

Time Spent in Home Production in the 20th Century: New Estimates from Old Data

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Abstract

This paper presents new estimates of time spent in home production in the U.S. during the 20th Century. Regressions based on detailed tabulations from early time diary studies are used to construct nationally representative estimates for the first half of the 20th Century. These estimates are then linked to estimates from individual-level data from 1965 to the present. The new estimates show that time spent in home production by housewives fell by less than six hours per week from 1900 to 1965, whereas time spent by all prime-age women fell ten hours. For prime age men and women combined, hours in home production were unchanged from 1900 to 1965, and then fell modestly thereafter. The new estimates are used to assess leading theories about long-run trends in home production.

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I. Introduction

A number of recent theoretical models are founded on the premise that the time spent in home production decreased dramatically over the first two-thirds of the 20th Century. For example, Greenwood, Seshadri, and Yorukoglu (2005a) argue that the diffusion of appliances led to a fall in time spent in home production and allowed women to increase their labor force participation. In another theory, Greenwood, Seshadri, and Vandembroucke (2005b) argue that the diffusion of appliances lowered the cost of having children and thus led to the baby boom of the 1950s and 1960s.

There is no consensus, however, on trends in home production time during the 20th Century. On the one hand, most economists believe that there was a significant decline in time spent in household production during the first two-thirds of the 20th Century (e.g. Cain (1984), Owen (1986), Lebergott (1976, 1993), Fogel (2000), and Folbre and Nelson (2000)). On the other hand, many sociologists, home economists, and economics historians argue that the amount of time spent in home production by housewives did not decrease for a large part of the 20th Century (e.g. Vanek (1973, 1974), Hartmann (1974), Walker and Woods (1976), Cowan (1983), Bryant (1996), Kline (1997), and Mokyr (2000)). In fact, Mokyr (2000) labels the absence of a decline in housework during the era of appliance diffusion the “Cowan Paradox.”

There is no agreement on long-run trends in time spent in home production because of the dearth of comprehensive data. While there have been a number of time use studies in the U.S. over the course of the 20th Century, only the studies beginning in 1965 are based on nationally representative samples and are reasonably consistent across time. As a result, most of the theoretical work seeking stylized facts on long-run trends in home production has had to

extrapolate trends from noncomparable and sometimes erroneous estimates of time spent in home production. Thus, theory is far ahead of measurement in this literature.

The goal of this paper is to advance measurement to catch up with theory. To do this, I use a variety of data sources to construct new estimates of time spent in home production during the 20th Century. I do so for key subsets of the population as well as for the entire population. To develop a comprehensive picture of trends in home production, I link estimates from earlier time use surveys to the nationally representative time use surveys from 1965 to the present.

The combined samples of the early studies are large, representing several thousand individuals, but they were not nationally representative. Although none of the individual-level datasets is still available, Wilson's (193-) unpublished complete report shows hundreds of tabulations of time spent in home production by key characteristics, such as the number and age of children, whether electricity and indoor plumbing were available, and the socioeconomic status of family. Extending an idea by Bryant (1996), I use the grouped data from these tabulations to estimate regressions of the determinants of time spent in home production in the early part of the 20th Century. I then combine these estimates with demographic detail from the Census to formulate nationally representative estimates for housewives going back to 1900. I augment these estimates for housewives with estimates from the few time use surveys that studied employed women, men, and children to present a comprehensive picture of time spent in home production by all segments of the population.

My analysis of the original sources reveals the reason for some of the conflicting views. First, most of those who have maintained that home production fell significantly during the first two-thirds of the 20th Century have relied exclusively on a couple of rough estimates offered by Lebergott (1976, 1993). Investigation of the original sources, however, reveals that Lebergott's

estimates were inadvertently based on the wrong table in a key dissertation and on the assumptions of a social activist who conducted no study. Second, some of those economists aware of the early time use studies have dismissed them, arguing that the nature of the samples means that the estimates must have been seriously biased downward. I show that the nationally representative estimates are only slightly higher than the raw estimates of the early samples.

Lebergott (1976) argued that time spent in housework by housewives fell by around 40 hours per week from 1900 to 1966. In contrast, I find that it fell by less than six hours per week between 1900 to 1965, and all of that change could be accounted for by the number and age of children and the increased education levels of housewives. Time spent in home production by all prime age women (employed and nonemployed) fell by ten hours per week from 1900 to 1965, while time spent by prime age men rose by seven hours per week. As a result, time spent by all prime age individuals was unchanged over this period.¹ However, in the ten year period from 1965 to 1975, women's time spent in home production fell by another seven hours whereas men's time rose by only one hour, so that the average time for prime age individuals fell by three hours per week. From 1975 to 2005, prime age hours fell by only one hour more. If estimates of home production time by children and the elderly are included, the per capita time spent in home production has been virtually constant over the 20th Century.

Using the estimates of total time spent in home production, I show that the ratio of market hours to home production hours actually fell during the 20th Century, contrary to what many believe. Comparison of the trends in home production hours relative to appliances and market hours suggests that the diffusion of appliances had no impact on home production hours.

¹ Men were greater than 50 percent of the prime age population in 1900 whereas women were greater than 50 percent of the prime age population in 1965, so the average time by all prime age individuals is not a simple average of men and women.

This result is consistent with a model in which the elasticity of substitution between home hours and appliances in production is unity.

The rest of the paper is organized as follows. Section II presents a simple theoretical model showing that the diffusion of appliances need not imply declines in time spent in home production. Section III discusses the empirical classification of activities for defining home production time. Section IV analyzes the leading time use studies of housewives during the first half of the 20th Century and discusses how errors in interpretation have led to some misconceptions. Section V uses some of the early time use studies to create nationally representative estimates for housewives. Section VI surveys and analyzes the time use studies on other demographic groups, such as employed women, men, children, and the elderly. This section presents estimates of time use for each of these other groups. Section VII discusses the implications of the new estimates and Section VIII concludes.

II. Theoretical Links between Appliances and Time Spent in Home Production

Clarence Long (1958) was one of the first to suggest that the diffusion of household appliances was a potential factor explaining the rise of women's labor force participation in the 20th Century. Greenwood, Seshadri and Yorukoglu (2005) elegantly formalized the notion that appliances were the "engines of liberation" that released women from the home into the labor market. According to Jones, Manuelli and McGrattan (2003), however, Greenwood et al's results were due to two key assumptions: that labor supply is indivisible and that the home technology is Leontief.

To investigate the role of home technology in the effects of appliances on labor supply, I consider a modified version of an alternative model presented by Greenwood et al (2005). I

focus on a static version for ease of exposition, since the results do not depend on dynamic considerations. Also, I assume a simple household optimization problem since details of household bargaining are inessential to the point I wish to make.

Households choose market consumption C_m , consumption of home produced goods C_h , home production capital K , market hours N_m and home production hours N_h to maximize utility:

$$(1) U = \mu \ln(C_m) + \nu \ln(C_h) + (1 - \mu - \nu) \ln(l) \quad \text{with } l = 1 - N_m - N_h$$

subject to the production function for home goods:

$$(2) C_h = [\theta \cdot K^\rho + (1 - \theta)N_h^\rho]^{(1/\rho)}, \quad \text{with } \rho < 1$$

and budget constraint:

$$(3) C_m + qK = w \cdot N_m$$

where q is the real rental price of home production capital (in terms of consumption goods) and w is the real wage rate for market work. μ , ν , and θ are assumed to be positive and between zero and unity.

Manipulation of the first-order conditions from this maximization problem leads to two key equations for the capital-labor ratio in home production and the ratio of market hours to home production hours:

$$(4) \frac{K}{N_h} = \left[\frac{\theta}{1-\theta} \cdot \frac{w}{q} \right]^{\frac{1}{1-\rho}}$$

$$(5) \frac{N_m}{N_h} = \frac{\mu}{\nu} + \left(\frac{w}{q} \right)^{\frac{\rho}{1-\rho}} \left(\frac{\theta}{1-\theta} \right)^{\frac{1}{1-\rho}} \left(1 + \frac{\mu}{\nu} \right)$$

Equation (4) indicates that either a fall in the rental cost of capital q or a rise in the market wage w raises the capital-labor ratio in home production for any value of $\rho < 1$. Differentiation of Equation (5) with respect to q and w shows that the effects on market hours versus home hours depend crucially on the elasticity of substitution between capital and labor in home production, $\varepsilon = 1/(1-\rho)$. In particular, one can establish the following result:

Proposition: Let $\varepsilon = 1/(1-\rho)$ be the elasticity of substitution between capital and labor in the home production function. A fall in the rental cost of home production capital q or a rise in the market wage w leads to:

- (i) a rise in market hours relative to home hours if $\varepsilon > 1$
- (ii) no change in market hours relative to home hours if $\varepsilon = 1$
- (iii) a fall in market hours relative to home hours if $\varepsilon < 1$

Thus, this simple theory demonstrates that a rise in home capital such as appliances need not shift labor from the home to the market. With these functional forms, such a shift only occurs if the elasticity of substitution between labor and capital in home production is

sufficiently high. The canonical Cobb-Douglas case ($\rho = 0$) predicts *no* change in the ratio of market to home work in the face of either falling durables prices or rising market wages.

Jones, Manuelli and McGrattan (2003) consider alternative versions of the model in which all production is Cobb-Douglas, but in which utility depends on a composite commodity with a constant elasticity of substitution between market goods and home produced goods. They show that technological progress in the home production sector leads market hours to rise only if market and home goods are complements. If they are substitutes, market hours fall in response to technological innovation in the home sector. Ngai and Pissarides (2007) present a model with multiple sectors and multiple types of home production goods. They show that labor allocated to home production can actually rise for some stages of growth before eventually falling to zero.

In sum, from the viewpoint of theory, there is no “Cowan Paradox”. Standard theory predicts that hours spent in home production can rise, fall, or stay the same in response to technical innovations such as appliances. The effect depends on key elasticities of substitution. Given the failure of theory to make clear predictions, it becomes even more imperative to develop consistent long-term measures of time spent in home production. The rest of the paper undertakes this task.

III. Classifying Time Spent in Home Production

General conceptions of what is home production have not changed much in the last century. Time use studies from 1912 tend to classify activities similarly to time use studies in 2005. Interestingly, opinions about many tasks have not changed much either. In the 1920s, 55 percent of farmwives said they enjoyed cooking the most whereas 13 percent said they enjoyed care of children the most. Laundry and cleaning ranked at the bottom (Wilson (193-)). In 1985,

individuals continued to rate cooking higher than childcare, and rated laundry and cleaning near the bottom (Robinson and Godbey (1999), Table 0).

Because there are some ambiguities for a few categories, it is useful to review standard definitions of home production. Reid (1934, pg. 11) defines household production as “those unpaid activities which are carried on, by and for the members, which activities might be replaced by market goods, or paid services, if circumstances such as income, market conditions, and personal inclinations permit the service being delegated to someone outside the household group.” According to this definition, an active market in a good or service that substitutes for a home activity would suggest that activity should be classified as home production rather than leisure. Fogel (2000, p. 185) offers an alternative method for categorizing activities:

Chores and *work* both involve tasks necessary for earning and maintaining a standard of living. Disagreeableness is not the criterion for including an activity in the category chores since then, as now, some chores, such as gardening and cooking, could be pleasurable, as was true of other categories of work. Chores, like work, denotes economic compulsion, whether that compulsion is administered by a “boss,” the invisible hand of the market, or is self-administered in order to ensure the maintenance of standards of living.

Both Reid’s and Fogel’s definitions suggest similar categorization of activities.² Column 1 of Table 1 shows the activities that are both classified as “homemaking” in all early studies of home production and for which the categories are sufficiently detailed in later studies that one can separate them from non-home production activities. These include food preparation, cleaning the house, care of family members living in the household, and shopping and managing the household. Column 2 shows other activities that are only sometimes classified as home production. These include gardening (which is reported in many of the early studies, but is classified as work since many of those studies focused on farm households), care of others who

are not in the household, and entertaining children. To be consistent across time, I will exclude gardening and care of children and adults who are not part of the household.³ I will exclude playing with children from the baseline measures of home production, though I will show the effect of including it as well.

IV. Analysis of Early Time Use Studies of Housewives

This section analyzes the principal studies that have been used to estimate time spent in home production by housewives in the first half of the 20th Century. A later section will discuss other groups such as employed women, men, and children.

Two features of the studies are important to keep in mind as they are reviewed: the survey method used and the ways in which the samples are not nationally representative. Consider first the survey methods. Some earlier studies used time diary methods and others used recall estimates. The time diary method requires individuals to keep track of their activities throughout a day, typically in five to fifteen minute intervals. Recall estimates, in contrast, typically ask more vague questions, such as “How much time do you usually spend on housework in a week?” A number of cross-validation studies show time diaries to be the most accurate source of estimates for housework (Juster and Stafford (1985, 1991), Robinson and Godbey (1999)). As Robinson and Godbey (1999, page 59) discuss, studies that rely on individuals’ recall estimates of time spent in various activities almost always add up to more than the total time available. For example, they discuss several studies in which estimated time spent

² Ramey and Francis (2007) also consider enjoyment levels as a way to divide activities between home production and leisure.

³ One could argue, however, that care of others who are not in the household should be included as household production in the last part of the 20th Century. Because of divorce and the greater tendency of the elderly to live separately from their children, many prime age individuals spend significant time caring for children and elderly parents who do not live with them.

in weekly activities ranged from 187 hours to 250 hours, clearly violating the constraint that there are only 168 hours per week. Thus, more weight should be placed on the estimates that use time diaries rather than recall or anecdotes.

The second issue to consider is the nature of the samples. None of the time use studies conducted in the first half of the 20th Century was based on nationally representative samples. Thus, as I discuss each study and its features, it will be important to keep in mind how the sample differs from the national average and how that difference may affect the estimate of time spent in home production. Later in the paper, I will use estimates from detailed group data from one of the key studies to create nationally representative estimates.

A. Leeds (1917)

As part of his dissertation, Leeds (1917) conducted a survey of time use among 60 families in Pennsylvania between 1912 and 1914. The families were distributed across cities, suburbs, villages and rural areas. The larger sample of 60 was not based on records, but on recall estimates by the housewives. A smaller sample of 12 families also kept records.

The sample was nonrandom in several key ways. First, all of the families were earning enough to reach a level of “decency” which was generally defined as earning at least \$1,000 a year, with an attempt to include some members of the “one-servant class.” Second, Leeds discarded records from apartment dwellers and only used those who lived in houses. Third, because Leeds tried to select families with children, with a focus on children under the age of ten years, his sample had more children than average. In his sample, there were 2.75 children per household. According to Census numbers from 1910, the number of own children ages 0 to 17

per married woman between the ages of 18 and 64 was 1.8.⁴ Thus, the sample had more children per married woman than the national average.

The average of the sixty housewives' estimates of time spent on home production was 55.8 hours per week (Leeds (1917), page 68). This estimate included time spent in meal preparation and cleanup, care of clothing, house cleaning and repairing, shopping, physical care of children, oversight of children, and management of the household. It did not include gardening. As we shall see, this estimate is only slightly greater than the estimate of time spent in home production by housewives in the 1960s.

Why, then does Lebergott (1993, p. 51 and 59) cite Leeds for his rough estimate that housewives spent over 40 hours per week in food preparation and meal clean-up alone? My reading of the original Leeds dissertation reveals that Lebergott inadvertently used the hours spent by all people in the household, including hired help, rather than the amount of time spent by the housewife herself.⁵ In addition to the housewife's hours, hired help and help from family members contributed an extra 46 hours per week to home production, for a total time of 101.75 hours per week (page 67). Thus, Lebergott's estimate included services bought on the market with home production hours of housewives and other family members.

This is a serious over-estimate because total time devoted to home production was much higher in households with hired help than households without hired help. The USDA (1944, Table 7) time diary study of the 1920s and 1930s showed total time devoted to home production in the households of urban, highly educated households (75 percent of whom had hired help) was 20 hours *more* per week than for rural households (90 percent of whom had no hired help.)

⁴ The data appendix discusses how this estimate was obtained.

⁵ Compare the table on page 67 of Leeds's dissertation to the table on page 68.

Thus, Lebergott's use of the total hours table rather than the housewife hours table results in a substantial overestimate of the time spent by the average housewife. This error has multiplied through the literature because most economists quote this number from Lebergott.

There are other potential sources of bias in the 55.8 hours per week estimate, however. The first two involve an upward bias. As discussed above, recall estimates tend to overstate the amount of time spent. Thus, 55.8 may be *too high*. For the twelve families that kept time diaries, the estimates of total time spent (by the housewife and her assistants) were on average 18 percent above the actual time spent according to the diaries (Leeds (1917), page 70). Thus, the more accurate estimate could be as low as 47 hours per week. Second, all time diary estimates from the 1920s to the present show that time spent in home production is significantly affected by the number and age of children. Since Leeds' families had more children than the average married couple, and were more likely to have children under the age of 10, we would expect the estimates from the study to be biased upward relative to the national average.

The third potential bias involves a possible downward bias in the estimate. Leeds' study excluded the low income families living in the tenements in big cities at that time. The average expenditures for food, clothing, shelter, furniture and household operation was \$1,575 in Leeds' sample. According to a BLS study, the average urban family spent \$1,154 on these categories in 1917-1919 (*Historical Statistics of the United States, Millennial Edition On Line*, Table Cd483-502). Thus, Leeds' families had higher income than average. Many researchers have assumed that wives in lower socioeconomic status families spent more time in home production (e.g. Cain (1984), Owen (1986)). In fact, there is not much evidence for this assumption. Vanek (1973) analyzed the link between income and housework in rural families during the 1920s and 1930s (Tables 4.3 and 4.4). She found no relationship income and housework. Micro-level data from

the nationally representative 1965 time use survey (discussed in detail below) shows that nonemployed married women in the lowest household income quartile spent the same amount of time on home production as married women in the highest household income quartile, 52 hours per week in both cases. Thus, there is no firm evidence behind the widespread belief that the time spent on home production depends negatively on household income.

How could the poor maintain a household with no hired help and no modern appliances? First, because lower income families lived in smaller living quarters, there was less home production to be done. Reid (1934, pp. 58-59) argued that apartment dwellers spent significantly less time in home production than families in their own houses; there was less space to clean and no houses to paint or repair. Second, there is a good deal of qualitative evidence that lower income families produced less home production output. A home economist noted during that time “if one is poor it follows as a matter of course that one is dirty” (Hansen (1913)). Having clean clothes, clean dishes, a clean house, and well-cared for children was just another luxury the poor could not afford. Consistent with this observation, studies of wage-earners’ budgets revealed a monotonous diet with many ready-made goods, such as bakery bread, sausages, salted fish, and canned goods (Cowan (1983), page 164-165). According to the Lynds’ (1929, page 155) study, near the turn of the century only the working class bought their bread instead of making it themselves. Thus, it appears that home production output was substantially higher in middle and upper class households.

In sum, several aspects of Leeds’ sample suggests that his estimate of 55.8 hours per week may be above the national average whereas other aspects suggest that his estimates may be below the national average. In any case, Lebergott’s estimates were clearly too high because of his inclusion of hours spent by hired help and other members of the household. Below, I will

construct nationally representative estimates based on another source, and I will find estimates that very close to Leeds' estimate of 55.8 hours per week.

B. Charlotte Gilman (1904)

Lebergott cites Charlotte Gilman's (1904) as the second source for his estimate that housewives spent 12 hours per day on housework, with 6 hours per day on cooking alone in 1910 (Lebergott (1976, p. 92, 106; 1993, p. 51). Gilman, who was part of the Progressive Era reform movement concerned with the long hours of housewives, advocated that families take advantage of economies of scale and form cooperative kitchens. She asserted that farmwives spent six hours per day in preparing, serving, and cleaning up meals (Gilman (1904), page 95, 132). These numbers were *assumptions*, not based on any study. The time diary studies discussed in the next section showed that farmwives spent around 3.4 hours per day in preparing meals, cleaning up, and preserving food, and a total of 7.4 hours per day on home production. As discussed by Kline (1997), members of the Progressive Era reform movement consistently overestimated the time spent by farmwives in home production activities. Thus, Gilman's assumptions should not be used as a basis for any estimates.

C. Purnell Act Time Diary Studies

The Purnell Act of 1925 provided funding for detailed time diary studies of thousands of American women, with a focus on farm women. These studies were conducted by researchers working for the Bureau of Home Economics of the US Department of Agriculture. The combined sample size of the studies conducted around the country exceeded 3,000 housewives. Housewives were asked to keep a diary showing their activities for seven days, for 24 hours per

day. The unit for recording activities was five minute periods (Wilson (193-), Part I, page 11). Housewives also kept track of the amount of help received from members of the household and hired help. The samples were convenience samples and women were asked to fill out the forms during a “normal” week.

Vanek’s (1973) landmark dissertation analyzed twelve studies funded by the Purnell Act and compared time use to the 1965 study. Her analysis led her to the startling conclusion that homemakers in the mid-1960s were spending slightly *more* time on home production than the homemakers of the 1920s. Vanek noted, as did at least five of the original researchers conducting the various studies, that women with access to electricity, plumbing and appliances spent the same amount of time on housework as women who lacked these conveniences (Kline (1997), pages 372-375).

Table 2 shows a summary of the Purnell Act studies for homemakers. All these studies were surveyed by Vanek (1973), but my summaries of Kneeland (1928), Wilson (1929, 193-), the USDA (1944), and Cowles and Dietz (1956) are based on my reading of the original studies. With the exception of two small sample outliers, the estimates across studies range from 47 hours per week to 56.5 hours per week, with a weighted mean of 51.9. There seems to be no significant differences according to whether the women lived on farms, in rural areas, or towns, or whether the studies were conducted in the 1920s, 1930s, 1940s, or 1950s. Farmwives had longer workdays than other housewives, however, because in addition to performing homemaking tasks, they devoted between 9 and 11 hours per week to farm work. The two USDA samples from large urban areas consist entirely of housewives who were graduates of elite colleges; thus, it is difficult to untangle how much of the slightly lower estimates are due to their socioeconomic status and how much is due to the benefits of living in large cities.

Table 3 shows time spent in subcategories of home production for three groups: one sample of farm housewives in the mid-1920s reported by the USDA (1944), town housewives in the mid-1920s from Wilson's (193-) study, and married nonemployed women in 1965, with the latter estimates based on my calculations from individual-level data from the nationally representative American Heritage Time Use Survey. The numbers from the USDA summary are very similar to other Purnell Act studies. The table shows that the household size for all three groups was very similar, just over four persons per household. The USDA survey did not specify the number of children versus adults, but Wilson's study showed an average of 1.83 children and 2.24 adults per household among the town housewives. The numbers were virtually identical in 1965, 1.87 children and 2.18 adults.

While the total time spent in home production is very similar across the three groups, some of the subcategories differ quite a bit. Housewives in the 1960s spent less time on food preparation and clothing care, but more time on family care and much more time on purchasing, household management, and travel than farmwives and town housewives in the 1920s. Being able to rely on the market for food and clothing saves time in those categories, but adds time in terms of purchasing, traveling to stores, and household management such as paying bills.⁶

After analyzing data such as these, Vanek (1973) concluded that total time spent in home production did not change between the 1920s and 1960s. Her analysis has been dismissed by some economists because she did not adjust her estimates for the fact that the samples were not representative (e.g. Cain (1984), Owen (1986)). For example, Cain (1984) hypothesized that the early numbers might be underestimates relative to the national average because (1) busier

⁶ Owen (1986) has argued that perhaps family care, travel and home management shouldn't be counted as home production because they are "quasi-work activities." Yet both Wilson's (193-) study (Part V) and the 1985 study reported in Robinson and Godbey (1999) (Table O) show that women prefer cooking and sewing to family care and home management, and ranked home management similarly to laundry. Thus, there is no basis for arguing that the

women were less likely to respond; (2) higher status farmwives might have done less home production; and (3) the number of children per household may have been less than the average for farm households.

With regard to Cain's first concern about self-selection of less busy individuals, all the evidence points to the fact that the individuals most likely to respond to time use surveys are the ones who are *busier* (Robinson and Godbey (1999, page 63)). Thus, there is no evidence of the type of bias in Cain's first concern.

Bryant (1996) sought to address Cain's second and third concerns by using regression analysis to calculate the effects of education, place of residence and family size on home production. Bryant combined information from Wilson's (193-) tables with the USDA (1944) study, and studied the effects of household size, education, and residence on total home production, as well as subcategories. When Bryant used his regression estimates to make the sample nationally representative, he obtained estimates of home production time in the 1920s that were three hours per week *lower* than the rural estimates.

Bryant's (1996) analysis was a significant step forward because he used formal statistical techniques rather than guesses to make adjustments to the raw data. However, because he based most of his analysis on the USDA (1944) study, he was unable to control for the number and age of children. Also, his urban sample consisted entirely of graduates of elite colleges, who had somewhat lower hours of home production than the other samples. Below, I will show that Wilson's (193-) data allow for more precise controls for producing nationally representative estimates for the first half of the 20th Century.

shift from food preparation to family care and home management should be interpreted as a decrease in the amount of housework done.

D. USDA Surveys of the Farmer's Standard of Living

Before the Purnell Act led to the detailed time diary studies discussed in the last section, the Department of Agriculture also conducted large-scale surveys of farmers' standards of living (Ward (1920), Kirkpatrick (1926, 1971)). These estimates suggest that farm women worked much longer than the subsequent time diary studies indicate, over 11 hours per day. However, virtually all of the discrepancy between these estimates and those from the Purnell Study can be attributed to differences in definitions and estimation techniques. The survey estimates of the length of the workday were based on average times of starting work in the morning and stopping work in the evening, and included farm work. Appendix B shows that when one applies the survey methods to Purnell Study data, the estimates of the length of a workday are almost 11 hours. Thus, the estimation method used in these early survey studies induces upward bias in the estimates relative to the time diary estimates.

E. The Middletown Study

The Lynds' (1929) famous study of "Middletown" has also been used as a source for estimates of time spent in home production (e.g. Greenwood and Vandembroucke (2005)). Thus, it is useful to consider how home production was estimated in this study. In 1924, the Lynds' conducted extensive interviews of women who were "business class" and "working class." They used recall methods to ascertain the amount of time spent in housework, which they defined as "routine cleaning, preparing of food, etc., exclusive of "extra" cleaning or baking or laundry work" (Lynd and Lynd (1929), footnote 19, page 168). Constructing estimates from the intervals they provide suggests that the average time spent on meals and routine cleaning was around 6 hours per day for the working class wife and 5.5 hours for the business class wife.

Appendix C compares these estimates to those of farmwives and considers why the Middletown estimates are higher. I argue that the use of recall, combined with an over sampling of families with children, can explain the differences.

V. Nationally Representative Estimates for Nonemployed Women

This section constructs nationally representative estimates of time spent in home production by housewives (and other nonemployed women) between the ages of 18 and 64. The next section will study other demographic groups.

For the pre-1965 sample, I first use the data from Wilson's (193-) study in the early 1920s to estimate how household characteristics affect the amount of time spent in home production. The sample size is over 500 housewives and is about equal to the sample of housewives in the 1965 time use study used below. The individual-level data are no longer available, but Wilson (193-) provides hundreds of tables of tabulations of her sample by different groups. I use tabulations of data by residence (farm, nonfarm rural, and town) and family composition. The family composition cells are grouped according to the presence of children and whether there are children in each of four age categories. The permutations on these age categories and residence categories result in 35 cells with nonzero observations. I estimate regressions based on the grouped data, using the number of observations per cell as weights.

Table 4, column (1) shows the effects of residence on time spent in housework. One might suspect that the housewives who lived in town would spend less time on home production because they had better access to hired help, bakeries and commercial laundries. As the estimates and R^2 's show, there is no significant difference in the unconditional mean of total time spent in home production by residence in this sample.

Table 4 column (2) shows the effects of household composition on home production. The variables included are the number of adults, the number of children, whether the youngest was under one year of age, and whether the youngest was between one and five years.⁷ In this larger regression, only the town dummy variable was marginally significant so the other residence variable was excluded. The four family composition variables explain 84 percent of the variation across cells. The estimates show average weekly home production of 49 hours for a rural family of two adults with no children. Additional adults appear to *decrease* the amount of time spent by the housewife. Although some of the additional adults were boarders who would have increased the amount of work, others were family members, such as “maiden aunts” who helped with the housework.

According to the estimates, one child adds 1.6 hours more work if that child is over the age of five. If the child is under the age of one, though, it adds 15 hours more home production per week. A preschooler between the ages of one and five adds almost 6 hours more work to the housewife. The two variables indicating the presence of young children have important explanatory power; if they are omitted, the R^2 falls from 0.82 to 0.55.

A key question is how the socioeconomic status of the household affects the time spent in home production by the housewife. There is no information on income in Wilson’s tabulations, but there is information on the education level of the housewife. Without controls for the number and age of children, I find no statistically significant difference in housework across education levels. As Wilson (193-) notes, however, the less educated women in her sample tended to have fewer children. Thus, it is important to control for the number and age of

⁷Because the underlying data are grouped data, they cannot be used to test for nonlinear effects in the number of children.

children. Because education was not tabulated for the nonfarm rural groups, there are only 25 cells in these regressions.

Column (3) of Table 4 shows the regression with both the child controls and an education variable. The controls for residence and the number of adults are omitted because neither was statistically significant in the regression with education, and their presence did not noticeably affect the other coefficients estimates (except the constant term). The results show a significant effect of education of the housewife.⁸ The estimates suggest that housewives with an elementary education or less do an extra 6.6 hours of housework relative to more educated households. Thus, this regression provides some formal statistical evidence that socioeconomic status, at least as measured by education, does affect the amount of housework done in the 1920s.⁹

As discussed in the introduction, many economists believe that the diffusion of electricity, plumbing, and appliances led to a decline in time spent in home production. Wilson's tabulations also allow us to investigate this hypothesis. Column (4) of Table 4 adds a variable indicating the fraction of households in the group that had both electricity and plumbing. This fraction varies widely, from zero in some of the farm groupings to 100 percent in some of the town groupings. However, the coefficient estimate is -0.132 with a standard error of 1.85. Thus, these regression results support the existing evidence that the presence of modern utilities and appliances has no effect on the time spent in housework (e.g. Vanek (1973), Kline (1997), and Bittman et al (2004)).

⁸Wilson breaks education into three categories: elementary school or less, high school, and some college. When the college variable was added, the coefficient estimate was -0.78 with a standard error of 4, and thus was omitted from the specification reported in the table.

⁹Interestingly, this effect does not seem to be present in the post-WWII period. Analysis of micro-level data from 1965 shows that nonemployed married women with less than a high school education spent five hours less per week than those with a college degree, even after controlling for family composition.

To summarize, the regression results identify four key variables for determining the amount of housework done: three variables indicating the age and number of children and the education level of the housewife. Place of residence and presence of “labor-saving” devices appear to be unimportant.

I therefore use the regression estimates from column (3) of Table 4 to form nationally representative estimates of time spent in home production. I apply the coefficients to the national averages of the explanatory variables for nonemployed women between the ages of 18 and 64. These national averages are calculated from the Census and *Historical Statistics* from 1900 to 1960, as described in the data appendix.

One point to note is that most of the studies analyzed were for nonemployed housewives. Among all nonemployed women ages 18 to 64, 77 percent were married in 1900 and 86 percent were married in 1960. The widowed, divorced, and never-married women who were not employed were often the unmarried daughters or “maiden aunts” who lived with their families and helped the housewife with home production (Lynd and Lynd (1929), pages 25, 110, 170). Given the absence of information on their hours of housework, I assume that they spent the same amount of time in home production as a married woman with the same number and age composition of children.

Obtaining nationally representative estimates for the period from 1965 to the present is simple relative the early period. Estimates of time spent in home production since 1965 are available from the micro files of the time diary surveys conducted by the Survey Research Center in 1965, 1975, 1985, and 1992-94, and the BLS time use surveys beginning in 2003. I use the American Heritage Time Use Survey (AHTUS) version of these studies, augmented with the 2003, 2004 and 2005 BLS surveys. The data appendix shows the activities codes included in

“home production.” I do not use the 1992-94 survey because of key missing data (such as marital status) and the problems with that survey discussed by Robinson and Godbey (1999, pages 323-324). As alluded to in the previous discussion of Table 1, there are some ambiguities for creating consistent categories over time. The first concerns whether playing with children should be classified as home production. I will show estimates of home production with and without playing with children. The second concerns “outdoor chores” versus “gardening.” I include outdoor chores in home production but I exclude gardening and pet care. The data appendix describes how I make the BLS surveys consistent with the earlier surveys.

Table 5 shows the new estimates of home production for nonemployed prime age women from 1900 to the present. The estimates for married women fall from 57.7 hours per week in 1900 to 51.9 in 1960. Because these estimates are constructed from constant regression coefficients from the 1920s, the source of the change is the change in family composition and education. Interestingly, my estimate for 1910 of 56.4 is just slightly above Leeds’ (1917) estimate of 55.8 for 1912. My estimates imply a number for the mid-1920s of around 55.1, which is just a few hours above the mean for Wilson’s study. The estimates for 1930, 1940, and 1950 are equal to the means for the other Purnell Act studies. The estimates for all nonemployed women in this age group are similar.

The last two columns show estimates based on individual data from the nationally representative time use studies starting in 1965. I show estimates both excluding playing with children and including playing with children. The difference is only half an hour a week in 1965, but rises to 1.6 hours per week in 2005. I will focus my discussion in the rest of the paper on the estimates that exclude playing with children.

Note that my method, based on regressions on Wilson's data from the 1920s, produces an estimate for 1960 that is virtually identical to the estimate from the nationally representative sample in 1965. This match lends credence to my estimation method, which assumes that only the family composition and education of the housewife matters for the period from 1900 to 1960, and which assumes that the diffusion of appliances had no effect on time spent in home production. The results suggest a very gradual decline in time spent in home production by nonemployed prime age women from 1900 to 1965.

Between 1965 and 1975, however, the amount of time spent in home production by these women decreased dramatically, by more than ten hours per week. This drop has been noted by a number of previous studies, such as those by Robinson and Godbey (1999) and Aguiar and Hurst (2007). Furthermore, this drop cannot be explained solely by changes in the number and age of children and education. Applying my estimation method from 1900 to 1960 to data for 1970 and 1980 yields total home production estimates of 51 for 1970 and 49 for 1980, which are far higher than the actual 41 hours in 1975. Between 1975 and 1985, time in home production dropped by another four hours. Between 1985 and 2005, there was virtually no change.

In sum, my estimates indicate that the time spent in household production by nonemployed prime age women fell from 56 in 1900 to under 38 hours in 2005. Of this 18 hour decrease, 60 percent occurred in one ten year span – 1965 to 1975.

VI. Estimates for Other Demographic Groups

Housewives have received the lion's share of attention because they have historically accounted for most of the housework. However, to understand total trends in housework, as well as how the increasing labor force participation of women has affected time spent in housework, it

is essential to study the rest of the population. In this section, I will construct estimates for employed women, employed men, unemployed men, individuals over 65 and children. These estimates will also be used to construct aggregate estimates for the population.

A. Employed Women Ages 18-64

There are far fewer estimates of the time spent in home production by employed women in the early period, in part because they represented a less important part of the population. I now discuss estimates from four studies that addressed this segment of the population.

Janet Fowler Nelson (1933) used time diary methods to study the leisure time of female white-collar workers. The study was conducted for the International Y.W.C.A. in 1931 and 1932. The sample contains over 1,000 observations on young women employed as secretaries, office clerks, teachers, and nurses. The majority was single and none had children.

Details about the sample are summarized in Table 6A. These women appear similar to national samples in several aspects. First, Nelson's comparisons indicate that the distribution of father's occupations was similar to the national average, indicating that this was not a select group (Nelson (1933, p. 12). Second, Nelson states that she found no differences in time use between the women who were associated with the Y.W.C.A. and the control group that was not associated with the organization. Third, their hours of work are similar to other employed women. According to Sundstrom (2000), the average weekly hours for female manufacturing workers was 39.8 in 1931 and 36.3 in 1932, which is just below the average of 40 in Nelson's sample. Fourth, the women's living arrangements were roughly similar to the national average. According to the Census, only eight percent of single (never-married) employed women were either a household head or lived with a friend or roommate in 1930. 92 percent lived with

relatives or as a lodger or boarder. As Table 6A shows, 90 percent of Nelson's sample lived with their families or as boarders. Fifth, the average age of the working girls of 25 was just two and one-half years under the national average for single employed women (between the ages of 18 and 64).

Nelson's survey included 57 activities, most of which were detailed leisure activities. One of her other categories was "household responsibilities." To create a home production category that is comparable to the other studies, I combined the time spent in this category with her leisure categories "shopping" and "sewing."

Table 6B shows the amount of time spent in work, commuting, and home production, separately for "business girls" (secretaries, etc.) and "professional girls" (teachers, nurses, librarians). According to the estimates, business girls spent 40 hours working per week, 7 hours commuting, and 6 hours in home production. Professional girls spent 37 hours working per week, 5 hours commuting, and 6.5 hours in home production. As I will discuss below, female high school students did about 5 hours of housework per week. Thus, employed single females in their 20s appear to have been very similar to high school students in their time spent in home production.

Although the study was intended to focus on single women, the sample also included 58 married women (none of whom had children). The final columns of Table 6B show estimates for select time use categories. Unfortunately, Nelson does not report the estimates for some of our added categories of home production. Nevertheless, the estimates suggest that even though married women spent the same amount of time working and commuting, they spent 2.5 times more time in home responsibilities than the single women. If we apply this factor to the total

category of home production, it would indicate that married girls spent 15 or more hours in home production activities.

A second study that provides information on employed women is the time diary study conducted by Lundberg, Komarovsky, and McNerny (1934) between 1931 and 1933 of 2,500 respondents of Westchester County, New York. It was a convenience sample in which high school students were greatly over-represented. Although the average income of this county was quite high, the study also had a number of lower income respondents. Fortunately, Lundberg et al (1934) show time use by general occupation and gender.¹⁰ Though far from perfect, this study serves as one of the few sources of early time use data on groups outside of housewives.

According to the study, the group of female factory workers (a sample of 60 individuals with a total of 228 diary days) spent 9.8 hours per week on “household and children” whereas white-collar female office employees (a sample of 226 individuals with 678 diary days) spent 8.4 hours per week on household and children. We do not know how many of these women were married or how many had children. These estimates lie between the single and married women estimates of the Nelson study.

In the third study, Kuschke (1938) surveyed employed married women in a small study (69 observations) (summarized by Vanek (1973, p. 140)). He found that rural employed married women spent 26.8 hours per week on home production and urban employed women spent 23.6 hours.¹¹

¹⁰ Robinson and Converse (1972) have criticized this study for not being clear about whether days of the week were equally represented. However, footnote A to Table 1 of Lundberg et al (1934) makes very clear that the days of the week were equally represented.

¹¹ Unfortunately, I was unable to obtain a copy of the original study and thus do not know any other details about the sample.

The fourth study is by Wiegand (1954) (summarized by Walker (1969)). In a sample of 53 employed married women in 1952, the average time spent in home production was 28.7 hours per week on home production.

I use the estimates from these four studies to construct estimates of time spent in home production for employed women. For the early period, I estimate hours of employed women by weighting the ever-married and single employed women cells by their fractions from the census.¹² I use the mean of Kuscke's estimates of 25 hours per week for ever-married employed women in 1936 and Wiegand's estimate of 28.7 hours for 1952. For single employed women, I increase Nelson's estimate for business girls from 6 to 7 hours to make them more nationally representative, since Lundberg et al's estimates indicate that female factory workers spent slightly more time on home production than female white-collar workers. This method gives an estimate of 15.6 hours per week per employed woman in 1931. For the period before 1931, I assume that housework by ever-married women follows the same trends as for nonemployed women. I assume that housework by single employed women was a constant seven hours before 1931. Since single employed women worked much longer hours in the market in the first few decades of the century and were even more likely to reside with family or as boarders, it is unlikely that they would have had time to do more home production.

Table 7 shows my estimates for employed women, nonemployed women, and all women between the ages of 18 and 64. The estimates for all women are constructed by weighting the employed and nonemployed estimates by the employment-population ratio. The data appendix describes how this series is constructed. The estimates from 1965-2005 are from nationally representative samples.

¹² I assume that widowed, divorced, and separated women do as much home production as married women, so the married category includes all women who have ever been married.

Ironically it appears that single employed women in 1965 spent significantly more time in home production than those in 1930. The difference in living situations is the most likely reason for this difference. In the early part of the century over 90 percent of employed women lived with their families or in boarding houses. Thus, they relied on their mothers or boarding house keepers to do most of their home production. In contrast, by 1965 almost 30 percent of these women were either the head of the household or shared with roommates or friends, and hence had to do all of their own home production. Thus, the estimates suggest that while the amount of home production by nonemployed women was slowly decreasing, the amount of home production by employed women was increasing.

The final column of Table 7 shows the estimates for all women, where the individual estimates have been weighted by the fraction employed. For all women between the ages of 18 and 64, the estimate is 49 hours per week in 1900, falling to 40 hours in 1965 and reaching 28 hours in 2005. Thus, the estimates suggest that time spent in home production fell slightly more from 1965 to 2005 as from 1900 to 1965.

B. Men Ages 18-64

We now turn to the other half of the prime age population. Because men historically have not done much home production, there are only a few studies to which we can turn. The estimates from the Purnell Act studies during the 1920s indicate that employed husbands spent very little time doing housework, between two and three hours a week (Wilson (1929), Vanek (1973)). Lundberg, Komarovsky, and McNerny (1934) estimated that male laborers and white collar workers spent about 4 hours a week whereas male professionals spent 6 hours a week in

1931. In contrast, by 1965, the average employed man spent 11 hours per week, and by 2005, he averaged 15 hours a week.

Are the numbers for the 1920s too low? One question is the accuracy of wives' estimates of husbands' housework time. In Wilson's (193-) study, wives were asked to keep written records of time spent by other members of the household and thus should be reasonably accurate. Furthermore, a recent study using various methods for measuring time spent on housework found that wives' estimates of husbands' housework hours were quite accurate (Lee and Waite (2005)). Thus, I do not have a reason to believe that wives' estimates are biased downward. A second factor that makes the lower estimates of employed men's housework in the 1920s plausible is the negative correlation between housework and the length of the workweek. According to the 1965 time use study, men who worked 38 to 42 hours per week averaged 10 hours on housework, whereas those working 58 or more hours a week averaged 5 hours on housework. During the early decades of the century, employed men worked significantly more hours per week than they did in later decades. Thus, it is not so surprising that they helped less with the housework.

Another possible bias is single versus married men. All of the men in the 1920s studies were married. Do single men do more housework? My analysis of the 1965 data shows that whereas the average employed married man in 1965 spent 10.8 hours on home production per week, the average employed single man spent 8.5 hours on housework. Thus, single employed men tend to do less housework than married employed men, so the 1920s estimates are not likely to be biased downward.¹³

Finally, I consider home production hours of nonemployed men, which is a very small category, except during the Great Depression. According to the study by Lundberg,

¹³Single men did little housework in the early period because they were more likely to live in boarding houses, where food and cleaning services were provided.

Komarovsky, and McNerny (1934) hours of non-employed men were around 12 hours per week in 1931. In 1965, they were 19 hours a week, where they have remained until the present.

Table 8 shows the estimates for prime age males. I use the Purnell study estimate for 1920, the Lundberg et al estimates for 1930, the AHTUS and BLS estimates for 1965 to 2005, and interpolate between decades. I project the Purnell study estimates before 1920 in the absence of other information. Since men worked longer hours in 1900, it seems unlikely that they would do more home production than in the 1920s and 1930s when they had shorter work hours. The totals are constructed by weighting by employment-population ratios. The estimates show an increase of more than ten hours a week for time spent in home production by men. Both employed and nonemployed men increased their time spent in home production.

C. Individuals Ages 65 and Over

The estimates presented so far have dealt only with the 18-64 age group. 1975 was the first year that the 65 and older age groups were included in the national time diary studies. For 1975, the estimates of housework range from 32.7 hours for nonemployed women to 12.5 hours for employed men. Non-employed women ages 65 and older spend less time than non-employed women ages 18-64 because most women ages 65 and older do not have young children. After 1975, women's hours fall slightly and men's hours increase substantially.

To extend the data earlier than 1975, I assume a constant ratio of home production of older individuals to those ages 18-64 without children for each of the four gender-employment categories. Although there is much uncertainty about the estimates for the older age group in the early part of the sample, they are such a small fraction of the population (and their labor force

participation rate was higher in the early part of the century) that imprecision of the estimates have little aggregate effect.

D. Children

Finally, I consider the housework done by children. According to Wilson (1929), homemakers in the 1920s reported an average 3 hours of housework from children ages 6 to 14 and 5 hours of housework for children ages 15 to 18.¹⁴ The Lundberg et al (1934) study estimated that high school students spent 4.5 hours on home production in 1931. Fox's (1934) survey of suburban school children from grades 6 to 12 found an average of 3.3 hours per week. Estimates from Wiley et al (1991), Juster and Stafford (1991), Timmer, Eccles and O'Brien (1985), and Hofferth and Sandberg (2001) suggest similar numbers for 1981, 1990, and 1997, around 3 hours for grade school children and 5 hours for teenagers. These seven studies conducted over a 70 year span suggest that housework by children has been about constant. Thus, I assume that children ages 0-4 do no housework, children ages 5-13 work a constant 3 hours a week and children ages 14-17 work 5 hours a week on housework.

VII. Discussion

A. Estimate Quality

The last section constructed estimates for all segments of the population. Before combining those to study overall trends, it is useful to review the quality of the estimates.

The estimates for housewives are probably the most precise, both since the data were rich enough to allow for adjustments to make them nationally representative and because there were

¹⁴ Children also spent time doing farm chores, but these hours are counted as "unpaid family worker" hours in working hours series such as the one by Kendrick (1961).

so many different studies of housewives that all gave the same estimates for the early period. For 1912, both the raw estimate and my adjusted estimate (based independently on regressions coefficients from 1920s data applied to 1910 Census data) are 56 hours per week. For the second half of the 1920s, the raw estimates from the various studies totaling 2,500 observations average 53 hours per week, whereas my adjusted estimates are 54 hours per week. For the 1930s, 1940s, and 1950s, the raw estimates are 51 hours per week whereas my adjusted estimates are 52 hours per week.

The precision declines, however, when we extend those estimates (after adjusting for number and age of children) to nonemployed women ages 18-64 who are not currently married, the “maiden aunts,” unmarried daughters, and widows. These women represented 23 percent of nonemployed women in 1900. In the absence of other information, I have assumed they behaved similarly to nonemployed married women with similar numbers and ages of children.

The estimates for employed males are based on less detailed data, but all of the available estimates of their home production in the early 20th Century suggest very low numbers, between two and three hours per week in the early century. I have no reason to believe the estimates are not nationally representative.

The estimates for employed women, who constituted only 17 percent of all women in 1900, are somewhat surprising. The large study by Nelson (1933) suggests that single employed women spent much less time in home production in the 1930s than the AHTUS suggests they did in 1965. Nelson’s estimates are roughly consistent with Lundberg et al’s (1933) estimates, and become less surprising once one realizes that almost all single employed women in the early 20th Century lived with their families or in boarding houses. The estimates for married employed women are based on much smaller studies, but they are similar to the estimates from 1965 on.

Fortunately, this group constituted only six percent of all prime age women in 1900, so errors in estimation have little effect on aggregates.

The estimates for children are surprisingly uniform across time and across studies. Thus, I think these estimates are quite precise. On the other hand, the estimates for older individuals in the pre-World War II era are very imprecise. They do not have much impact on the aggregate, though, because they were a small segment of the population.

B. General Trends

In order to study general trends in home production time, the estimates from the last several sections are combined to form aggregate estimates as follows. For each of the relevant gender-employment-age cells, I use available estimates and then interpolated values between years of the time diary studies. I then weight the estimated hours of housework of each cell by the fraction of the population that falls in that cell. Because average housework time differs so much between employed and nonemployed individuals, fluctuations in employment rates lead to fluctuations in the estimates. The year-to-year fluctuations are probably qualitatively correct, but should not be used for quantitative analysis because of the imprecision involved.

Figure 1 and Tables 7, 8 and 9 summarize the estimates of weekly hours in home production by prime-age men, women, as well as their weighted average. The figure shows that time devoted to home production by women fell gradually until 1965, after which it fell more steeply until 1975. Overall, time spent fell by 21.6 hours per week from 1900 to 2005; a third of that fall occurred between 1965 and 1975. On the other hand, time spent by prime-age men rose steadily, by a total of eleven hours. Average time by all prime age individuals (weighted by their

shares of the population in each year) was virtually unchanged from 1900 to 1965, and then fell by 4.4 hours per week by 2005.

One might wonder how much of the fall in time spent by prime age individuals is due to changing demographics. Aguiar and Hurst (2007, Table IV) show that for all prime age individuals, only 25 percent of the change from 1965 to 2003 is due to demographic changes of the population, such as age, education, and whether the individual had a child. The rest is due to within demographic cell changes.

These estimates do not suggest a dramatic decline in home production by prime-age individuals. It appears that most of the decline in time spent by women was compensated for by an increase in time spent by men, at least from 1900 to 1965.

Figure 2 shows average time spent by prime age individuals compared to average time spent by all individuals of all ages. On a per capita basis, there is no trend in time spent in home production during the last century. Weekly hours were 16.2 in 1900 and 16.9 in 2005. Table 9 and its addendum reveal why per capita home production is slightly higher now than in 1900. The fraction of the population that was under 18 years old was 40 percent in 1900 and is now only 25 percent. As discussed earlier, children have historically done very little home production. Thus, including them in the average significantly changes the trends.

Figure 3 shows home production hours by household plotted against the average size of households over time. Housework time per household falls by 41 percent from 1900 to 2005, whereas the number of persons per household falls slightly more, by 44 percent. Thus, all of the decline in housework time per household can be explained as a proportional response to the decrease in the size of the household.

C. Implications for Theory

We can now use the series created in the last section to assess the plausibility of various theories. Recall from the theory presented in Section II that the capital-labor ratio in home production should depend positively on the ratio of the market wage to the price of appliances. The elasticity of the capital-labor ratio with respect to this variable is equal to $1/(1-\rho)$, which is the elasticity of substitution between capital and labor in home production. On the other hand, the effect of the ratio of the market wage to the price of appliances depends on the value of $\rho/(1-\rho)$. Thus, the effect could be positive, negative, or zero.

Figure 4A shows the capital-labor ratio in home production plotted against the ratio of wages to the price appliances. “Labor” is the total time spent in home production by the population. The data appendix gives more details about the construction of the variables in the graph.¹⁵ The graph shows that the data are consistent with the simple theory, since the capital-labor ratio in home production rises with the wage-price ratio. A simple regression of the log of the capital-labor ratio on the log of the ratio of wages to appliance prices yields a coefficient of 0.8, suggesting a slightly lower elasticity of substitution between capital and labor in home production than Cobb-Douglas.¹⁶

Figure 4B shows the ratio of total market hours to home production hours plotted against the ratio of wages to the price of appliances. There is little relationship between these two series. In fact, contrary to the standard story in which declines in home production hours freed up time for market work, total hours in the market fell relative to hours in the home from 1900 to 1960. The regression of the log hours ratio on the price ratio yields a coefficient of -0.034, suggesting

¹⁵ Technically, the rental cost of capital should be used rather than the price of capital. However, as long as there are no significant trends in the real interest rate they should have the same trends.

¹⁶ Tests cannot reject a unit root in either variable, nor can they reject noncointegration. Given its questionable statistical properties, the results from this regression should be viewed merely as suggestive.

that the price ratio has virtually no impact on the ratio of market hours to home production hours. This result is consistent with Ngai and Pissarides' (2007) model, or with a more simple model with Cobb-Douglas preferences and Cobb-Douglas technology for home production. The advantage of this latter theory is that it can also explain the cross-sectional evidence indicating no relationship between time spent in home production and the presence of utilities and appliances (Vanek (1973), Bittman et al (2004)).

Let us briefly consider two leading alternative explanations for why home production did not fall during the diffusion of appliances. The first argues that the diffusion of appliances compensated for the decrease in servants. As Ruth Schwartz Cowan points out in her 1983 book *More Work for Mother*, in the pre-appliance era many families hired laundresses or sent out their laundry to commercial facilities. Because of the large waves of immigration during the early part of the century, the real price of hiring full-time or part-time help was relatively low. At the same time that appliances diffused, immigration restrictions were imposed and the number of domestics employed fell precipitously. In fact, Lynd and Lynd (1929, footnote 23) quote two business class wives in the 1920s as saying "My labor-saving devices just about offset my lack of a maid." Figure 5 quantifies this effect by showing housework hours per household including time spent by servants.¹⁷ Servant hours per household amounted to eight hours per week in 1900 but had declined to only one hour per week by 1950. Thus, it is possible that the time-saving from appliances merely replaced servant hours.

A second leading explanation is due to Mokyr (2000). Mokyr argues that the failure of labor-saving appliances to save labor during this period was the result of a different type of technological progress: the revolution in sanitation and cleanliness, the germ theory of disease, and knowledge about the consequences of nutrition for health. Mokyr presents evidence and a

model suggesting that at the very time electric appliances were diffusing, the public became aware of the importance of cleanliness and nutrition for families' health. Thus, the demand for housework rose just as the appliances were introduced.

Whatever the explanation, it appears that the data are not consistent with the “engines of liberation” explanation of increases in women’s labor force participation. Prime-age women’s housework fell by ten hours from 1900 to 1965, but that fall was matched by an increase in men’s hours. Thus, total housework time barely changed during the era of the most rapid diffusion of appliances.

VIII. Conclusions

This paper has developed new estimates of time spent in home production from 1900 to 1965 and then linked them to the nationally representative estimates from 1965 on. The new estimates are based on early 20th Century time use studies of thousands of individuals. For housewives, I estimated the determinants of housework time using detailed data from early tabulations. The estimates from these regressions were then used to produce nationally representative estimates. Estimates were also collected for other segments of the population, such as single employed women, married employed women, men, children and the elderly, and used to form aggregate estimates of time spent in home production.

The new estimates contradict the beliefs of many economists. In particular, time spent in housework by housewives barely changed during the period of rapid diffusion of electricity, indoor plumbing and appliances. For all prime age individuals, average time spent in housework did not begin to fall until after 1965. Even from 1965 to 2005, the fall was modest.

¹⁷ See the data appendix on how hours by servants was estimated.

Hours in home production per household fell by 41 percent from 1900 to 2005. However, the number of people per household also fell by 44 percent during this period. Thus, per capita time spent in home production was virtually unchanged during the 20th Century.

The data show a strong positive relationship between the capital-labor ratio in home production and the ratio of wages to appliance prices. On the other hand, the correlation between the ratio of market hours to home hours and the wage-appliance price ratio is essentially zero. I have shown that these two relationships are consistent with a unitary elasticity of substitution between capital and labor in home production. This theory can also explain the absence of a relationship between appliances and hours spent in home production in cross-sectional data.

Appendix A. Data Sources

Variables for Constructing Nationally Representative Estimates:

Estimates of population by age-sex-marital status groups, the number of children under 18 and the fraction of women with children under one and between one and five are estimated from the IPUMS version of the Census. The variable *momloc* is used to link women with their own children. All estimates are for the noninstitutional population. The fraction who have completed eight grades or less of education are taken from the Census from 1940 on. Based on the low high school attendance early years of the century, I assume that the fraction with less than or equal to an eighth grade education is 95 percent for 1900. I then interpolate between 1900 and 1940.

To create total hours spent in housework, I used employment-population ratios and fractions of the population by age and gender. The following is a description of the procedures used.

1. For the period from 1900-1920, I used decennial census estimates of population and labor force (*labforce*) by gender from IPUMs. To convert labor force to employment, I used Weir's (1992) unemployment estimates. The 1930 Census gives employment and labor force numbers. According to the 1930 data women's unemployment rates were 78% of men's unemployment rates. I assume the same ratio for the earlier years. The census of 1910 was known to have overcounted female employment in agriculture because of the nature of questions asked, so I do not use information from that census. For 1930 – 1940, I use *empstat* to calculate employment numbers.
2. To interpolate between decennial numbers between 1900 and 1930 in a way that captures the cyclicity of employment, I first calculate the annual ratio of total employment (from Kendrick) to the population ages 14 and over. Second, I calculate the ratio of the decennial employment-population ratio for each age and gender group relative to the Kendrick-based number. Third, I interpolate the ratio and then multiply it by the Kendrick number to obtain an estimate of annual employment-population ratios for each group.
3. For 1930 – 1940 I have annual CPS employment numbers, but not by gender and not by age. I use the CPS employment-population ratios to interpolate the ratios for each of the groups.
4. For 1940-1947, I have annual CPS employment numbers by gender. I use the implied ratios to interpolate for each of the groups.
5. For 1948 on, I have annual CPS civilian employment numbers by gender and age. I add military employment by gender to the 18-64 age group. The military data are from Mini Historical Statistics and official DOD data.

Definitions of Home Production from the AHTUS and BLS Surveys

AHTUS 1965, 1975, 1985: I define home production as the sum of codes tmain20 –tmain37, tmain39, tmain40, tmain95, tmain96.

BLS 2003-2005: I first extract gardening from “lawn and garden.” According to the 1992-94 survey, gardening was 19 percent of the sum of outdoor chores and gardening. Thus, for 2003-2005, I assume that gardening was 19 percent of exterior cleaning, lawn and garden, and pool care. Home production is defined as the sum of 1st tier codes 2 + 3 + 7 + 8 + 9 + 10 plus travel codes 17.2., 17.3, 17.7, 17.8, 17.9, 17.10, less the adjustment for gardening, pet care (2.6), and playing with children (3.1.3, 3.1.4, and 3.1.5). (The travel codes for the 2005 survey are 18.2, 18.3, 18.7, 18.8, 18.9, and 18.10.)

Data for Figures 3, 4 and 5

The number of households and population are taken from Mini Historical Statistics and updated from the census.

The capital series is the quantity index for appliances from the BEA and the home production series is the average time spent in home production per capita multiplied by the noninstitutional population. Since aggregate wage data are difficult to obtain historically, I use labor productivity measured as GDP divided by total hours worked. Average wages and labor productivity should have the same trends in equilibrium. The hours worked series is the one constructed by Ramey and Francis (2007) based on Kendrick data and CPS data. Finally, the price of appliances is based on the nominal and chained appliance investment series from the BEA.

Servant hours were estimated as follows. I use estimates of numbers of servants in private households from *Historical Statistics* series Ba1396 by decade, with missing values filled in by my calculations from IPUMS. For 1900, I use Stigler’s (1946) estimate that servants worked 60 hours per week. For 1940 on, I estimated hours from IPUMs and interpolated between decades.

Appendix B. Reconciling Estimates from the Farm Surveys and the Purnell Studies

As discussed in the text, the Department of Agriculture also conducted large-scale surveys of farmers’ standards of living (Ward (1920), Kirkpatrick (1926, 1971). Ward studied 10,000 farm women and estimated an 11.3 hour work day averaged over summer and winter (excluding Sundays). Kirkpatrick studied 2,886 white farm families in 11 states and found an almost identical 11.4 hour work day (excluding Sundays). Kirkpatrick (1926, pp. 47-48) describes how this estimate was obtained:

The average length of work day (excluding Sundays) for the operator and the home maker is determined from estimates of the time reported for beginning and for completing the day’s work in summer and in winter. The hours from which this average was obtained start with the time of beginning work in the morning and end with the completion of chores or of household or other tasks in the evening. Time spent at meals and in reading or other rest during the day was excluded before the average was taken in each instance.

These estimates suggest that farm women worked much longer than the subsequent time diary studies indicate. I will now demonstrate that the difference is due to definitions and estimation techniques.

The first difference is that the surveys exclude Sundays, whereas the time diary studies included Sundays in the averages. Thus, to compare the estimates we need to convert the time diary estimates to ones that exclude Sunday. Fortunately, this is possible in Wilson's study. The calculations following Table 4 of Part II of Wilson's (1930) complete report shows the following breakdown of activities:

	Homemaking	Farm Work	Other Work
Hours Spent on Sunday	4.43	1.05	0.02
Average per day Mon-Sat	7.85	1.70	0.15

Thus, Wilson's study indicates that time spent on homemaking and other work was 9.7 hours per day excluding Sunday. This compares to the Kirkpatrick and Ward estimates of 11.3 or 11.4 hours per day. Hence, there is still a difference of 1.6 hours per day.

Most of the rest of the discrepancy can be explained by the method used to estimate the workday in the surveys. We do not have the necessary information to convert the surveys to the more reliable time diary methods. However, we can do the reverse by applying the survey method to the time diary samples. In particular, we can measure the time between starting work and stopping work, and subtract eating meals, rest and reading as described by Kirkpatrick (1926). According to the USDA (1944) study, for farmwives, the average time of starting work was 6:25 a.m. and the average time of stopping work was 8:00 p.m. Thus, the total time between starting work and stopping work was 13.5 hours. According to Wilson (1929, Table XXXIV and Table XXXVI) the average (over all 7 days) daily time spent in resting or sleeping during the day was 0.4 hours, in eating meals was 1.3 hours, and in reading was 0.96 hours. We would expect the average to be lower on weekdays than on Sunday, but we were not able to find estimates that distinguish by day of week. If we subtract the combined total of 2.7 hours spent in these activities from the length of the day, we would obtain an estimate of hours of work of 10.8, which is only slightly lower than Ward and Kirkpatrick's estimates. Their method of estimating work as the residual after subtracting eating, resting and reading overestimates the amount of work done because it does not take into account time spent in personal care time as well as leisure activities, such as telephoning and informal socializing. Telephoning, correspondence and informal socializing accounted for 1.2 hours per day (including Sunday) for farm wives (Wilson (1929, Table XXXVI)).

To summarize, the Department of Agriculture surveys suggest a much longer workday than the time diary estimates. However, I have shown that the rough approximation method used in those surveys leads to an over-estimate relative to the more reliable time diary method.

Appendix C. The Middletown Study

The Lynds' (1929) famous study of "Middletown" has also been used as a source for estimates of time spent in home production (e.g. Greenwood and Vandenbroucke (2005)). Thus, it is useful to consider how home production was estimated in this study. In 1924, the Lynds' conducted extensive interviews of women who were "business class" and "working class." They

used recall methods to ascertain the amount of time spent in housework, which they defined as “routine cleaning, preparing of food, etc., exclusive of “extra” cleaning or baking or laundry work” (Lynd and Lynd (1929), footnote 19, page 168). Constructing estimates from the intervals they provide suggests that the average time spent on meals and routine cleaning was around 6 hours per day for the working class wife and 5.5 hours for the business class wife. Thus, the Middletown study does not give an estimate for all home production, just a few categories. Their estimates were as follows. On an average weekday, of the 112 working class wives, seven percent spent less than four hours a day, 69 percent spent between four and seven hours per day, and 24 percent spent more than seven hours per day. Of the 40 business class wives, 23 percent spent less than four hours per day, 55 percent spent between four and seven hours per day, and 23 percent spent more than seven hours per day. Based on these interval estimates, the average time spent on meals and routine cleaning is around 6 hours per day for the working class wife and 5.5 hours for the business class wife.

How do these estimates compare to the farmwife studies? According to Wilson (1929, page 18), the average farmwife spent 3.8 hours on preparing and cleaning up meals and routine cleaning and straightening of the house. Thus, the estimate for farmwives is *lower* than both the working class and business class wives of Middletown. This difference is surprising, given that the farmwives in the sample had little paid help (only 0.3 hours per week on average), few modern conveniences (only 28 percent had electricity), and little access to market produced goods and services. In contrast, the Lynds emphasized the use of appliances and market produced goods and services in their sample. Also, 90 percent of the business class housewives had some paid help during the previous year and one-third of the business class housewives had full-time servants (Lynds (1929), page 170).

What explains the higher estimate for Middletown than for the farmwives? The most obvious explanation is the one discussed in the text: recall methods lead to substantial overestimates of time spent relative to time diary estimates. When asked about typical weekdays, it is likely that the Middletown interviewees overestimated the time spent in meals and cleaning because they did not subtract out other distractions, such as childcare and informal socializing. A second possibility is that the Middletown families in the sample really did spend more time on meals and cleaning because their households were bigger. According to the Lynds, the average size of family in Middletown was 3.8 persons in 1920. Yet because the Lynds only chose families with at least one child of school age, their sample of business class families had 4.7 persons and the working class families had 5.4 persons. Thus, their families were noticeably larger than average relative to the typical Middletown family. On the other hand, Wilson’s farm families averaged 4.17 persons, of which 3.87 were members of the family. (The rest were farm help and boarders.) Bryant (1996) estimates that while the average household size on farms was 4.2, the average household size nationwide in 1925 was 4.0 persons. Thus, Wilson’s families were closer to the national average in terms of size.

In sum, we have two reasons to think that the estimates from the Middletown study may be high relative to the national average. First, the survey method is not as accurate as the time diary method. Second, the Middletown families were much larger than the national average.

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Table 1. Classification of Activities in Time Use Studies

Activities always classified as home production	Activities that are sometimes classified as home production
Food activities, including preparing meals, clearing away, refreshments for social affairs, preservation of food (excludes eating meals)	
Care of house and surroundings, including cleaning, care of fires, making, installing and repairing.	Fruit and vegetable gardening is classified as work in the early studies (which focused on farmwives). Gardening is not separated from outdoor chores such as yard cleanup and pool care in BLS time use studies from 2003 on.
Care of clothing, including washing ironing, mending, sewing	
Physical care of household members, including care of children and adults Supervising children Teaching children	Care of nonhousehold members is classified as leisure in the early studies Playing with children “for their sake” was classified as home production in the early studies. Taking children “for outings or to play games” was classified as leisure.
Managerial activities, such as food purchasing, planning and recording finances, supervising work of household	
Travel associated with homemaking	

Classifications from Leeds (1917, pp. 37-67), Wilson (193-), Part I, pages 59-64; Wilson (1929) Table XXXIII – Table XXXII, and USDA (1944), page 6 and Table 7 footnotes.

Table 2. Purnell Act Time Diary Studies of Homemakers

Study	Year of Study	Sample Size	Average weekly hours spent in home production
USDA (1944)	1924-1931	559 249 282 410	51.7 (farm) 51.5 (rural nonfarm) 49.5 (small cities) 47.1 (large cities)
Wilson (1929, 1930)	1926-1927	288 71 154	51.6 (farm) 54.8 (rural nonfarm) 51.5 (town)
Whittemore & Neil (1929)	1926-29	102	54.1 (farm)
Kneeland (1928)	1928	700	52.3 (farm)
Arnquist & Roberts (1929)	1929	137 21 39	53.0 (farm) 53.9 (rural nonfarm) 52.7 (town)
Crawford (1927)	1927	49 32	62.7 (farm) 58.6 (town)
Richardson (1933)	1929-31	91	53.7 (farm)
Wasson (1930)	1930	100	53.8 (farm)
Warren (1940)	1936	497	52.1 (farm)
Dickens (1945)	1943	57	52.1 (town)
Muse (1944)	1943	183	56.5 (farm)
Cowles & Dietz (1956)	1953	85	52.8 (farm)

Note: These estimates do not include time spent on farm work.

Table 3. Hours per Week in Types of Home Production by Select Groups of Housewives

	1920s Farm Housewives USDA (1944)	1920s Town Housewives Wilson study (193-)	1965 Housewives AHTUS
Total home production	51.7	51.7	52.2
Food preparation	23.5	19.9	16.5
Care and cleaning of house and grounds	9.6	9.3	9.5
Care of clothing	11.3	11.5	6.9
Care of family	3.9	6.5	8.5
Purchasing, management, travel, other	3.3	4.4	10.8
Number of persons in household	4.3	4.1	4.1
Number of observations	559	154	536

Table 4. Determinants of Home Production Time in the 1920s
Dependent Variable: Housewife's Weekly Hours Spent in Home Production

	(1)	(2)	(3)	(4)
Constant	51.56 (1.46)	56.02 (5.49)	43.09 (1.62)	43.21 (2.32)
Nonfarm rural	3.30 (3.28)			
Town	-0.033 (2.47)	-1.67 (0.99)		
Number of adults		-3.65 (2.04)		
Number of children		1.64 (0.43)	2.03 (0.48)	2.02 (0.50)
Youngest under 1 year old		14.77 (2.09)	16.76 (2.38)	16.77 (2.45)
Youngest between 1 and 5 years old		5.62 (1.09)	6.89 (1.38)	6.88 (1.42)
Fraction with Elementary education or less			6.58 (3.45)	6.41 (4.24)
Fraction with electricity & plumbing				-0.132 (1.85)
Number of observations	513	513	442	442
Number of cells	35	35	25	25
R²	0.033	0.85	0.87	0.87

Data are from Wilson (193-), Part II, Tables 49, 56, 115, 127.

Standard errors in parenthesis.

**Table 5. Estimates of Home Production: Nonemployed Women, Ages 18-64
Hours per Week**

Year	Total		Total, excluding playing with children	Total, including playing with children
	Married nonemployed women	All nonemployed women	All nonemployed women	All nonemployed women
1900	57.7	56.2		
1910	56.4	55.2		
1920	55.1	54.3		
1930	53.5	52.9		
1940	52.0	51.4		
1950	51.7	51.5		
1960	51.9	52.0		
1965			52.1	52.6
1975			40.9	41.3
1985			36.8	37.5
2003			36.6	37.9
2004			36.9	38.6
2005			37.5	39.1

The estimates in the first two columns are based on applying the coefficients from the regression in Table 2, column (4) to demographic data. The last two columns are based on nationally representative time use data from the AHTUS and BLS.

**Addendum: Characteristics of nonemployed females ages 18-64
used for constructing estimates**

Year	Fraction with youngest child under age 1	Fraction with youngest child between 1 and 5	Number of own children ages 0-17 in household	Fraction with elementary or less education
1900	0.11	0.26	1.61	0.95
1910	0.10	0.25	1.51	0.85
1920	0.09	0.26	1.49	0.74
1930	0.07	0.23	1.37	0.63
1940	0.06	0.21	1.16	0.54
1950	0.09	0.26	1.18	0.42
1960	0.11	0.27	1.51	0.32
1970	0.08	0.24	1.39	0.27
1980	0.09	0.23	1.20	0.17

Table 6. Summary of Nelson's Study of Working Girls in 1931-1932

A. Sample Attributes

	Total	Business Girls (secretaries, stenographers,clerks)	Professional Girls (teachers, nurses, librarians)
Usable observations*	1,079	938	141
% metropolitan	64%	66%	50%
Average age in years	24.7	24.4	26.4
Average wage	\$25.0	\$24.1	\$31.1
Education		Primarily high school graduate 12% had some college 2% college grads	59% had some college 24% college grads
Percent single	93%	93%	93%
Living arrangements	79 % at home 10.5% in own or shared apartment 10.5% in boarding houses	82% at home	61% at home

* The response rate was 37%

B. Time Use Estimates

Time Use Category	Business Girls	Professional Girls	Single Girls	Married Girls
1. Work	40.1	36.9	41	41
2. Commute	7.3	5.0	7.3	7.3
3. Household Responsibilities	3.7	4.2	3.5	8.8
4. Shopping	1.6	1.8		
5. Sewing	0.7	0.5		
Total home production (3 + 4 + 5)	6.0	6.5		

Table 7. Estimates of Weekly Hours Spent in Home Production: Women Ages 18-64

Year	Ever Married Employed Women	Single Employed Women	All Employed Women	Nonemployed Women	All Women
1900	27.2	7.0	14.4	56.2	49.1
1910	26.7	7.0	15.7	55.2	47.6
1920	26.3	7.0	15.2	54.3	46.2
1930	25.6	7.0	15.9	52.9	43.4
1940	26.1	10.0	18.4	51.4	42.4
1950	28.3	13.0	23.8	51.5	41.2
1960	29.1	16.0	26.3	52.0	40.9
1965	29.3	17.5	27.2	52.1	39.5
1975	25.8	15.4	24.5	40.9	32.4
1985	26.9	14.5	23.9	36.8	28.8
2003	26.5	17.1	24.1	36.6	27.9
2004	26.2	17.3	23.9	36.9	27.8
2005	25.8	17.6	23.6	37.5	27.5

Addendum: Auxiliary Information for Constructing Hours in Home Production

Year	Fraction of employed women who are single (never married)	Fraction of women ages 18-64 who are employed
1900	0.64	0.17
1910	0.56	0.19
1920	0.57	0.21
1930	0.52	0.26
1940	0.48	0.27
1950	0.30	0.37
1960	0.21	0.43

Table 8. Estimates of Weekly Hours Spent in Home Production: Men Ages 18-64

Year	Employed Men	Nonemployed Men	All Men
1900	3.0	11.9	3.9
1910	3.0	11.9	3.9
1920	3.0	11.9	3.9
1930	5.0	11.9	5.9
1940	6.6	14.0	7.8
1950	8.2	16.2	9.1
1960	9.8	18.3	10.7
1965	10.6	19.4	10.9
1975	11.2	18.1	12.0
1985	13.3	18.4	14.2
2003	14.4	20.2	15.3
2004	14.4	19.4	15.2
2005	14.5	19.1	15.3

Table 9. Estimates of Weekly Hours Spent in Home Production by Age Group

Year	Ages 0 -17	Ages 18-64	Ages 65+	Ages 18+	All Ages
1900	2.5	25.8	20.9	25.5	16.2
1910	2.5	24.8	21.9	24.6	16.2
1920	2.5	24.5	21.6	24.3	16.2
1930	2.6	24.5	22.2	24.3	16.7
1940	2.7	25.2	24.0	25.0	18.2
1950	2.3	25.4	25.1	25.4	18.2
1960	2.4	26.1	26.8	26.2	17.7
1965	2.6	25.9	26.9	26.0	17.5
1975	2.7	22.8	24.0	22.7	16.4
1985	2.8	21.9	24.0	22.0	16.9
2003	2.6	21.8	24.7	22.3	17.2
2004	2.6	21.7	24.4	22.1	17.1
2005	2.6	21.5	23.4	21.8	16.9

Addendum: Noninstitutional Population by Age Group

Year	Fraction Ages 0 -17	Fraction Ages 18-64	Fraction Ages 65+
1900	0.40	0.56	0.04
1910	0.38	0.58	0.04
1920	0.37	0.58	0.05
1930	0.35	0.60	0.05
1940	0.31	0.63	0.07
1950	0.31	0.61	0.08
1960	0.36	0.55	0.09
1965	0.36	0.55	0.09
1975	0.31	0.59	0.10
1985	0.27	0.62	0.11
2003	0.26	0.62	0.12
2004	0.26	0.62	0.12
2005	0.25	0.63	0.12

Figure 1. Average Weekly Hours in Home Production by Individuals Ages 18-64

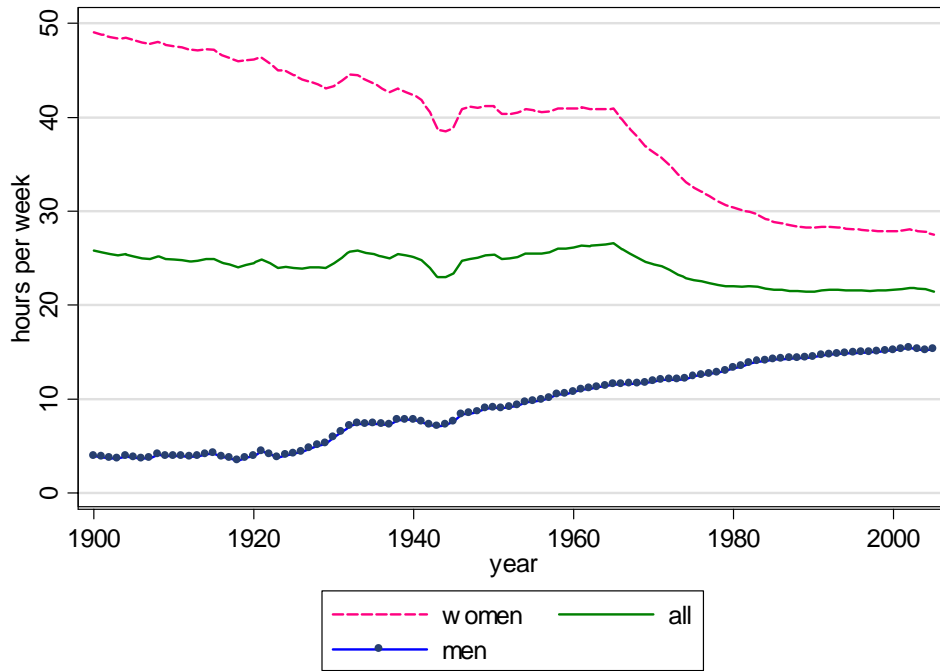


Figure 2. Average Weekly Hours in Home Production for Two Aggregates

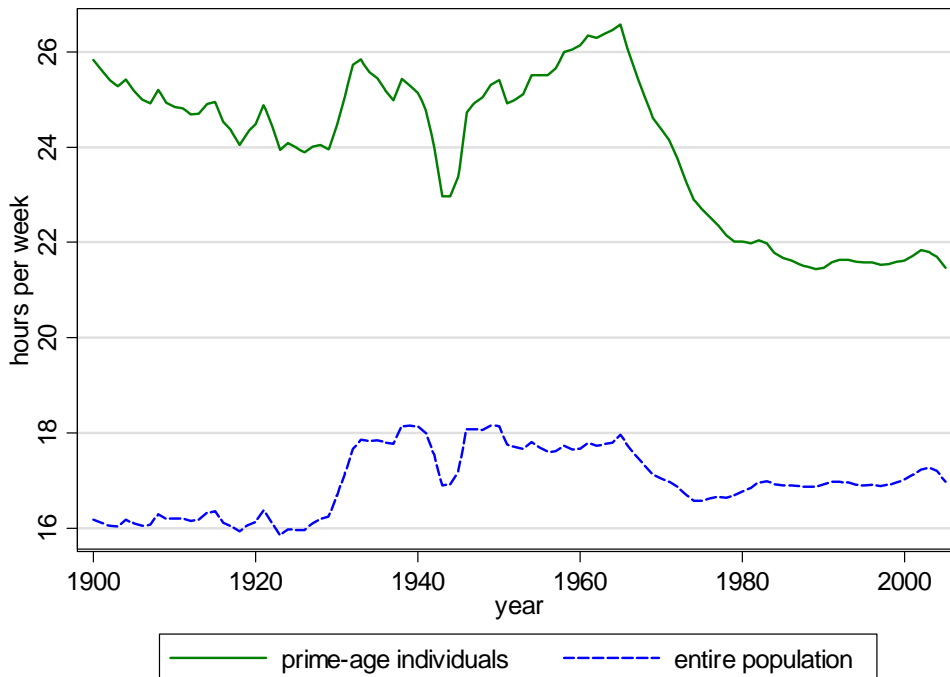
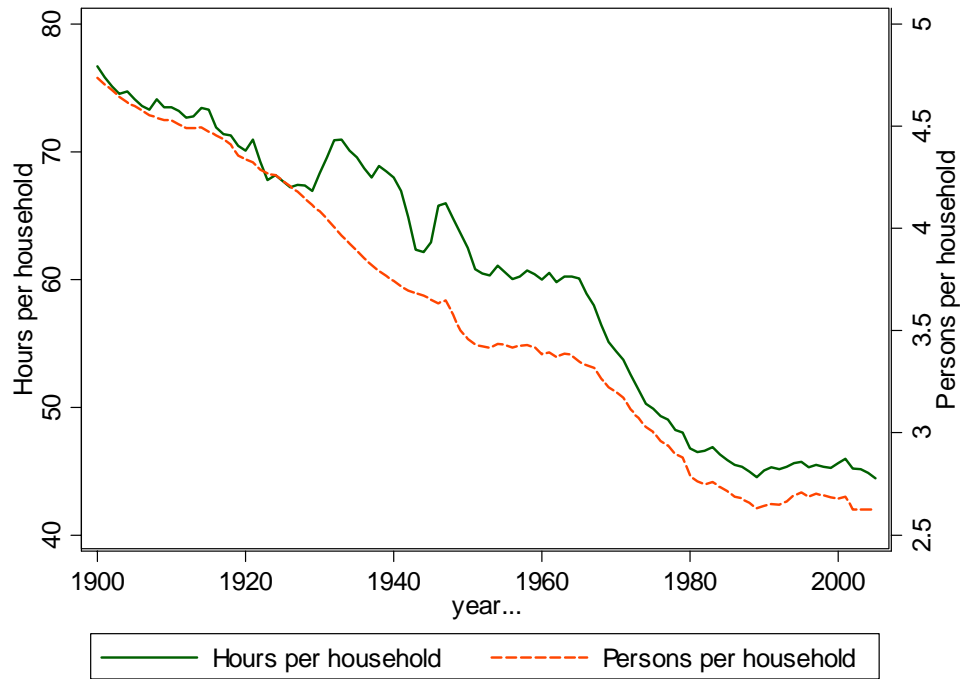
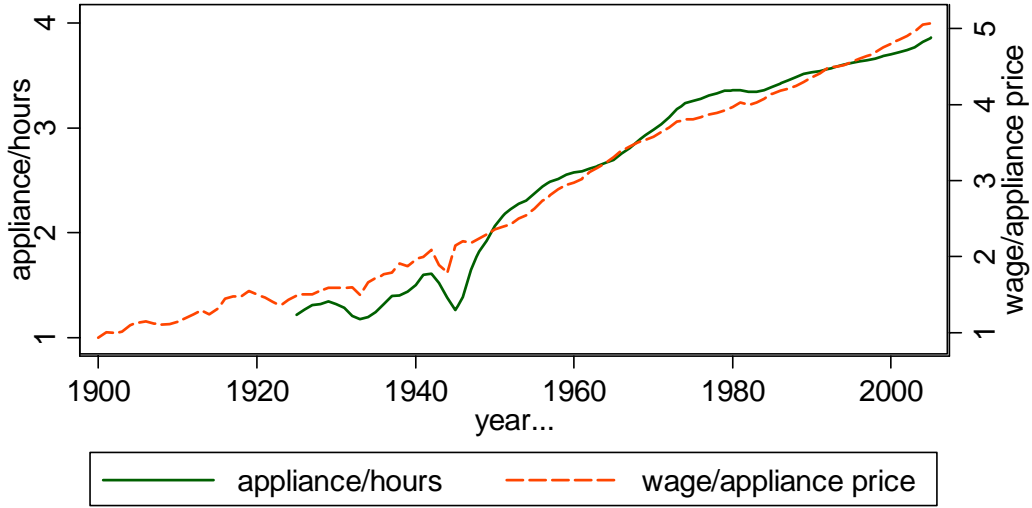


Figure 3. Housework Hours per Household versus Household Size



**Figure 4. Appliances, Home Production Time, and Wage-Price Ratios
(all variables in logarithms)**

A. Ratio of Appliances to Home Production Hours



B. Ratio of Market Hours to Home Hours

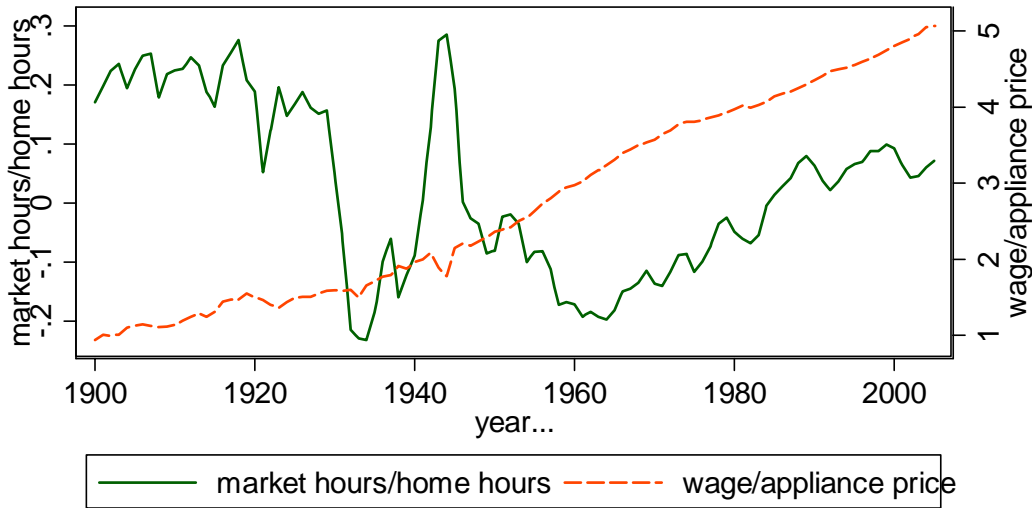


Figure 5. Housework Hours per Household Including Servant Hours

