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The Impact of Home Production on Economic Inequality in Germany

by

*Joachim R. Frick, Markus M. Grabka, Olaf Groh-Samberg**

Abstract

Using representative income and time use data from the German Socio-Economic Panel (SOEP), we estimate non-monetary income advantages arising from home production and analyze their impact on economic inequality. As an alternative to existing measures, we propose a *predicted wage* approach that relaxes some of the strong assumptions underlying both the standard opportunity cost approach and the housekeeper wage approach. We also propose a method of adjusting the number of hours spent on home production to reduce the bias arising from multi-tasking and joint production in time-use data. Sensitivity analyses comparing results among different approaches provide indications of method effects. Although this study supports the evidence that considering home production leads to a reduction in inequality we show that the size of this effect differs according to the variation in the mean and distribution of the estimated monetary value of home production across the three approaches. This finding underscores the need for a harmonized approach in cross-national comparative research.

Keywords: home production, non-cash incomes, economic inequality, well-being, SOEP

JEL-Codes: D31, D13, I32

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1 Introduction

Like other types of private in-kind income, such as imputed rent for owner-occupied housing and fringe benefits, *home production* improves household welfare without being reflected in the household's cash flow, either in disposable household income or in labor income (see Smeeding and Weinberg 2001). In distributional analyses, the omission of private in-kind incomes may lead to substantially biased results on economic inequality and poverty. Considering income from home production appears to be particularly important in a cross-national perspective, e.g., when comparing countries that differ with respect to subsistence economies or gender divisions of labor in home production (see Canberra Group 2001).

The aim of this paper is to quantify the value of non-cash income derived from home production and to analyze its impact on income inequality and poverty in Germany. Expanding the definition of home production to include *housework*, *errands*, and *private care* for children and elderly household members adds a significant percentage of the overall population as potential beneficiaries of such fictitious income. Estimates for Germany, based on a national time budget survey conducted in 2001/02 among persons aged 10 and over, show that the time spent on unpaid work amounts to as much as 25 hours per normal week, whereas the average number of hours spent in paid work amounts to just 17 hours (BMFSFJ 2003). These figures, of course, vary substantially by sex and age.¹ Given that the time spent on home production activities is usually estimated on a lower “wage rate” than paid work, the monetary value of unpaid work in private households typically ranges between thirty and fifty percent of GDP (Chadeau 1992; OECD 2006: 113). Thus, despite all the methodological and practical problems in deriving a monetary value for household production, one must assume that individuals do draw utility from these activities, which make a significant contribution to their economic wellbeing.

This paper proposes a new “predicted wage” approach to derive a “price” for non-market activities. We build on the existing literature by testing three different approaches to defining fictitious hourly wages, thus allowing for sensitivity analysis and robustness checks on the distributional impact of adding home production. We compare results obtained from a “housekeeper wage” approach (which assigns a uniform wage to all household workers), an “opportunity cost” approach, and a “predicted wage” approach. While the latter two methods

allow for individual variation, we propose the “predicted wage” approach as a robust measure of the monetary value of home production that avoids some of the strong assumptions underlying the established procedures. In contrast to the standard opportunity cost approach, the predicted wage approach consistently assigns a *predicted* hourly wage rate to all adult household members, regardless of their current employment status and wage rate. Thus, the predicted wage measure accounts for individual differences in characteristics related to productivity and opportunity costs, but it avoids the strong assumption of a completely free choice between paid and unpaid work that underlies the opportunity cost approach. Arguing that the predicted wage approach is preferable to the other two from a theoretical standpoint, we provide empirical results on the estimated impact of household production on income inequality based on German data.

We are the first who provide evidence on the distributional impact of home production activities on the German economy, along with a series of sensitivity and robustness checks. Like most of the previous literature on home production, we employ time-use data to estimate the amount and monetary value of home production. We conduct these estimates by multiplying the (adjusted) number of hours spent in home production by a fictitious hourly wage. We use detailed time-use data comprising a more comprehensive set of home production activities (including, for example, errands and childcare) for a typical workday, as well as for Saturday and Sunday. The data come from the 2009 wave of the German Socio-Economic Panel (SOEP), a representative household panel survey of the German population in private households. As the SOEP data contain detailed income information as well as individual time-use data for *all* adult household members during typical working and weekend days, they are well suited to estimating the impact of home production on income inequality for the *entire* population.

Moreover, we provide a tentative solution to the problem that time-use data do not make it possible to account for multitasking and for the fact that time spent on home production has to be seen as a mixture of productive time and leisure time, known as “joint production” (Graham and Green 1984, Kerkhofs and Kooreman 2003) or “activity benefit” (Gørtz 2007). We show that the assumptions underlying the specified functional form of joint production are implausible or at least arbitrary. Instead, we propose to make use of the fact that

¹ Roughly estimated, the total time spent on unpaid work equals the amount of time spent on paid work in OECD countries, with the bulk of this work being carried out by women (e.g., Swiebel 1999; OECD 1995).

the respondents also report the time spent on paid work and the time spent on leisure in order to top-code the reported hours spent in home production activities.

The paper is structured as follows. Section 2 discusses the various approaches that can be used to derive a money measure of home production based on output or consumption information or time-use data, and reviews previous literature on the distributional effects of home production. Section 3 describes the empirical implementation using recent micro data for Germany. Section 4 presents results on the distributional impact of fictitious income from home production on income inequality and poverty obtained using different approaches. Section 5 concludes.

2 Measuring Home Production and its Distributional Impact – Theoretical Framework and Literature Review

Attempts to estimate the monetary value of home production and to explicitly consider this important contribution to the “wealth of nations” have a long history in national accounting, dating back to the nineteenth century and the pioneering work of Margarete Reid (1934). This strand of research aims to incorporate monetary measures of home production into a macro-economic accounting framework in order to evaluate the contribution of unpaid work—in particular women’s housework—to the German economy (see, e.g., Ironmonger 1996; Blundell et al. 1994; Gronau 1980).

Once such a measure has been identified, the question arises to what extent income inequality and poverty might be affected by including the economic benefits of home production in the underlying measure of economic well-being. Table 1 provides an overview of previous studies analyzing the distributional impact of home production. There is wide variation in the type of data used, the restrictions on the kind of home production activities considered, the populations addressed, and the approaches chosen to derive a monetary value for these activities. Accordingly, the estimated contribution of fictitious income from home production, measured as a percentage of the baseline cash income, varies from some 13% to more than 200% (last column in Table 1). Notwithstanding this variation, however, most of the studies (except the earliest ones) find a significant reduction in income inequality once non-cash income from home production is added to household cash income. In the following, we briefly review this literature, focusing on the various approaches used to estimate the monetary value of home production activities.

Expenditure data: In principle, several approaches can be used to derive a monetary measure of home production. First, *expenditure or consumption data* may provide a straightforward way to define the monetary value of products and services provided by the household for its own consumption (“output” approach). The rationale behind this approach is that the income advantage of home production equals the price of similar products and services that one would have to pay for on the market. However, detailed information on the quantity and quality of the products and services produced by the household is required to accurately calculate the market value of home production output. Such data are, however, almost entirely nonexistent. In fact, to the best of our knowledge, there is only one study that effectively employs the output approach to estimate the distributional effect of home production. Koutsambelas and Tsakloglou (2008) make use of the Greek Budget Household Survey, which contains self-reported information on the income from own-farm production and own non-farm production.² Most of the reported income from household production stems from the rural subsistence economy of small agrarian production. Indeed, the monetary value of own production derived from the Greek Budget Survey amounts to less than 2% of the baseline disposable cash income. The distributional effects are similarly small.

Time budget or time-use data: In the absence of expenditure data, the most common way of imputing a value for home production is to multiply the time spent on home production activities by a fictitious hourly wage (“input” approach). This method requires data on time use and earnings of all household members, as well as household income. For information on time use, time budget surveys are usually considered more accurate and superior to time-use data (Bryant et al. 2004). Time budget data typically record the type of activities performed at short intervals (e.g., every 15 minutes); whereas time use information collected in population surveys typically is based on the average hours spent on a certain activity on a normal week or weekend day. Hence, time budget data make it possible to identify periods of multi-tasking (e.g., cleaning the house while watching the children) and the lengths of specific periods (e.g., doing housework two hours in the morning and again one hour in the evening) and cover 24 hours per day. In contrast, time-use data on various activities may well add up to more than 24 hours a day without providing information on multi-tasking, or add up to substantially fewer than 24 hours without providing information on what was done the rest of the

² It is of course possible to ask survey respondents for a subjective estimate of the monetary value of their own home production activities, including housework and childcare. Such a subjective approach, which is also commonly used in imputing the value of owner-occupied housing (see Frick et al. 2007b), might be appropriate for a more narrow notion of home production activities like subsistence production and do-it-yourself work, i.e., for activities that take the place of purchasing products from well established markets with well-known prices.

day. Thus, time-use data are considered less reliable—and generally upwardly biased with respect to home production activities—due to the reported subjective estimate of average hours of time use.

In the following, we describe the most commonly used approaches to derive a fictitious hourly wage and, based on that, the price of home production activities.

Housekeeper wage: Given the time spent on home production activities, there exist two alternatives for determining the hourly wage rate to be multiplied by the amount of time. On the one hand, an hourly wage can be derived from the *typical wage* of employees in economic sectors that typically provide goods and services produced at home (“housekeeper wage”). It is also possible to assign different wages to each of the various activities that can be distinguished in the data, e.g., wages of nannies for childcare, wages of gardeners for gardening, etc (Franzis and Steward 2011). However, there will always be the question of whether the wages of skilled workers in the pertinent fields (“specialist approach”) or the wage rate of an unskilled worker in the household services economy (“generalist approach”) provides the more appropriate reference point (Schaffer and Stahmer 2006: 320f.; Jenkins and O’Leary 1996; Chadeau 1992).

In principle, the housekeeper wage approach results in applying a flat hourly wage to every person engaged in (a specific type of) home production activity. Thus, the underlying rationale is largely comparable to the market value approach, which is based on expenditure and consumption data. The imputed monetary value is thought of as a market price, but instead of detailed information on the goods or services produced, the numerical product of the time used to produce these goods and services is used together with a certain (pseudo-)market wage rate to determine this value.³

However, above and beyond ignoring the quality of the product, this procedure imposes the strong assumption that there is no variation in individual productivity, so that the time spent on home production by a professional or specialist is equal to the time spent by an amateur. That is, two hours spent repairing a washing machine will produce an outcome of the same monetary value, no matter whether the appliance was fixed by a professional mechanic or a retiree—or whether the ambitious home handyman spent two hours on it in vain and finally bought a new one.

3 As such, the housekeeper wage approach directly mirrors Reid’s (1934) initial definition of housework as the production of goods and services that could have been purchased on the market (“third-person criterion”).

Opportunity cost: In contrast to the “market value” or “housekeeper rate” approach, in the *opportunity cost* approach the hourly wage is determined by the forgone individual earnings that workers would have obtained if they had done the work on the labor market instead of in home production. The rationale behind this method clearly differs from the previous ones. In the standard opportunity cost approach, it is assumed that, in order to satisfy a given set of needs for home production activities, people have a choice between (a) buying these products and services on the market in exchange for the individual labor earnings from paid work, and (b) providing these goods and services on their own. If the amount of time in paid work that is required to earn the market price of home-produced goods and services is less than the amount of time needed to provide these goods and services on one’s own, then option (a) “earn & buy” is more profitable than option (b) “do it yourself”. Thus, the main advantage of this approach is that it refers to the *individual’s* capacity to earn money as well as, at least indirectly, the *individual’s* productivity in home production. Contrary to the housekeeper wage approach, this implies that one hour spent by a professional to repair the washing machine is worth less than one hour spent by a home handyman—because the handyman is assumed to repair his washing machine himself only if he would otherwise earn less than the price of hiring a professional to repair it. In the words of Frazis and Stewart (2006: 10; 2011: 8): “It is hard to imagine that a lawyer is five times more productive building a deck than a carpenter.”

However, the standard opportunity cost approach imposes the very strong assumptions that individuals have a free choice of working unlimited hours in their paid job (see Franzis and Stewart 2011: 8; Zick et al. 2008: 5f.; Frazis/Stewart 2006: 10f.; Kooreman and Wunderink 1997: 113ff.). In general, this is not the case, since workers cannot usually increase their paid working hours at will.⁴ Moreover, for the population beyond working age, as well as for the unemployed and otherwise non-working individuals, there are no *stricto sensu* opportunity costs because these individuals do not have the option to “earn & buy” instead of “do it yourself” (Zick and Bryant 1990: 147). This is why predicted wages, typically derived from Heckman-type selection correction regressions, are used to estimate the opportunity costs of home production activities for non-working adults. But even for individuals of working age, and even ignoring the unrealistic assumption of unlimited access to paid work, the choices between paid and unpaid work are highly interdependent in the household context and also depend on preferences, tax regulations, and other complex constraints. For example, families

with children below the age of three are often confronted with the decision of whether the mother should seek (part-time) employment and find some kind of childcare arrangement or household help or stay at home and care for the child herself. This decision depends not only on the virtually incalculable *net* monetary advantage of paid work (given a certain job opportunity), but also on individual attitudes, preferences, and social norms concerning motherhood and child-rearing,⁵ as well as on the availability of childcare arrangements (see, e.g., Wrohlich 2007 for a complex modeling approach to this decision).⁶ Thus, given the complexity of the decisions that would have to be modeled, and the unrealistic assumptions involved in the simple “free choice” framework, it is rather unlikely that we will arrive at proper estimates of the monetary value of home production based on the standard opportunity cost approach.

Predicted wage: Still, one main feature of the opportunity cost approach is that it can overcome the assumption of constant productivity across individuals, as in the housekeeper wage approach, and instead accounts for individual variation in productivity as well as—to a certain extent—in opportunities. In order to incorporate this idea into our measure of home production, we derive a rather simple estimate of the individual earnings capacity based on age, health, household constraints, skills and qualifications. This “predicted wage” can be calculated for every person independent of employment status, and shows much less variation than the observed hourly wages for those who are employed. Thus, the predicted wage approach assumes that a given individual exhibits an “average” productivity in any type of activity, be it home production or paid work. We argue that this approach is preferable over the other two approaches from theoretical perspectives, and empirically assess whether the choice of method does indeed affect the estimated impact on income inequality.

Review of Results: Reviewing the previous literature documented in Table 1, most of these studies find an inequality-reducing effect of home production. The only exceptions to this finding are the first three studies, which, while employing the opportunity cost approach, also apply rigid sample restrictions by excluding non-working households. Comparing the two main approaches, the opportunity cost approach yields larger incomes from home production, but a less pronounced leveling effect as compared to the housekeeper wage approach

⁴ One indicator of this restriction is the fact that overtime work in many firms is compensated for by leisure time, rather than by being paid, and there is a general trend towards unpaid overtime in Germany (Anger 2006).

⁵ For instance, Beblo (1999: 67ff.) shows that time allocation between German couples is not only determined by factors captured in the opportunity cost approach, but also by gender-specific relations of dominance, as indicated by the age difference between husbands and wives.

⁶ Moreover, this approach also assumes that individuals are perfectly informed about market prices and are able to precisely estimate the time they would need for certain kinds of home production tasks.

(with the only exception being Zick et al. 2008). Gottschalk and Mayer (2002) even included leisure time in one of their extended measures of economic well-being. This, of course, yields a fictitious income from home production more than twice as high as the baseline cash income.

The main result of a leveling effect of home production on economic inequality can be expected from standard economic theory, assuming that households with lower overall working hours will spend more time on unpaid work, to partly compensate for lower incomes (Kooreman and Wunderink 1997). Thus, extended income (i.e., disposable monetary household income plus income from home production activities) is assumed to be more equally distributed than monetary household incomes. However, in contrary to the expectation of a negative correlation between household income and home production, most studies found, if any, a rather positive correlation (Jenkins/O’Leary 1996; Gottschalk/Mayer 2002; Frazis/Stewart 2006, 2011). Frazis and Stewart (2006, 2011) showed that the leveling effect of home production is not explained by the variation in home production, but mainly by the addition of the mean value of home production to the baseline household income. In the paper at hand, we investigate this issue further, making use of the variation in both mean values and distributional patterns of income from home production as derived from the various approaches. Moreover, as all of the approaches discussed here are based on some set of rigid assumptions, and unless there is an otherwise convincing argument for either of them, it is probably best to apply different approaches (namely, the “housekeeper wage”, the “opportunity cost,” and the “predicted wage” approach) and to compare the respective results by means of a sensitivity check.

3 Deriving a Monetary Value of Home Production based on Time-Use data

For our analysis we use microdata from the German Socio-Economic Panel (SOEP) for the most recent survey year 2009. The SOEP is a wide-ranging representative longitudinal study of private households that provides yearly information on all household members, consisting of Germans living in the old and new German federal states, foreigners, and recent immigrants to Germany. The panel was started in 1984, extended to East Germany in 1990 immediately after the fall of the Berlin Wall. By 2009, after further additions, the survey sample consisted of roughly 12,000 households and 27,000 persons (see <http://www.diw.de/gsoep>; Wagner et al. 2007).

Time-use information: Multi-tasking and “joint production”

To derive a monetary measure of home production, we use the rather simple question of the average number of hours an individual spends on certain activities on a normal weekday, a normal Saturday, and a normal Sunday (see Schema 1). For our measure of home production, we consider the five categories *errands*, *housework*, *childcare*, *elderly care* (including care and support to non-elderly persons), and *repairs & gardening*. We compile the information provided for a normal weekday (multiplied by five), a normal Saturday, and a normal Sunday to arrive at the time spent on home production during a normal week.

As discussed above, the type of time *use* information included in the SOEP may be inferior to that obtained by time *budget* surveys due to the fact that multi-tasking activities are not accounted for. This will likely result in an overestimation of the time spent on home production since certain types of activities such as housework and childcare probably overlap to at least some degree. A second general problem discussed in the literature relates to the mixing of productive and leisure time, known as “joint production” (Graham and Greene 1984; Kerkhofs and Kooreman 2003) or “activity benefits” (Gørtz 2007). Home production activities provide utility not only in terms of the produced goods and services, but also in terms of satisfaction or “psychic income.” Childcare, for instance, has been found to be more enjoyable and satisfying than paid work based on data from the Swedish HUS survey (Hallberg and Klevmarken 2003). Moreover, the utility derived from home production activities might well exceed their pure market value due to the intrinsic value of enjoying the fruits of one’s own labor rather than purchasing something “anonymous” on the market—an extra benefit referred to by Gørtz (2007) as a “consumption benefit.”

In order to account for the fact that time spent on home production may be considered leisure time, at least to a certain degree, Graham and Green (1984) introduced a *jointness function* $g(\cdot)$, such that a person spending H hours on home production values $g(H)$ as a perfect substitute for leisure. Graham and Green suggested $g(\cdot)$ to be *increasing*, twice differentiable and concave in H , and that the first hour spent on home production should be considered a perfect substitute for leisure, whereas the value of $g(H)$ becomes zero with H approximating the total time available. However, this functional form for $g(\cdot)$ remains rather arbitrary. Considering, for example, a retiree spending six hours on gardening or someone spending long hours shopping on the weekend, a *decreasing* functional form of $g(H)$ more likely assumes that leisure time is increasing in importance. The general problem here is that time spent on home production might follow very different time regimes depending on the scarcity or abun-

dance of available time, which is not under the control of the individual (see also the above discussion on the opportunity cost approach). For retirees, unemployed persons, or those working at home on the weekend, the amount of time spent on home production activities might be *stretched* to some extent through breaks and relaxation (see Aslaksen and Koren 1996: 68) and essentially confounded with leisure. On the other hand, for young families and under conditions of time constraints, home production activities follow similar time regimes than paid work. The functional form of $g(H)$, as suggested by Graham and Green (1984) and further elaborated and applied by Kerkhofs and Koreman (2003) and Gørtz (2007), only applies to the latter.

As this paper aims at estimating the monetary value of home production and its distributional effects on the *entire* population—including retired and unemployed persons—we do not attempt to account for potential *jointness* of home production and leisure by imposing any functional form to $g(H)$. In fact, the effect of potential extra utility derived from home production seems to be rather small, if not at all negligible, as shown by the empirical results of Kerkhofs and Koreman (2003) and Gørtz (2007).

Given that we are employing time-use data, there is still the problem of *multi-tasking*. We attempt to account for this problem by top-coding the aggregate time spent on home production activities. The maximum number of hours considered for home production is given by 24 hours minus the reported time spent on *paid work*, the reported time spent on *leisure*, and a minimum of 6 hours for sleeping, eating, and recreation.⁷ If the aggregate hours reported for the five categories of home production exceed this maximum, we truncate the time measure for home production. Thus, we assume that the time spent on paid work does not overlap with time spent either on home production or leisure, but that time spent on leisure may very well overlap with time spent on home production activities. In other words, we assume that individuals reported hours for leisure time will—at least to a certain degree—already include the time spent on the “joint production” of home production and leisure.

Extent of Home Production

The total time spent on home production during a normal week is on average 29 hours per person (aged 17 and above) when top-coding the data as described above. As shown in Figure 1, time spent on home production varies significantly between sexes and across the life

⁷ There are only few cases of more than 16 hours reported for a single activity, in particular for childcare (162 cases with up to 24 hours spent on childcare). Furthermore less than 9% of all adults in Germany report that they usually sleep for less than 6 hours a night (own calculations based on SOEP data).

course. Generally, women spend more time on home production than men, in particular in the typical fertility and childcare life stage from age 28 to 45. After age 45, the hours spent on home production remain rather stable for the rest of life. For men, the overall level of home production activities is much lower and the life-course pattern is somewhat different. The peak in home production activities at about age 34 is much lower and somewhat shorter than for women. However, from age 50 onwards, there is a small but steady increase in the time spent on home production. This is most likely due to an increased involvement in home and garden activities after retirement.⁸

Concerning other individual characteristics (see Table 2), married individuals engage in home production significantly more often than the population average, and substantially more often than singles. Also, the gender differences are strongest for married couples, and almost nonexistent for widowed persons. The gender differences also increase with (self-rated) health status: for women, there is a positive correlation between health and home production, whereas for men there appears to be a U-shaped pattern. We also observe a slightly U-shaped pattern for education, whereby individuals with intermediate education spend more time on home production activities than individuals with high and low levels of education. Finally, the unemployed spend the highest number of hours on home production activities compared to those in the labor force or in training.⁹ There are strong gender differences for the unemployed, the marginally employed, and part-time employed people, whereas there are almost none for those employed full-time.

On the household level (see Table 3), the average time spent on home production activities is 53 hours per household and week, before top-coding, and 49 hours per week after top-coding. A closer look at the disaggregated number of hours spent on each of the activities (before top-coding) reveals that housework is the most important single activity (19 hours/week), followed by childcare (13 h/w), errands (11 h/w) and repairs and gardening work (8 h/w). Nursing care for elderly persons or invalids in the household is rather rare (1.7 h/w on average), however, very time consuming for households with persons in need of care (19 h/w). Housework and errands are distributed rather uniformly across different household types, with the exception that rental households, households that do not have a yard or garden, and urban households spend significantly less time than others on housework and errands.

⁸ See Lewis et al. (2008) for a gender-specific analysis of the patterns of paid and unpaid work in Western Europe. While Lewis et al. focus on childcare as the main unpaid activity of parents in two-parent families, their results are by and large in line with those presented here using a wider definition of home production activities in the total population.

Even more so, activities related to repairs and gardening work are much more prevalent among homeowners, households with a yard or garden, and rural households. Thus, certain types of accommodations and living conditions will more likely create a need (as well as an opportunity) for home production activities. This applies, of course, to childcare activities as well, which are most likely to take place in households with children below the age of 14. These households also spend more time on housework. There is likely to be a certain degree of overlap between housework and childcare activities, which cannot be revealed by means of our time-use data.¹⁰ However, the difference between the raw reported hours spent on home production activities and the top-coded figures can be interpreted as an indication of multi-tasking. This difference is about three hours per week, on average, and strongest for households with children (with 17 h/w).

Deriving fictitious hourly wages

In the following empirical analysis, we apply three different approaches to monetarize the value of home production activities: the housekeeper wage approach, the opportunity cost approach, and the predicted wage approach. For sensitivity purposes, we use two variants of housekeeper wages to cover the range of low-wage occupations (generalist vs. specialist approach). A *net* hourly wage of €4 is assigned to approximate the lowest-grade wage observed in the economic sectors “miscellaneous services” and “construction”, whereas a wage of €8 per hour comes close to the minimum wage currently under discussion by German policy makers. Thus, the €8 wage rate approximates the protected wage of skilled service workers, whereas the €4 wage rate might represent the current wages of informal employment in the private sector.

In addition to the housekeeper wage approach, we apply the “predicted wage” approach to account for individual variations in productivity and opportunity costs. Given the counterintuitive assumption imposed by the opportunity cost approach as discussed above, we use the *predicted* individual wages only, instead of real wages, even for employed individuals observed as earning a market wage rate. Thus, we only introduce the predicted, and therefore limited, individual variation according to the covariates included in the regression model to capture differences in individual productivity, independent of the type of activity. By doing

⁹ However, in a recent paper using time budget data, Burda and Hamermesh (2009) find only a moderate compensating increase in time spent on home production among the unemployed.

¹⁰ Correlation analysis of the various home production activities shows the highest correlations between housework and errands for both men and women (0.44); between housework and childcare for women (0.32), and between housework and repairs and gardening for men (0.30).

so, the estimated value of home production activities is defined in the same way for the entire population, independently of current employment status. However, for sensitivity purposes, we also apply the *standard opportunity cost approach*, i.e., using current gross hourly wages (instead of predicted wages) for the employed.

We use log *gross* hourly earnings as the dependent variable in the underlying regression model based on all individuals with individual labor earnings, estimated separately for men and women (see Table 4). We used simple OLS regression models, because a correction for potential sample selection according to Heckman did not appear to be necessary for either women or men. In order to be able to obtain good predictions for the population outside the workforce, we did not include workplace characteristics in the regression model. However, the explained variance is more than 40% for men and at least 28% for women. The resulting coefficients show, as expected, that, e.g., hourly wages increase with age and education, are lower in East Germany than in West Germany, and decrease with any reduction in health status (at least for men). Based on the earnings regressions, we predicted the predicted wage for the whole population aged 17 and above.

After simulating income taxes and social security contributions for the predicted gross wages,¹¹ we estimate an average *predicted* net hourly wage of €9.14 (with a standard deviation of €3.76) for all persons. Differentiated by gender, the predicted hourly wages are on average €10.60 (standard deviation €4.15) for men and €7.75 (standard deviation €2.68) for women. Thus, the average predicted wage comes close to the higher version of the two housekeeper wage approaches (€8). However, the distribution is obviously quite different. For the opportunity cost approach, we end up with hourly wages that are only slightly higher, at €10.96 for men and €7.84 for women, whereas the variation is much broader than with the predicted wage approach. The respective numbers for the standard deviation are about twice as high at €10.91 for men and €4.21 for women.

¹¹ This simulation is based on the ratio of taxes and social security contributions to market income at the household level.

4 Empirical Results: The Impact of Home Production on Income Inequality

In the following analyses, we link fictitious income from home production as described in the previous section to a baseline cash income measure as provided in the SOEP.¹² In a first step, we analyze the distribution of the income advantages arising from home production. The main focus of interest is whether income gains from home production are differently or inversely distributed when compared to the distribution of household income. In a second step, we analyze the impact of incomes from home production on the overall income distribution and poverty once incomes from home production are included in an extended income measure. Underlying these analyses is the principle of comparing the situation of a baseline model using monetary annual post-government household income with the income situation *after* adding income from home production.

Following the standard approach in inequality research, we assume that all household members pool and share all available resources (i.e., income) so that everyone's standard of living in the household is the same. This requires that the monetary value of home production activities is aggregated across all members of a given household and re-assigned to all of them.¹³ The modified OECD equivalence scale is applied (1; 0.5; 0.3) in order to adjust for differences in household composition and size, thus allowing for economies of scale in larger households.¹⁴

4.1 The Distribution of Income Advantages from Home Production

Almost every person (99%) in the entire population lives in a household where at least one of the various home production activities considered is performed by at least one household member, and thus, just about everyone enjoys income from some sort of home production. However, the overall amount of income from home production varies across approaches (see Table 5). The mean equivalized transfer added when using the €8 housekeeper wage is about €14,100, which represents roughly 70% of the baseline mean equivalized household income

¹² Due to the problem of missing income information on non-respondents in otherwise interviewed households we completely eliminate all individuals from partially interviewed households. The weights for fully interviewed households which are, however, at risk of partial unit-non-response are boosted accordingly.

¹³ In order to compare annual post-government income with our approximated non-monetary measure of home production activities in a normal week, we assume the reported time use pattern for a "typical week" to be the same across the entire year, with an assumed "vacation from home production" of two weeks.

¹⁴ Comparing results obtained from an alternative equivalence scale, namely the square root of household size, with those derived from the OECD scale, Frazis and Stewart (2006: 13) found "little difference."

in 2009 (€20,500). Interestingly, the opportunity cost (€16,200) as well as the predicted wage approach (€16,100) yield very similar total amounts. Applying a housekeeper wage of €4 cuts the monetary value derived from home production in half compared to the results obtained when applying a €8 housekeeper wage.

To gain preliminary insights into the relationship between disposable household income and income advantages arising from home production, we report correlation coefficients for the baseline income measure and the equivalized income component of home production, comparing results from the various approaches (see Table 6). The correlation between the estimated income from home production based on the two flat wage approaches (which are identical) and household income is rather small and actually negative (-0.08), whereas there is a positive correlation for the opportunity cost approach (0.14). Results gained from the predicted wage approach lie in between, at 0.04. This is as expected, given that the housekeeper wage approach effectively assigns a rather flat monetary value to every household, depending only on the incidence of home production activities—which is more prevalent for low income families, as will be shown below. On the other hand, the opportunity cost approach reproduces the inequality in individual contributions to household income, whereas the predicted wage approach only considers a rather general earnings capacity.

To further examine the distribution of income from home production—and the sensitivity of the approach chosen—we analyze the amount and value of home production across quintiles based on the baseline household cash income. Table 7 presents average hours spent on home production per adult, and the corresponding average income per adult and hour, across quintiles of the baseline distribution. In line with the expectation from standard economic theory, individuals spend more hours on home production in the lower part of the income distribution. In the bottom quintile, adults spend an average of 31.5 hours per week on home production, with this number declining almost monotonically to 24.6 hours in the top quintile. Looking at the average income gained from home production per adult and hour, the respective values for the housekeeper approach are by definition identical over the income distribution. The predicted wage and the opportunity cost approach show rather similar patterns, although variation is far more pronounced for the latter. With increasing baseline income, the transfer from home production rises to more than €12 per hour in the top quintile, while this figure is only about €7.60 in the bottom quintile.

Figure 2 presents the relative increase in mean income when adding the monetized value of home production to the cash baseline income by income quintile. First of all, the

relative increase in the extended income measure including the value of home production rises to almost 80% when applying the opportunity cost or the predicted wage approach (and only slightly lower for the €8 housekeeper wage approach), indicating that home production has a pronounced impact on the welfare of private households. When differentiating this effect by baseline income quintiles, one can observe a similar pattern across the methods applied. Although the mean transfer differs only slightly within a single approach (results not displayed here), the lower the baseline income, the higher the relative increase due to home production. This increase is about 160% of the baseline cash income in the bottom quintile when using the €8 housekeeper wage, the predicted wage or the opportunity cost approach, and cut down by half with the €4 housekeeper wage. For the top quintile, this increase dwindles to 32% with the housekeeper approach (€8) and above 40% with the predicted wage and opportunity cost approaches.

4.2 The Impact on Economic Inequality and Poverty

Although income from home production is positively correlated to baseline household incomes, at least under specific assumptions, it might still exert a leveling effect on economic inequality and poverty unless incomes from home production are even *less* equally distributed than baseline cash incomes.

In Figure 3 we show relative changes in income shares for each quintile (of the baseline model) after adding fictitious income from home production. Again, the lowest income quintile benefits considerably from home production in relative terms, with its income share rising from 9% in the baseline model up to 11% after including a value for home production, depending on the approach chosen (thus, the *relative change* is between 8% and 22% as depicted in Figure 3). The second to fourth quintiles also expand their respective share of overall income (with the exception of the fourth quintile in the €4 housekeeper approach), whereas the income share of the top quintile is reduced accordingly by 8% to 17%.

When comparing the distributional impact of home production as given by the various approaches, we find the strongest changes in the housekeeper approach applying a wage rate of €8, while the predicted wage approach yields intermediate and the opportunity cost approach the smallest changes due to the value of home production.

The impact of home production on income inequality as measured by various indices is shown in Figure 4. For all approaches, there is a clear picture of remarkably reduced inequality once home production is considered in the measure of disposable household income.

The inequality-reducing effect varies from 12% to 27% as measured by the relative change in the Gini coefficient. These effects are more pronounced when using alternative inequality indicators such as the mean log deviation (MLD) and the half-squared coefficient of variation (HSCV), which give more weight to changes at the lower and upper tail of the income distribution, respectively. Here, the leveling effect amounts to almost 60% when applying a housekeeper wage rate of €4. Comparing the four methods applied one can observe the strongest inequality-reducing effects for the housekeeper wage approach, while this effect is the smallest for the opportunity cost approach, although a leveling effect of about 20% using the MLD and HSCV coefficient is still present.

Finally we explore the effect of the consideration of home production in an extended income measure on relative poverty. When looking at the head count ratio (FGT0 as proposed by Foster et al 1984) relative income poverty is reduced by more than 25% when applying the housekeeper approach (see Figure 5). For higher values of the “poverty aversion” parameter,¹⁵ we find stronger poverty-reducing effects arising from the consideration of home production in the measure of well-being. Again, when comparing the four approaches, the strongest effects arise from the housekeeper approach—with only somewhat stronger effects for the higher wage rate of €8, than for the wage rate of €4¹⁶—while the opportunity cost approach shows the smallest and the predicted wage approach intermediate effects.

In sum, we find robust evidence for an inequality reduction when using the extended income measure. Franzis and Stewart (2011) argue that this reduction is almost exclusively due to adding the mean value of home production—based on a sophisticated housekeeper wage (or replacement cost) approach.¹⁷ However, we find considerable variation across the three approaches, which is due to the differences in the *distribution* of the monetary value of home production, as the mean value of home production is fairly uniform across the €8 housekeeper wage, the opportunity cost, and the predicted wage approach.

¹⁵ The Foster–Greer–Thorbecke (FGT) family of poverty measures is commonly used when comparing income distributions with respect to poverty. Within this framework, the poverty ranking is sensitive to the choice of poverty aversion parameter (defining a particular FGT poverty-measure), e.g., the FGT1 index represents the normalized poverty gap while FGT2 gives the squared poverty gap.

¹⁶ The somewhat surprising result that both housekeeper approaches show rather similar effects arising from the inclusion of the value home production are due to the assumption of a dynamic poverty threshold.

¹⁷ Based on detailed time use information drawn from ATUS, Franzis and Stewart (2011) assign average wages for the activities carried out in specific occupations, i.e., average wages for childcare activities by nannies, average wages for cleaning by professional cleaners, etc.

5 Conclusion

This paper supports claims of cash income being a less-than-perfect measure of individual well-being, and underscores the need to consider non-cash income advantages arising from various home production activities. Our empirical analyses for Germany reveal that basically the entire population profits from at least one household member doing unpaid work at home. Nevertheless, there is quite some variation across socio-economic and demographic characteristics. We propose a new specification for measuring the monetary value of home production that comprises two distinct features: first, we adjust the numbers of hours spent on home production to reduce bias arising from multi-tasking and joint production when making use of time-use data. Second, we propose a predicted wage approach which approximates the hourly wage rate for home production by means of the predicted wages of *all* individuals, rather than using “true” market wages from paid employment. The predicted wage approach thus accounts for rather general, predicted differences in individual productivity and earnings capacity. This is grounded in the consideration that people engaging in home production activities typically act as “amateurs,” lacking professional skills in the things they do at home—whatever professional skills they may otherwise possess. On the other hand, in contrast to the housekeeper wage approach, it allows for *some* correlation between specific skills and general productivity. Thus, this approach overcomes the strong assumption of a completely free choice between paid and unpaid work that underlies the standard opportunity cost approach, and the assumption of an essentially flat productivity distribution across all individuals contained in the standard housekeeper approach.

In line with the literature—particularly the research on the distributional impact of other non-cash components in Germany¹⁸—we find inequality and poverty to be generally lower in an extended welfare measure than in a purely cash-based approach (see also Gottschalk and Smeeding 1997). Sensitivity analyses and robustness checks comparing results obtained from different approaches to measure home production provide some indications of method effects. Although the substantive notion of reduced inequality in well-being is supported, the degree of variation in our findings confirms the need for a harmonized approach in cross-nationally comparative research. In line with our theoretical expectations, applying a housekeeper wage of €8 yields the strongest leveling effect on economic inequality, whereas the opportunity cost approach produces the smallest leveling effect. Results obtained from the

predicted wage approach lie in between these two extremes. These differences are not only attributable to the mean value of home production (as suggested by Franzis and Stewart 2011), but also to the different distributions. The inequality-reducing effect is strongest when the distribution of the fictitious hourly wages for the time spent in home production is assumed to be flat—as with the housekeeper wage approach—and weakest when this fictitious hourly wage is assumed to mirror actual earnings—as in the opportunity cost approach. We argue that the predicted wage approach, which empirically lies in between the two aforementioned methods, is the most convincing theoretical approach and might thus serve as the basis for a harmonized treatment of home production in welfare analysis.

¹⁸ See Groh-Samberg et al. (2011) for non-cash income included in public educational transfers, Frick et al. (2007a, 2007b) for imputed rent, and Frick et al. (2008) for public health transfers. For a comprehensive analysis of the impact of non-cash incomes from four different sources on the income distribution in Germany, see Frick et al. (2009).

6 References


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7 Tables & Figures

Excerpt of questions on time use from the 2009 SOEP individual questionnaire

What is a typical day like for you?
How many hours do you spend on the following activities on a typical weekday, Saturday, and Sunday?

 Please give only whole hours.
 Use zero if the activity does not apply!

	Typical weekday Number of hours	Typical Saturday Number of hours	Typical Sunday Number of hours
Job, apprenticeship, second job (including travel time to and from work)	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>
Errands (shopping, trips to government agencies, etc.)	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>
Housework (washing, cooking, cleaning)	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>
Child care	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>
Care and support for persons in need of care	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>
Education or further training (also school, university)	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>
Repairs on and around the house, car repairs, garden work	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>
Hobbies and other free-time activities	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>

Table 1: Previous studies on the distributional effect of home production

Study	Country	Data	Population	Method	Version	Ref. Year	GINI baseline	GINI plus homeprod.	GINI change in %	home prod. in % of baseline
Bryant & Zick 1985	USA	Panel Study of Income Dynamics (PSID)	White, married-couple households where the husband is employed	opportunity cost	rural households	1975	0.280	0.290	3.6	77.0
					urban households		0.270	0.300	11.1	73.3
					rural households	1979	0.260	0.240	-7.7	80.1
					urban households		0.250	0.240	-4.0	97.4
Zick & Bryant 1990	USA	PSID	White, married couples with husband employed	opportunity cost		1975	0.281	0.309	10.0	75.7
						1979	0.259	0.268	3.5	81.0
Bonke 1992	DK	Time Use Survey	Couples with employed husbands (aged 16-76)	opportunity cost		1987	0.164	0.169	3.0	47.8
Aslaksen & Koren 1996	Norway	Time Budget Survey	All households	housekeeper wage		1990	0.289	0.225	-22.1	--
Jenkins & O'Leary 1996	UK	Social Change and Economic Life (+ FES)	Adults in 1-family-households (20-59)	housekeeper wage		1986/87	0.292	0.170	-41.8	86.3
				opportunity cost			0.292	0.209	-28.4	65.4
Gottschalk & Mayer 2002	USA	Panel Study of Income Dynamics (PSID)	Households with head aged 25-64	opportunity cost, incl. leisure time	decile ratios instead of Gini reported: p50/p20; p80/p50	1976	1.90; 1.62	1.81; 1.51	-4.9; -6.6	241.8
						1992	2.19; 1.85	1.92; 1.68	-12.5; -8.7	228.4
				housekeeper wage		1976	1.90; 1.62	1.76; 1.55	-7.2; -4.3	13.9
						1992	2.19; 1.85	2.02; 1.76	-7.5; -4.6	12.5
				opportunity cost		1976	1.90; 1.62	1.78; 1.57	-6.6; -3.1	40.8
						1992	2.19; 1.85	2.05; 1.78	-6.2; -3.5	33.3
Frazis & Steward 2006	USA	American Time Use Survey (ATUS)	Adults in 1-family-households (25-64)	housekeeper wage	general, excl. sec. childcare	2003	0.416	0.328	-21.2	30.5
					special, excl. sec. childcare			0.324	-22.1	33.1
					general, incl. sec. childcare			0.299	-28.1	44.7
					special, incl. sec. childcare			0.297	-28.6	46.7
Zick et al. 2008	USA	Time Use in Economic and Social Accounts (1975), ATUS (2003)	Adults	housekeeper wage		1975	0.343	0.300	-12.5	23.2
						2003	0.412	0.346	-16.0	31.8
				opportunity cost		1975	0.343	0.283	-17.5	44.9
						2003	0.412	0.363	-11.9	48.5
Koutsambelas & Tsakoglou 2008	Greece	Budget Household Survey	Adults	consumption	income from own production	2004	0.322	0.315	-2.1	1.8

Table 2: Home Production (Hours per Week) by Selected Individual Characteristics in Germany, 2009

		men	women	all
marital status	married	24.3	44.1	33.8
	single	16.5	24.9	20.3
	divorced	22.3	31.9	27.8
	widowed	25.8	26.8	26.6
immigrant	no	22.2	35.2	28.9
	yes	19.6	38.3	29.4
health status	very good	17.3	34.9	26.0
	good	21.5	37.1	29.1
	satisfactory	23.6	36.5	30.3
	poor	22.4	34.2	29.0
	very poor	18.4	27.3	23.4
schooling	lower secondary	22.6	35.0	28.8
	intermediate secondary	22.2	38.0	31.0
	upper secondary	20.3	33.5	26.5
vocational training	no voc. qualification	17.4	32.1	26.2
	lower vocational	23.3	38.0	31.1
	higher vocational	23.6	36.6	28.1
	tertiary	21.9	33.9	27.0
employment status	full time	20.3	22.6	21.0
	part time	22.4	44.6	41.7
	marginal	20.6	44.8	38.0
	unemployed	29.7	50.8	40.4
	in training	10.1	14.1	11.7
	not working	23.7	36.8	31.3
total		21.9	35.7	29.0

Time spent in home production activities in hours per week, after top-coding.

Source: SOEP v26; authors' calculations.

Table 3: Home Production Activities by Selected Household Characteristics in Germany, 2009

		errands	house- work	child- care	nursing	repairs & gardening	total (raw data)	total (top coded)
home ownership	home owner	11.6	22.0	13.6	2.2	12.8	62.3	58.8
	tenant	9.8	16.9	12.9	1.4	5.0	46.0	42.8
garden	yes	11.2	21.1	16.3	2.2	11.6	62.4	58.0
	no	9.7	16.3	9.2	1.2	3.8	40.2	38.2
community size	< 2,000	10.5	22.4	14.6	1.8	13.8	63.1	58.3
	2,000 – 20,000	10.6	20.6	13.7	1.9	10.5	57.3	53.5
	20,000 – 100,000	10.4	18.8	15.3	1.7	7.9	54.0	50.8
	100,000 – 500,000	10.7	17.6	12.6	1.3	5.8	48.1	45.3
	> 500,000	10.5	16.6	9.3	1.9	5.2	43.5	40.8
region	West Germany	10.3	18.8	13.4	1.7	7.4	51.5	48.2
	East Germany	11.7	19.7	12.6	1.9	11.6	57.4	54.2
person in need of care in hh	yes	7.7	16.9	5.4	19.4	4.8	54.2	49.5
	no	10.6	19.1	13.6	0.9	8.4	52.6	49.3
children<14 in hh	yes	12.0	24.3	69.6	1.3	8.8	115.9	99.3
	no	10.2	17.9	1.6	1.8	8.1	39.6	39.0
total		10.5	19.0	13.2	1.7	8.2	52.7	49.3

Time spent in home production activities in hours per week, after top-coding; aggregated time spent in home production after top-coding.

Source: SOEP v26; authors' calculations.

Table 4: Regression of logged gross hourly wages

		male			female		
		Coeff.	t	P> t	Coeff.	t	P> t
Age		0.074	17.6	0.000	0.070	13.7	0.000
Age squared		-0.001	-15.1	0.000	-0.001	-11.8	0.000
Migration (Ref: no)	Immigrant	-0.043	-1.5	0.139	-0.028	-0.9	0.382
	2nd generation immigrant	0.029	0.8	0.425	0.009	0.2	0.828
	information not available	-0.348	-2.5	0.012	-0.131	-0.9	0.380
East Germany (Ref: West)	yes	-0.369	-17.6	0.000	-0.281	-12.7	0.000
Community size (Ref: <2,000)	2-5,000	-0.013	-0.4	0.726	0.036	1.0	0.342
	5-20,000	0.055	1.7	0.092	0.063	1.7	0.090
	20-50,000	0.034	1.1	0.294	0.094	2.6	0.010
	50-100,000	0.050	1.2	0.214	0.075	1.7	0.098
	100-500,000	0.012	0.4	0.721	0.070	1.8	0.067
	>500,000	0.006	0.2	0.867	0.139	3.6	0.000
Health (Ref: very good)	good	-0.044	-1.7	0.088	-0.018	-0.7	0.514
	satisfactory	-0.113	-4.1	0.000	-0.039	-1.3	0.179
	bad	-0.174	-5.0	0.000	-0.105	-2.9	0.003
	very bad	-0.271	-4.3	0.000	-0.042	-0.6	0.565
Schooling (Ref: lower secondary)	intermediate	0.095	4.9	0.000	0.157	7.2	0.000
	college	0.227	9.6	0.000	0.275	10.4	0.000
Vocational education (Ref: none)	basic vocational	0.286	11.6	0.000	0.264	10.5	0.000
	higher vocational	0.361	11.2	0.000	0.392	10.4	0.000
	tertiary	0.576	19.0	0.000	0.551	17.5	0.000
Marital status (Ref: married)	single	-0.144	-6.3	0.000	-0.006	-0.3	0.801
	divorced	-0.127	-4.6	0.000	-0.057	-2.2	0.032
	widowed	0.042	0.5	0.655	0.039	0.8	0.438
No. of children<6 in hh (Ref. none)	one child<6	0.055	2.2	0.029	0.029	1.0	0.317
	two or more children<6	0.055	1.4	0.174	0.136	2.2	0.030
Constant		0.714	3.9	0.000	0.316	1.6	0.115
Observations		5,203			4,747		
Adj. R-squared		0.408			0.276		

Dependent Variable: Log (Current Gross Hourly Wage). Additional controls not displayed here are months of interview.

Population: Persons aged 17 and above in private households.

Source: SOEP v26; authors' calculations.

Table 5: Mean equivalized income from home production

Baseline income	house.4	house.8	pred. wage	opp. cost
20,499	7,068	14,137	16,112	16,244

Note: *house.4* (*house.8*) represents the housekeeper approach with a wage of €4 (€8) per hour.
Source: SOEP v26; authors' calculations.

Table 6: Correlations: Household income and income from home production

house.4/8	pred. wage	opp. cost
-0.075	0.040	0.142

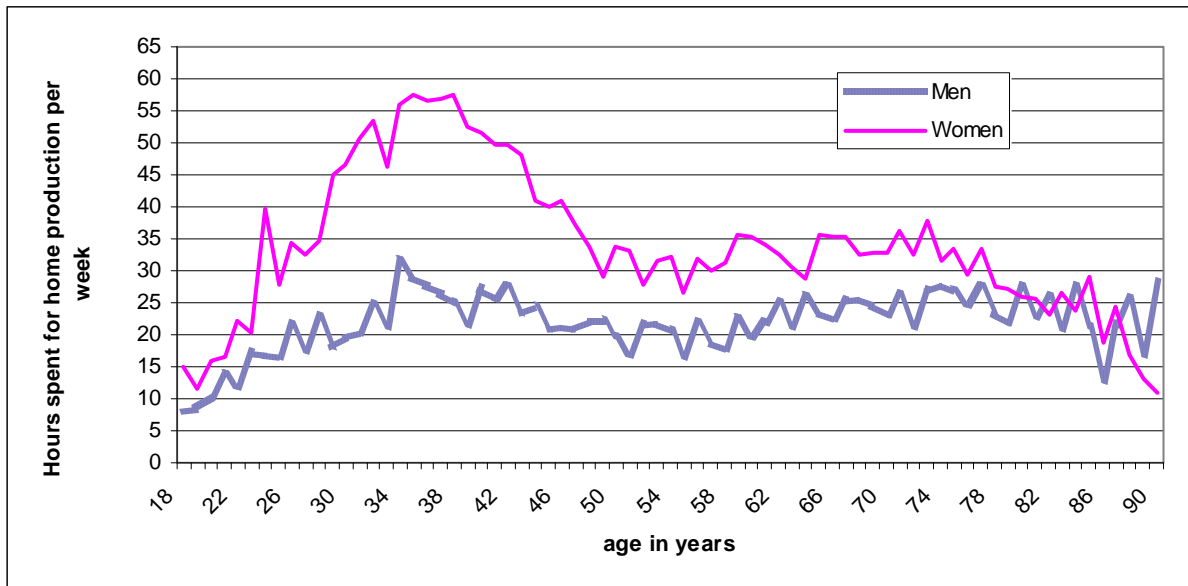
Source: SOEP v26; authors' calculations.

Table 7: Amount and value of time spent on home production

	hours per adult and week	transfer per adult and hour			
		house.4	house.8	pred. wage	opp. cost
lowest quintile	31.5	4.0	8.0	8.3	7.6
2nd	31.2	4.0	8.0	8.5	7.9
3rd	29.6	4.0	8.0	8.9	9.0
4th	28.5	4.0	8.0	9.2	9.8
highest quintile	24.6	4.0	8.0	10.7	12.4
Total	29.0	4.0	8.0	9.1	9.4

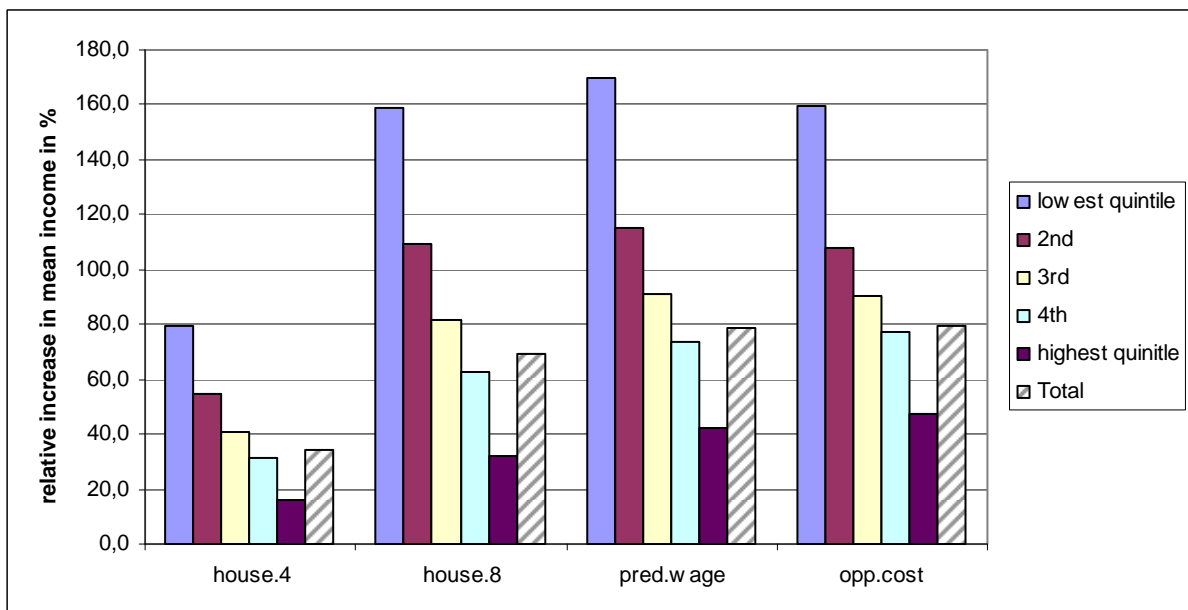
Source: SOEP v26; authors' calculations.

Figure 1: Time spent on home production by age and gender



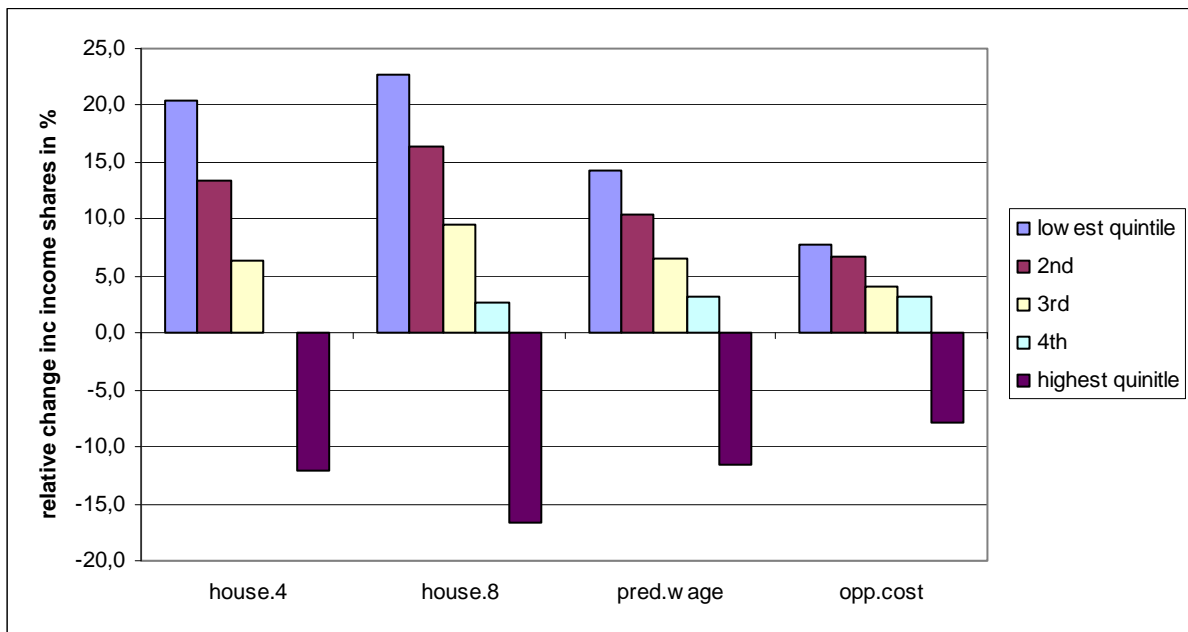
Source: SOEP v26; authors' calculations.

Figure 2: Income advantages from home production: Relative increase in mean income across quintiles



Source: SOEP v26; authors' calculations.

Figure 3: Income advantages from home production: Relative change in income shares across quintiles



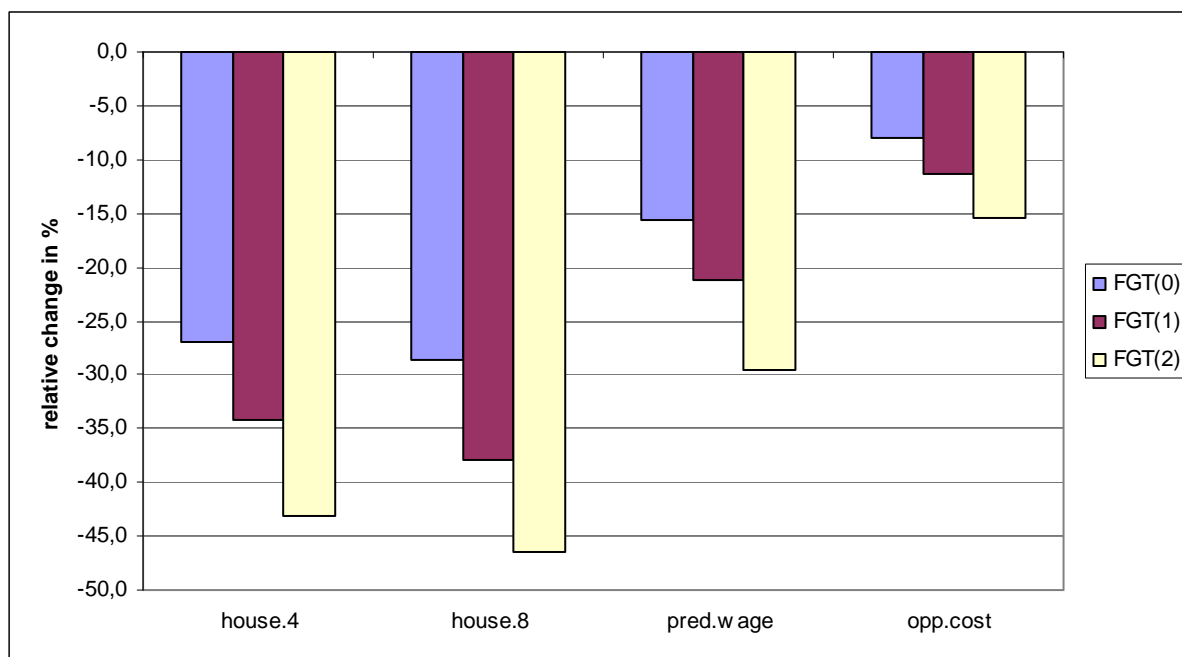
Source: SOEP v26; authors' calculations.

Figure 4: Relative change in income inequality due to home production (in %)



Source: SOEP v26; authors' calculations.

Figure 5: Relative change in poverty due to home production (in %)



Source: SOEP v26; authors' calculations.