	-0.018
	(.00247)	(.00984)	(.00563)	(.00432)	(.04452)	(.00116)	(.04686)	(.01389)
Male 10-14	-0.006	-0.029	-0.042	-0.002	0.032	-0.001	-0.049	-0.079
	(.00262)	(.03338)	(.00559)	(.00448)	(.04047)	(.00106)	(.05344)	(.03469)
Male 15-19	-0.002	-0.043	-0.059	-0.020	0.016	0.000	-0.109	-0.124
	(.00298)	(.03019)	(.00612)	(.00468)	(.02197)	(.00117)	(.03890)	(.03192)
Male 20-24	0.001	0.014	-0.009	0.002	0.184	-0.003	0.189	0.007
	(.00227)	(.01942)	(.00562)	(.00477)	(.18584)	(.00094)	(.18762)	(.02168)
Female 0-4	-0.009	0.004	-0.025	0.006	0.000	0.001	-0.023	-0.024
	(.00236)	(.01032)	(.00532)	(.00409)	(.01124)	(.00111)	(.01812)	(.01378)
Female 5-9	-0.005	-0.009	-0.026	0.015	0.032	0.000	0.007	-0.024
	(.00249)	(.02574)	(.00560)	(.00434)	(.13812)	(.00097)	(.05179)	(.02754)
Female 10-14	-0.005	-0.035	-0.042	0.002	0.028	0.000	-0.054	-0.081
	(.00259)	(.03433)	(.00568)	(.00448)	(.03706)	(.00120)	(.05156)	(.03564)
Female 15-19	-0.006	-0.006	-0.064	-0.016	-0.002	-0.002	-0.096	-0.092
	(.00251)	(.01155)	(.00556)	(.00433)	(.00572)	(.00104)	(.01622)	(.01507)
Female 20-24	-0.010	-0.039	-0.073	-0.015	0.086	-0.003	-0.055	-0.137
	(.00282)	(.01853)	(.00598)	(.00489)	(.08456)	(.00110)	(.08752)	(.02138)
Female 25+	-0.010	-0.035	-0.100	-0.029	0.038	-0.002	-0.139	-0.175
	(.00282)	(.00981)	(.00612)	(.00512)	(.03031)	(.00105)	(.03394)	(.01471)
R Square	0.071	0.008	0.203	0.203	0.005	0.038	0.018	0.050

N=6809 for all regressions. Robust standard errors listed in parentheses.

Table 4
Gender Allocation Regression Results for the European Sample, 1888 Cost of Living Survey

	Tobacco	Liquor	Husb Cloth	Wife Cloth	Religion	Charity	All Adult	4 Adult
Intercept	0.037	-0.155	0.187	-0.010	-0.167	-0.394	-0.502	0.059
	(.00909)	(.23700)	(.02309)	(.01867)	(.13075)	(.27052)	(.54242)	(.23979)
ln (x/n)	-0.001	0.020	-0.007	0.007	0.027	0.049	0.095	0.018
	(.00086)	(.02268)	(.00211)	(.00178)	(.02333)	(.03254)	(.06518)	(.02295)
ln (n)	0.000	0.042	-0.024	-0.025	0.000	0.036	0.029	-0.007
	(.00120)	(.03691)	(.00366)	(.00245)	(.00573)	(.03732)	(.07491)	(.03722)
Male 0-4	-0.007	-0.070	-0.028	0.037	-0.135	-0.166	-0.369	-0.068
	(.00461)	(.03488)	(.01224)	(.00899)	(.13691)	(.14074)	(.28301)	(.03885)
Male 5-9	-0.018	-0.071	-0.043	0.039	-0.118	-0.142	-0.352	-0.093
	(.00436)	(.02931)	(.01208)	(.00871)	(.12042)	(.12318)	(.24795)	(.03314)
Male 10-14	-0.014	-0.114	-0.026	0.032	-0.111	-0.182	-0.414	-0.122
	(.00461)	(.07085)	(.01341)	(.00892)	(.11529)	(.13462)	(.27091)	(.07293)
Male 15-19	-0.012	0.009	-0.055	0.010	-0.162	-0.123	-0.332	-0.047
	(.00464)	(.03993)	(.01289)	(.00943)	(.16026)	(.16466)	(.33072)	(.04346)
Male 20-24	-0.006	0.020	-0.026	0.005	-0.109	-0.054	-0.170	-0.006
	(.00457)	(.05445)	(.01583)	(.01123)	(.10835)	(.12095)	(.24351)	(.05792)
Female 0-4	-0.010	-0.023	-0.008	0.051	-0.138	-0.119	-0.247	0.011
	(.00462)	(.02269)	(.01257)	(.00904)	(.13984)	(.14107)	(.28359)	(.02795)
Female 5-9	-0.011	-0.117	-0.039	0.034	-0.119	-0.196	-0.449	-0.134
	(.00458)	(.08010)	(.01220)	(.00879)	(.12003)	(.14378)	(.28901)	(.08184)
Female 10-14	-0.017	0.014	-0.045	0.032	-0.108	-0.051	-0.175	-0.016
	(.00471)	(.05804)	(.01294)	(.00917)	(.10891)	(.12283)	(.24737)	(.06036)
Female 15-19	-0.025	-0.131	-0.059	0.008	-0.153	-0.239	-0.599	-0.207
	(.00455)	(.08757)	(.01319)	(.00955)	(.15341)	(.17628)	(.35374)	(.08947)
Female 20-24	-0.017	-0.106	-0.058	0.025	-0.135	-0.193	-0.484	-0.156
	(.00493)	(.05809)	(.01455)	(.01141)	(.13888)	(.15004)	(.30268)	(.06173)
Female 25+	-0.015	-0.071	-0.055	0.044	0.043	0.008	-0.047	-0.097
	(.00531)	(.03616)	(.01605)	(.01225)	(.04696)	(.05682)	(.12245)	(.04173)
R Square	0.030	0.007	0.194	0.238	0.004	0.003	0.005	0.010

N=1735 for all regressions. Robust standard errors are listed in parentheses

Table 5
Wald Test Statistics for the Hypothesis of Gender Equality in Household Allocation, 1888 Cost of Living Survey

American Sample

Age Group	Tobacco	Liquor	Husb Cloth	Wife Cloth	Religion	Charity	4 Adult
0-4	0.0347	0.3050	0.0265	0.0038	0.0289	0.0082	0.2042
5-9	0.0533	0.3882	0.4093	0.7378	0.0000	0.0018	0.0382
10-14	0.0693	0.0202	0.0003	0.3966	0.0047	0.1044	0.0016
15-19	1.4552	1.3166	0.2459	0.4237	0.6079	1.6470	0.8446
20-24	8.3646	3.9267	60.2146	5.9407	0.2339	0.1836	22.3659

European Sample

Age Group	Tobacco	Liquor	Husb Cloth	Wife Cloth	Religion	Charity	4 Adult
0-4	0.1961	1.2998	1.3573	1.2214	0.0003	0.0539	2.7309
5-9	1.0437	0.2934	0.0627	0.1940	0.0001	0.0843	0.2145
10-14	0.2599	1.9416	1.0472	0.0005	0.0003	0.5161	1.2417
15-19	4.4637	2.1160	0.0411	0.0350	0.0016	0.2325	2.5869
20-24	2.7167	2.5008	2.2484	1.5219	0.0211	0.5215	3.1188

Note: The Wald test statistics are based on the regression results presented in Tables 3 and 4.
The results test the hypothesis that the male and female coefficients in a given age group are equal to one another for the adult good listed above.

Table 6
Efficiency Test of Household Allocations, 1888 Cost of Living Survey

	$\frac{\partial\theta/\partial z^C}{\partial\theta/\partial y}$	$\frac{\partial q_j^A/\partial z^C}{\partial q_j^A/\partial y}$						
		Tobacco	Liquor	HusbCloth	WifeCloth	Religion	Charity	4 Adult
United States								
Male 0-4	-1.251 (.969)	1.046	0.941	-0.296	0.488	-2.996	0.875	-1.700
Male 5-9	0.504 (1.797)	1.341	1.810	1.238	3.706	1.259	0.474	0.995
Male 10-14	-1.893 (1.872)	0.656	0.295	0.023	1.140	0.613	0.362	0.529
Female 0-4	-0.879 (.689)	1.114	1.452	0.026	1.344	-3.337	0.919	-1.911
Female 5-9	0.284 (1.969)	1.205	1.184	0.848	2.206	1.264	0.454	0.992
Female 10-14	-2.098 (1.839)	0.529	0.074	-0.133	0.041	-0.056	0.518	0.137
Europe								
Male 0-4	-3.899 (11.929)	-2.632	-3.976	-4.203	-3.187	-5.216	-3.808	-0.352
Male 5-9	-3.720 (21.684)	0.127	-3.760	-4.433	-2.997	-4.630	-4.010	-2.487
Male 10-14	-4.380 (18.320)	-1.274	-4.168	-4.804	-3.688	-4.622	-4.494	-4.180
Female 0-4	-2.612 (7.042)	-1.002	-2.875	-2.351	-1.844	-4.955	-2.240	4.433
Female 5-9	-4.750 (18.539)	-2.157	-4.572	-5.450	-4.008	-4.980	-4.899	-4.701
Female 10-14	-1.852 (21.899)	1.368	-2.298	-2.399	-1.358	-3.852	-2.177	1.939

Bootstrapped estimates of standard errors (B=500) are listed in parentheses. The estimates from the demand equations come from a regression similar to those in Tables 3 and 4, where an estimate of the sharing rule (a theta hat unique to each household) has been added as a covariate.

Table 7
Relative Male/Female Wages by Age, 1888 Cost of Living Suvery

Age	United States	Europe
13	1.17	2.21
14	1.36	2.06
15	1.42	1.97
16	1.45	1.89
17	1.47	1.83
18	1.47	1.77
19	1.48	1.72
20	1.48	1.67
21	1.48	1.62
Average	1.42	1.86
13-14 Average	1.26	2.14
13-17 Average	1.37	1.99

Note: These estimates are derived from the income estimates presented in Table 2.