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Estimating the Impact of the Recent Economic Crisis on Work Time in Turkey

by

Emel Memiş
Levy Economics Institute of Bard College

S. A. Kaya Bahçe*
Department of Economics, Ankara University

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Levy Economics Institute
P.O. Box 5000
Annandale-on-Hudson, NY 12504-5000
http://www.levyinstitute.org

ABSTRACT

This paper provides estimates of the impact of the recent economic crisis on paid and unpaid work time in Turkey. The data used in this study come from the first and only time-use survey available at the national level. Infrequency of collection of time-use data in Turkey does not allow us to make a direct comparison of pre- versus postcrisis time-use patterns. We introduce a tractable way for estimating these possible effects by measuring the impact of an increase in unemployment risk on time-use patterns of women and men living in couple households. The method developed here can be applied to other developing-country cases where there is a lack of longitudinal data availability. Our findings support the argument that economic crises reinforce the preexisting gender inequalities in work time.

Keywords: Economic Crisis; Gender Inequality; Time Use; Unemployment Risk; Unpaid Work; Turkey

JEL Classifications: B54, J16, J22

INTRODUCTION

The most salient impacts of the recent economic crisis observed across the globe, regardless of the level of economic development, have been higher unemployment and vulnerable employment. Rising joblessness led by a dramatic decline in aggregate demand with falling exports particularly in the developing world has become a central issue. Much has been written about the crisis' impacts on employment status (extensive margin) in labor markets; however, consequences of the crisis in terms of work time (intensive margin), both market and nonmarket, have been neglected so far. The purpose of this paper is to address these "hidden" impacts of the recent crisis on work time, focusing on the case of Turkey.[1]

In times of economic crises, whether it is the individual's own job that is lost or other members' living in the household, efforts are made to compensate the loss in household income through adjustments in hours of work. Depending on their reactions to loss of employment, the pattern of these adjustments shows distinct characteristics across household members (Gronau 2006). The extra work burden due to the crises is often undertaken by women, who are being forced to work longer hours in the market under informal conditions and/or required to do more unpaid work, as the households rely more heavily on women for more unpaid work that takes place outside the market (Milkman 1976; Elson 1993).[2, 3] Although unpaid work is carried out outside the market, it is not necessarily isolated from the impacts of economic crises. On the contrary, unpaid economy is more vulnerable and unprotected in situations of crises; yet, assessments of the economic crises often neglect the impacts on this domain. In fact, dependence of market economy on the unpaid work is multiplied in many ways due to economic

[1] Turkey, a fast growing developing country during the 2000s, was hard hit by the recent crisis, despite its relatively stable financial system, due to the new measures taken after the 2001 banking crisis. The average unemployment rate has reached unprecedented figures, reaching to 14 percent at the end of 2009, one of the highest among the Organisation for Economic Co-operation and Development countries (TurkStat 2010).

[2] Unpaid work covers a range of different activities from taking care of children and other household members in need, to cleaning, shopping, maintaining the house, doing volunteer work, and helping other members in the community. In some developing countries, in areas where services are lacking, unpaid work includes activities such as collection of free goods like water and fuel from common lands vital for the household.

[3] See also Antonopoulos 2009, Seguino 2009, and Floro, Tornqvist, and Tas 2009 for the discussions on this issue in the context of the recent crisis.

shocks.[4] Dividing work time into two as unpaid and paid work time, in this study we seek to answer whether and to what extent individuals' work times change due to the recent crisis in Turkey. Do these results vary among women and men? Who in the household takes up the slack when the crisis takes place: women, men, or both? Does the recent crisis change time-use patterns of women and men in the division of unpaid and paid work in Turkey?

For our analysis, we use Turkish time-use data, which provides information on how people spend their time on different kinds of activities, such as work, leisure, sleep, and personal care. Despite the growing recognition of the importance of time-use data in economic analysis, unlike developed countries, for many developing countries the collection of time-use data is still more sporadic and less regular. They are not on the list of regularly collected data of national statistical institutes. Such is the case with Turkey. The first time-use survey data at the national level was compiled by the Turkish Statistical Institute (TurkStat) in 2006 and it is still the single database available with nationwide coverage.[5] This lack of data availability led us to propose a new and tractable method of estimation, which can also be applied to other countries where frequency of collection of time-use data does not allow for direct comparisons of pre- versus post-crisis time-use patterns.

Our method is based on a two-step estimation of paid and unpaid work time. We first estimate the unemployment risk of women and men living in couple households. Here, we define unemployment "risk" as the probability of being unemployed. In the second step, we estimate the effect of unemployment risk that is predicted in the first step on spouses/partners' paid and unpaid work time. Nationwide averages, calculated based on the marginal effects of spouses/partners' unemployment risk on work time, show that given a 1 percent change in spouses' unemployment risk, both women's paid work time and unpaid work rises significantly, whereas we only observe a significant change in men's unpaid work time where the impact is much sharper for women than men: women's unpaid work time rises approximately four (3.6)

[4] As Elson put it, when the adverse economic shocks arrive, the hidden "equilibrating factor" is women's unpaid work, their ability to absorb the shocks through more work, and "making do" on limited incomes (1993, p.241). See also Çağatay and Ertürk 2004 for an extensive overview of the current knowledge on the relationship between gender inequalities and economic changes.

[5] The survey is planned to be undertaken every five years but the second one scheduled in 2011 is already postponed due to budgetary issues (given the previous year was a Census year in Turkey).

times more than that of men and in urban areas the change is almost five (4.8) times more than men.

Based on these estimates obtained, we calculate the recent crisis' impact by constructing two different scenarios. First, in order to get an average estimate, we assume unemployment risk for married women and married men rise at a rate equal to the increase in relevant actual unemployment rates for both. Secondly, taking into account the fact that not all sectors were equally affected by the crisis, to capture these sector-specific impacts, we assume unemployment risk for married women and married men rise at a rate equal to the increase in actual unemployment rates by sector (agriculture, industry, and services).

Our results obtained for scenario one show that women's total work time increases by 5 percent while the corresponding rise for men is only 1 percent, which widens the existing gap between women and men in Turkey by 26 percent. The figures are much more striking for couples living in urban areas, i.e., gender gap in total work time increases by 49 percent in scenario one. Sector-specific results in scenario two suggest that the increase in total work time is highest for women (12 percent) and men (2 percent) whose spouse is employed in the industrial sector, which has been hit hardest by the recent crisis. In both scenarios, the difference between women and men in paid work time decreases along with the increase in women's paid work time, whereas the gap rises as far as the time devoted to unpaid work is considered. These findings support the argument that the adjustments in hours of work differ among women and men and that preexisting gender inequalities in work time are deepened by the economic crises.

The contribution of this research is twofold. First, from an empirical perspective, we provide a quantitative evaluation of the possible impacts of the recent economic crisis on paid and unpaid work time in Turkey and thus help complete the picture of cost of the recent economic crisis by focusing on a usually neglected dimension: the "hidden" costs observed in the unpaid sphere of the economy. Second, in terms of methodology, we introduce a straightforward way of investigating possible effects of an economic shock on time-use patterns through a change in unemployment risk, when time series dimension of available time-use data is incomplete.

THEORETICAL ISSUES AND EMPIRICAL EVIDENCE

Earlier literature on time-use patterns of women and men, with respect to unpaid and paid work time, assumed that intra-household time allocation is determined exogenously (Becker 1991). As many researchers have addressed the limitations of modeling household decisions based on this assumption, it is now established that there are several intra-household interactions endogenously determined along with the allocation of time. Employment status of the household members is one of the critical factors that have significant impacts on time-use patterns of household members and the same is true for the opposite, i.e., how people spend their time also affects peoples' employment status and their well-being (Floro 1995; Antonopoulos and Hirway 2010; Floro and Pichetpongsa 2010).

This paper builds its methodology to estimate the crisis impact on time-use patterns based on this endogenous relationship between employment status and time allocation. Behind our analysis is the hypothesis that economic crises, by changing the employment status of individuals with higher unemployment, are expected to affect the intra-household allocation of work time. On one hand, studies have pointed out that being unemployed in the market releases more time that can be devoted to unpaid work activities.[6] Thus, one might expect that an unemployed spouse, by sharing the unpaid work load, may cause a fall in unpaid work burden of her/his spouse. On the other hand, if not shared, extra unpaid workload due to loss in household income increases spouses' work burden. Among these two effects, the one that would dominate during the crisis depends particularly on the characteristics of the existing division of labor in unpaid and paid work within the household and there is ample evidence that while men's work is highly associated with paid market work, women devote a higher proportion of their work time doing unpaid work across the world (Gershuny 2000; Beneria 2003). In the theoretical literature, there is no agreement on which model predicts this traditional time allocation better. While some studies build upon Becker's model (1991) and consider gender-based specialization in paid and unpaid work as an efficient outcome of rational choice (e.g., Gronau 1973), others focus on institutions (e.g., Hartmann 1979) and emphasize the linkages

[6] Among others, see Ahn, Jimeno, and Ugidos 2003 for supporting evidence, where the authors based on the Spanish experience find that unemployed people allocate more time to money-saving activities; each weekday, they spend three and a half hours more on the home production of goods (substituted for goods previously bought in the market).

between the two domains, arguing that individual decision-making process cannot be isolated from the complex social context including social norms, regulations, laws, and policies (e.g., Bittman et al., 2001).[7]

In Becker's model of time allocation, the household is taken as the production and decision-making unit where individuals specialize in housework or market work, depending on their relative efficiency (Becker 1991). Full specialization is predicted by this model given that men earn higher wages than women in the market. Increased traditional specialization between spouses benefits both, with higher levels of household income and higher levels of productivity in household production. Despite Becker's predictions on what is beneficial for households, women's participation in paid work has been increasing across the world since the 1940s; however, employed women still continue to specialize in unpaid work both in advanced countries as well as in the developing world as put forth by the second shift or dual work arguments (Hochschild and Machung 1989; Schor 1991). These findings also point to a reverse causality between the unequal outcomes in the market and gender inequalities in the household division of labor by arguing that inequality in the household feeds back to the former inequality in the market, a phenomenon called housework penalty (e.g., Bryan and Sevilla-Sanz 2010). Thus, we observe that persistent gender inequalities particularly in mean duration of unpaid work, whether considered as an efficient outcome or not, have motivated many researchers to look for different explanations other than what Becker's unitary (with common preferences and altruistic head) household model provides.

Contrary to the unitary household model, game theoretic household models show that households can be both a cooperative unit and an institution where conflictual relations are involved. For example, cooperative bargaining models propose that time allocations are determined through cooperative behavior where spouses, having the bargaining power that depend on their individual characteristics, negotiate on the allocation of time between paid and unpaid work, where divorce corresponds to the threat point for each of them. Thus, anything that affects their single state utility in case of divorce would also influence the allocation of time through bargaining by changing their threat points (Manser and Brown 1980; McElroy and Horney 1981).

[7] See also Jaggar 1988, Gershuny, Bittman, and Brice 1997, Coltrane 2000, Hook 2006, 2010, Fuwa 2004, and Geist 2005, among others.

On the other hand, a noncooperative alternative: the separate spheres model developed by Lundberg and Pollak (1993) defines an internal threat point that corresponds to the case where spouses put themselves into separate spheres, although they remain within the marriage if they do not end up with an allocation decision through a cooperative process. The allocation of paid and unpaid work between these separate spheres reflects the socially recognized division of labor within the household. Considering the conflictual aspects of the households, the collective approach has also come up as an alternative to cooperative modeling, which depends on a household welfare function defined as a weighted sum of individual utility functions of each spouse. Thus, spouses maximize their utility functions given the prices and wages and any decision about the allocation of housework and market work is taken through a cooperative process where the final agreement is Pareto efficient (Chiappori 1997).

Several feminist scholars criticized both the unitary household models as well as the cooperative and noncooperative bargaining models, arguing first that household allocation of time is much more complicated than these models describe, as all three decision-making rules may coexist together (Seiz 1999). They also argue that all these models pay attention to the outcomes but ignore the causes and processes of how the bargaining power of each member is endogenously determined within the household. Household allocations are not exclusively determined by outside options, but also by ethical principles, social biases in perception, gender biases, policies, and state actors (neglected in these models). All these other factors may affect bargaining power, which requires a more complicated analysis of intra-household allocation of time than these models provide. Institutions, as argued, have a direct impact on decisions while indirectly influencing the normative context in which the decision is embedded. Patriarchy among others, as a source of unequal division of labor first at home and then in the market, affects gender division independently and directly benefits men through controlling women's labor. As a result, women's participation in the labor market cumulates demands on themselves rather than increasing men's unpaid work time (Meissner et al., 1975). Though very limited in number, there is also empirical evidence supporting these alternative explanations specifically in the context of economic crises. For example, in the Indonesian crisis of 1997, it has been found that women's unpaid work increased by 7 percent compared to 1.3 percent for men (Elson 2009). Similarly in the Philippines, following the 2008–2009 food, fuel, and financial crisis, the

likelihood of employment declined for both men and women while women's unpaid work burden substantially increased (Menon and Rodgers 2010). Earlier evidence also shows that women's participation in the labor market increases in order to compensate for the loss of income of their household, as observed in the 2001 financial crisis in Turkey (Kızılırmak 2008). This impact, known as the added worker effect, has been discussed widely in dynamic labor supply models (e.g., Mincer 1962; Lundberg 1985). With increased participation and paid work time, one might then expect a decline in women's unpaid work time. Empirical evidence, however, shows that increases in women's labor force participation are not necessarily substituted by unpaid work time. Rather, participation in the labor market imposes a double burden on women, particularly for those living under poverty. All these findings not only inform us on how women and men experience their daily time, but have important implications in terms of the well-being of the society as a whole. Thus, it is critical to understand the effects of economic crises on both unpaid and paid work time for a complete exploration of the crisis on well-being; evidence above shows that it is also critical to reveal the gendered impacts of crisis given the learned lessons in previous crises (Floro, Tornqvist, and Tas 2009). In this context, this study aims to contribute to the empirical literature above by providing estimates of the recent crisis' impact on time-use patterns of women and men in Turkey.

DATA

The data used in this study comes from the first and single national time use survey in Turkey conducted by TurkStat in 2006. This survey uncovers data for 10,893 individuals who are 15 years of age or older living in 4,345 households.[8] All household members age 15 and over provide information about how they allocate their time among different activities through interviews and daily dairies.[9] Household members provide data for two specified days (one for a weekday and one for a weekend day) where they record their daily activities in ten minute intervals for 24 hours of a day. All days of the week are surveyed in equal proportions and postponement of diary days is allowed for a maximum of two weeks. All members of the

[8] 5,070 (3,380 urban and 1690 rural) randomly chosen households were contacted for the survey. The response rate was quite high: 85.7 percent corresponding to 4,345 households.

[9] Data collection began on December 1st, 2005 and ended on December 31st, 2006, which covered a 13 month-period and was continuously done on a weekly-basis.

household keep their diary on the same day. If the respondent does more than one activity simultaneously, one of these activities is determined as the main activity and the data shows the distribution of the time spent on the main activity in 24 hours. Daily activities are classified according to the EuroStat (2000) activity coding list.

For our purpose, here we focus on women and men in a spousal/partner relationship, and we limit our sample to individuals who are of working age, i.e., ages 15 and over but younger than 65. Once we exclude the individuals with missing values in the variables of interest as well, we are left with an overall sample of 2,491 married couples living in nuclear families for which usable data are available.[10]

The descriptive statistics on the entire data set and the sample are provided by sex in Table 1 in the Appendix. Sample statistics show that the average age is 40 years for women and 43 years for men, calculated according to the median level of age ranges.[11] The average age in our sample is slightly higher than the entire sample. As the final sample consists of individuals in a spousal relationship, household characteristics do not vary among women and men: 68 percent of the households are living in urban areas. Since nuclear family households are more common in urban areas than rural, the percent of couples living in urban areas in the sample is higher than the figure for the whole data set (61 percent). The average number of children younger than 16 years of age is 1.3 and the average household size is 3.9 people. Based on the household income information summarized in Table 1 and the official poverty level of income reported for a four-member household, 42 percent of our sample (first three income groups) is living under poverty.[12] 32 percent of the couples in our sample have no children.

Statistics with regards to the individual characteristics point to major differences between married women and married men in Turkey. For example, illiteracy rate among women is as high as 19 percent, whereas the figure for men is only 6 percent (Table 1). In addition, the ratio of women with higher levels of education significantly lags behind. Outcomes of gender-

[10] Only 5 couples among the 2,491 reported that they are unmarried partners living together. We also exclude four households where there is more than one woman who reports herself as the wife. They appear to be polygamous households if not observed (due to a problem in data recording).

[11] Instead of the actual age information, only the age group that corresponds to the respondents' age is available in the data. Average age here is calculated based on the median value of each age group.

[12] Households in the income group where the median level of income is lower than the official level of poverty income for a four-member household (549 TL) in 2006 are identified as income poor. See TurkStat 2006 for poverty levels of income by household size.

based inequalities revealed in the labor market also show striking gender-based disparities: 20 percent of women are employed in the labor market, whereas for men the ratio is 82 percent. Unemployment rates are 3 and 1 percent for men and women respectively.[13] These figures, when compared to the averages of the entire data set, suggest that participation in the labor market is much lower among the women in our sample; 75 percent of married women report themselves as "homemakers" as compared to 61 percent for the whole data set. Labor force participation rate for our sample is more consistent with the official figure reported by TurkStat (2006), presenting that only 24.9 percent of women participate in the Turkish labor market.[14] As can be observed by the figures in Table 1, distribution of employed women and men between sectors as well as their employment types show a high degree of gender-based segregation in Turkey. The ratio of women employed in agriculture is still as high as 45 percent and 60 percent of employed women are in vulnerable employment, i.e., the total of irregularly employed, self-employed, and unpaid family workers. Table 2 provides information on couple households in our sample according to their participation in income earning activities. Couples in our sample illustrate the traditional male-breadwinner households, which is typical for nuclear families in Turkey. While 19 percent of these couples have no income earners, that is, neither the husband nor the wife is employed in the labor market, 62 percent of them have only one earner: in 60 percent, the husband is the earner while the remaining 2 percent corresponds to female earner couples. The rest is dual-earner couples (19 percent).

Figures in Table 3 present mean duration of time (hours/day) devoted to unpaid and paid work activities by women and men with respect to their labor market status and the type of

[13] Note that the lower unemployment rate for women, when compared to men, might be due to the definition of homemaker, which usually blurs the link between women and unemployment, leading to underestimation of the actual unemployment rate for women. In general, only those actively looking for a job are defined as unemployed; however, studies in sociological literature argue that most of the women considered as "economically inactive" wish to work although they do not qualify as active job seekers. Thus, the actual unemployment rates for women based on this argument may significantly differ from officially reported low rates (Ecevit 1998; Özbay 1990).

[14] Despite the urbanization and industrialization experience in Turkey, participation of women in the labor market has been very low, which is described as the "Turkish puzzle" in a recent report by the State Planning Organization and the World Bank (2009). See Memiş, Öneş and Kızılırmak 2011 for a discussion on this issue. As they argue, one reason behind this description as "puzzling" is the implicit assumption that decisions on participation in paid work includes only the combinations of market work and leisure time. Time spent on unpaid work activities is invisible in this scenario. The study shows that Turkish experience demonstrates "housewifization" of women through transitions between critical phases in life course particularly with marriage and having children.

employment.[15] We group the daily activities based on the following categories: (i) paid work (employment) consists of all work and work-related activities and (ii) unpaid work includes household maintenance (food preparation, dish washing, cleaning, laundry, ironing, gardening, repairing, shopping, etc.) and caring for other household members (childcare, caring for a dependent adult household member, etc.) [16, 17]. Total work is the sum of paid and unpaid work. As can be seen in Table 3, employed women spend approximately 9 hours/day for paid and unpaid work; thus, they have a higher total work burden compared to their male counterparts who devote 7 hours/day to total work. Moreover, 55 percent of women's total work time is allocated to unpaid work while men's time spent on unpaid work corresponds to only 12 percent of their total work time. The difference between unemployed and employed women with respect to the mean duration of unpaid work time is much lower when compared to the difference in their paid work time. This shows that there is no one-to-one substitution between paid and unpaid work time confirming that employed women do a double shift. In Table 3, it is also interesting to observe that employed women's total work time is more than 8 hours/day no matter what their employment status is. Again, this signifies an uneven distribution of unpaid work between spouses: while employed men devote approximately 12 percent of their total work time to unpaid work regardless of their employment status, employed women spend 50 percent or more of their total work time to unpaid work. Thus, married women in Turkey, who have an opportunity to work in the market, seem to be "choosing" between either working for very long hours for paid and unpaid work in total or not participating in the labor market.

Note that we observe non-zero amount of time spent doing paid work by the unemployed men and women in Turkey (Table 3). This is simply because paid work time also includes the time spent for looking for a job, which is not reported separately. Mean duration of paid work hours is slightly higher than zero for homemakers as well. This might reflect the fact that, although women (particularly those living in rural areas) participate in paid work activities, they

[15]Mean duration of time is the weighted average calculated using the weight variable named "factor" provided in the data set, which differs by day (weekday/weekend) for each respondent.

[16] Economic activities and occupations are classified according to Statistical Classification of Economic Activities in the European Community, NACE Rev.1.1 and International Standard Classification of Occupations (ISCO-88) respectively. Employment activities do not include travel to work. Since travel for all activities are classified together with unclassified activities as a single category by the survey, it is not possible to identify the amount of travel time to work.

[17] Unpaid work time does not include travel time spent for unpaid work activities; see the previous note for an explanation.

are reporting themselves as housewives since being a housewife, which still indicates a higher social status in Turkey, is more desirable and prestigious, particularly among women living in rural areas (Özbay 1990).[18] Based on time-use patterns summarized, in order to explore and estimate the crisis impact on work time spent by women and men in Turkey, we first build a methodology to explore the relationship between spouses' employment status and their time allocation living in couple households.

METHOD

In previous empirical literature, in order to investigate the relationship between spouses' employment status and their time allocation, scholars have taken the employment status as exogenous and tested its effects on work time by controlling several other socioeconomic factors including individual, household, and life course characteristics as the major determinants of allocation of time (e.g., Juster and Stafford 1991) that might potentially influence both time-use patterns and employment status. Generic empirical equation of estimation used by these studies can be formalized in a reduced form as follows:

$$y_{ji} = \alpha_j P_i + \beta_j' x_i + \varepsilon_{ji} \quad (1)$$

where y_{ji} is the variable representing time allocated to activity j by individual i, P_i is a binary variable indicating whether the spouse is employed (=1) or unemployed (=0), x_i is a vector of explanatory variables other than the employment status including the constant term (i.e., individual and household demographic characteristics including age, education, household composition variables), $\alpha_j$and β_j are vectors of parameters, and ε_{ji} is the error term. In this specification, spouses' employment status is assumed as an exogenous binary factor and time allocated is estimated based on a single equation. In contrast, based on the empirical evidence and theoretical issues discussed in Section 2, recent empirical research considers time allocation and spouse's employment status as endogenously determined (e.g., Gimenez-Nadal and Molino 2009, Connelly and Kimmel 2009, and Ahn, Jimeno, and Ugidos 2003). There is a great deal of emphasis on the role of unobservable social norms in this literature as the source of

[18] Özbay puts this as the "dream of being the wife in their home" of women who migrate from rural to urban areas, where she discusses the transformation in housework activities when the society has moved to a more urban and industrial environment in Turkey (1990).

endogeneity. Supported by empirical evidence, gender-biased norms and attitudes, which usually cannot be measured and thus not included in the set of explanatory variables, are highly likely to explain both time-use patterns of women and men as well as their employment status. Therefore, to the extent that there are unobserved factors that influence both, assuming employment status as exogenous would lead to biased estimates obtained by single equation estimation (Álvarez and Miles 2003). Thus, a two-step estimation procedure is used to deal with endogeneity of spouse's employment status.

In this application, we propose a two-step estimation method not only because of the endogeneity issue, but also because this technique allows us to facilitate estimation of the crisis' impact on work time where comparable time-use data is not available. This is often the case in many developing countries, including Turkey, where the frequency of data collection is very low. The empirical strategy developed next may prove to be useful for other country cases where there is a lack of data availability with regards to the post-crisis situation. Accordingly, the first step involves estimation of the unemployment risk where the probability of being unemployed is predicted for both women and men living in nuclear family households. We use the standard labor market statuses here as: (i) employed, (ii) unemployed, and (iii) out of labor force.[19] Defining unemployment risk as the probability of being unemployed conditional on participating in the labor market, we estimate the unemployment risk of each adult individual using a binary logit model, which is a widely used modeling technique to estimate binary

[19] According to the data we use, individuals may have seven employment statuses exclusive of each other: employed, looking for a job, student, retired, sick or elderly, homemaker, and other. Individuals who do paid work even for one hour during the week the data is collected are recorded as employed. Those who do not report paid work time for that week, although he/she has a job, are also recorded as employed. Those who are of working age but cannot find a job, although they accept to work at the current wage rate for the official working hours, are recorded as unemployed. In order to be recorded as unemployed, one should not do paid work for even one hour during the week he/she answers the survey. On the other hand, he/she should actively be looking for a job for the last four weeks and should be available to start working in two weeks in case he/she finds a job. These categories are exclusive of each other in the sense that, for example, if an individual reports that he/she is a student and does paid work, he/she is recorded as employed. However, faced with some data issues, we changed the status of some inactive respondents who reported paid work time but did not report sectoral code of their main economic activity. Thus, taking the advantage of time-use information we have, we redefined unemployed including the respondents who report positive paid work time without sector information assuming their paid work time as the time spent searching for a job. As a result of our re-definition, the number of unemployed increased by 14: 4 of the students, 2 of the retired, 1 of the sick and elderly, 3 of the home makers, and 4 of the others were defined as unemployed.

dependent variable (unemployed/employed=1/0).[20] The probability of being unemployed P_i is estimated by the method of maximum likelihood:

$$P_i = \frac{e^{\gamma Z_i}}{1+e^{\gamma Z_i}} \tag{2}$$

Unemployment risk is determined depending on the latent variable P_i^l for each individual:

$$P_i^l = \gamma Z_i + \vartheta_i^\gamma \tag{3}$$

where Z_i represents the vector of explanatory variables, ϑ_i^γ is symmetrically distributed with zero mean random term denoting unobservable determinants of unemployment risk, and $\mathrm{F}(\vartheta_i^\gamma)$ is the cumulative distribution function. The variable P_i is related to the latent variable P_i^l through the following rule $P_i = 1\ (P_i^l > 0)$ where 1(.) is the indicator function. Probability of an individual being unemployed can be shown as follows:

$$P_i = P(\gamma Z_i + \vartheta_i^\gamma > 0) = \mathrm{P}(\varepsilon_i^\gamma > -\gamma Z_i) = 1 - \mathrm{F}(-\gamma Z_i) = \mathrm{F}(\gamma Z_i) \tag{4}$$

Given that $\mathrm{F}(\vartheta_i^\gamma)$ is a logistic distribution, equation (2) provides a binary logit model, which we estimate separately for women and men living in couple households in order to capture distinct effects of determining factors in the case of women and men. We obtain estimated parameters separate for men and women $(\hat{\gamma}_m, \hat{\gamma}_w)$ where subscript *w* stands for women and *m* for men.

In the second step, we estimate unpaid and paid work time of each spouse, assuming time spent on both work times are determined simultaneously. The impact of spouses' unemployment risk on work time is captured through a single variable here, which is the predicted unemployment risk for each spouse obtained in the first step. We incorporate several controls that may confound the relationship between spouses' unemployment risk and work time such as the number of children living in the household. The technique we use is Tobit empirical specification, which allows us to solve a common problem in the time-use data where a large number of the respondents report zero value. A large number of the respondents in our

[20]An alternative specification to logit estimation is probit estimation, which requires a restrictive normality assumption. Thus, we prefer logit estimation here. In addition, when compared to probit log likelihood, logit log likelihood obtained in our estimation also indicates that the logit model provides a better specification (see the note for Table 4).

data set appear to spend zero time on unpaid/paid work activities. Data sets of this sort with truncation require specific methods (Wooldridge 2009).[21] Underlying sources behind this problem are categorized into three as: usual technical problems in data collection, individuals never participate in doing the work specified or, even though in general they do these activities, for some reason, they spend zero time on the day selected for the interviews (Ruuskanen 2004; Flood and Grasjo 1998). The empirical specification we use is:

$$y_{ji}^{l} = \propto_{j}^{'} P_{s}^{l} + \beta_{j}^{'} x_{i} + \epsilon_{ji} \tag{5}$$

where y_{ji}^{l} is the latent variable representing time allocated to activity j by individual i, x_i is a vector of explanatory variables including individual and household characteristics, P_s^l is the spouse's predicted unemployment risk, β_j and $\propto_j$ are vectors of parameters, and $\in_{ji}$ is the error term. The observed time allocation (y_{ji}) variables are related to the corresponding latent time allocation variables by:

$$y_{ji} = y_{ji}^{l} \text{ if } y_{ji}^{l} > 0\,, \qquad y_{ji} = 0 \text{ otherwise} \tag{6}$$

It is important to remark here that an ordinary least squares (OLS) estimation of equation (1) and equation (5) could be consistent if $cov(\varepsilon_{ji}, \vartheta_i^{\gamma}) = 0$ and $cov(\varepsilon_{ji}, \epsilon_{ji}) = 0$. However, given the potential endogeneity problem, necessary conditions for OLS estimation are highly likely to fail. Thus, we use maximum likelihood estimation with logistic estimation in the first step and Tobit estimation in the second step. The empirical specification we use in the second step is a multivariate Tobit, which entails simultaneous determination of time spent on unpaid

[21] Different estimation methods are introduced in the literature in order to solve the large number of respondents reporting zero time: the double-hurdle model, Heckman's model, and Tobit model. Unlike the Tobit model, the Heckman and double-hurdle models consider the decision to participate in doing work as an independent process from the decision on the duration of work. For this reason, one needs a specific equation for participation decision separate from the equation designed for the amount of work. Based on Flood and Grasjo (1998) where a comparison of the suitability of these three estimation methods within the context of labor supply estimation are presented, in the case of labor supply models, since hours of work are only observed for the individuals with market wage, the zero observations are taken as an outcome of a well-defined participation decision process that creates selection bias. The Heckman or double-hurdle method is used in such cases to solve the problem of large numbers of zeros. However, modeling the participation decision process of doing unpaid work is not as straightforward as in the case of labor supply model. Introducing a misspecified participation equation in a double-hurdle or Heckman's model can produce worse results than implementing a Tobit model (Flood and Grasjo 1998).

work and paid work for each spouse. Unobserved factors that influence time spent on unpaid and paid work activities might be correlated. This method provides statistical efficiency gains by using the full information about the error correlation. Apart from the estimation efficiency, the multivariate specification allows one to analyze the correlations between error terms of the equations which reflect the correlations in allocation of time among different activities not accounted for explanatory variables. We use the maximum simulated likelihood (MSL) method here based on the Geweke Hajivassiliou Keane (GHK) simulator in estimating the model in equations (5) and (6) and in order to interpret estimation results, we calculate the marginal effects by multiplying the coefficients obtained with the proportion of noncensored observations in the sample (Greene 1999, 2008).[22]

Maximum likelihood estimation in two stages does not give consistent estimators of parameters for $(\beta_j, \propto_j)$ unless instrumental variables are used in the first stage. As pointed out by Álvarez and Miles, consistent estimators may be obtained by nonlinear instrumental variables where a natural instrument for P_i is $F(\hat{\gamma} Z_i)$ provided that Z_i includes at least one variable, which is not contained in x_i (2003). In this application, Z_i includes individual characteristics (age, age squared to capture possible nonlinear effects of age, years of education completed, the age-education variable for the interaction effect of age and education, and the official rural/urban unemployment rates by sex, education, and age groups obtained from the data provided by the Labor Force Survey conducted in 2006 as the instrumental variable) and household characteristics (the ownership of home appliances). We include age and education related variables, as these variables have the potential to indicate the factors that influence employers' decision on hiring and firing. We expect to obtain a negative relationship both for education and age variable with unemployment risk in the estimation. The official unemployment rates by sex and by urban/rural residence reflect the factors that influence

[22] Among different empirical methods proposed in the literature for multivariate Tobit estimation, an alternative method that outperforms these in terms of computing time and accuracy is the maximum simulated likelihood (MSL) (Stern 1997; Arias and Cox 2001; Hajivassiliou and Ruud 1994). This method consists in the evaluation of the integrals in the log likelihood function by simulation rather than calculation. See Hajivassiliou and Ruud 1994 for alternative estimation methods that rely on simulation. Reviewing several probability simulators using Monte Carlo methods, Hajivassiliou and Ruud found that the Geweke-Hajivassiliou-Keane (GHK) simulator performed better than other simulators in terms of robustness and accuracy (1996). The simulation methods use the fact that the integrals of interest correspond to the probability of an event in a population. The GHK simulator in turn approximates these probabilities by taking a number of random draws from the truncated standard normal distribution and taking the average of the simulated probabilities. See Greene 2008, Stern 1997, Arias and Cox 2001, and Hajivassiliou and Ruud 1994 among others for an explanation of the GHK simulator.

regional demand for labor. Unemployment risk is expected to be higher the higher the average official unemployment rates and as the instrumental variable, it has proved not to be serially correlated with work time in second step estimation.[23] Turning to the household characteristics, we include the ownership of domestic appliances as a dummy variable in the estimation.[24] Ownership of appliances is a sign of households' well-being and living standards; thus, we expect to get a negative relationship between an individual's unemployment risk and this dummy variable. Secondly, given the close association between ownership of domestic appliances and unpaid work time, it might also play a critical role in determining time spent on job seeking activities (i.e., job search intensity of individuals, which in turn has a potential to decrease unemployment risk). Thus, we incorporate ownership of domestic appliances as a control to capture both of these effects.

x_i is the vector of explanatory variables that we control for when estimating unpaid and paid work time. Except for the instrumental variable incorporated in Z_i, x_i includes all the independent variables used in the first step (age and age squared, education years, interaction variable for education and age, and ownership of domestic appliances). In addition to these variables, we also control for the variables that may affect both unemployment risk and work time. Urban/rural (0/1) residence and the number of children (by sex and age group: older than 15 years of age and younger than 16) are our additional controls. Based on other country experiences, we expect to get a positive relationship between unpaid work time and urban/rural dummy and the reverse might be obtained for paid work time (Antonopoulos and Hirway 2010). With respect to the number of children, we expect to get an increase in unpaid work and a decrease in paid work time as the number of children living in household increases. However,

[23] Men's unpaid work time and paid work time are not correlated with the instrumental variable (with p values equal to 0.2 and 0.6 respectively). Women's unpaid work time is also not correlated with p-value as 0.9; however, women's paid work time is found to be correlated, which might be a reflection of the strength of discouraged worker effect for women in Turkey. See Tansel 2001 for a discussion on this issue.

[24] We do not use income variable as a proxy for the living standard of the household. This is partly because we want to examine the impact of the household's living conditions minimizing the respondent member's contribution. However, the only income variable provided by the data is household income and we cannot isolate other household members' income from the individual income. On the other hand, owning domestic appliances also indicates that households live in a condition where at least water and electricity are supplied. Thus, we introduce here a stock variable reflecting the quality of living conditions. We define households who do not have a washing machine and dishwasher as households with relatively worse living conditions. We only include these two home appliances as others do not reflect the differences in households' income level. For example, nearly all households in our sample have a television and refrigerator.

based on some evidence presenting that young children also spend a considerable amount of time on unpaid work activities helping their parents, one might also get an inverse relationship, particularly between the number of children ages 15 and over, and the risk of unemployment (Ilahi 2000). These results might show distinct characteristics among women and men as well as depending on the sex and age of the children.

Following the two-step estimation summarized, we compute the marginal effects of spouses' unemployment risk on unpaid and paid work time by multiplying the coefficient estimates obtained in the second step with corresponding scale factors used to transform the outcomes to uncensored ones (Greene 1999). Marginal effects show the change in individuals' work time in minutes/day, given a 1 percent increase in spouses' unemployment risk; then, based on the two different scenarios we constructed, using the marginal effects obtained for spouses' unemployment risk variable we estimate the recent crisis' impact on work time. First, to obtain an average estimate, we assume unemployment risk for married women and married men rise at a rate equal to the increase in relevant actual unemployment rates for both (see figures in Table 4). Secondly, in order to capture sector-specific impacts, unemployment risk for married women and married men is assumed to rise at a rate equal to the increase in actual unemployment rates by sector, i.e., agriculture, industry, and services.[25] We summarize our results for each scenario in the following section.

EMPIRICAL RESULTS

Table 5 presents first-step estimation results. Data suggest that unemployment risk significantly decreases with age for men at an increasing rate. This result might partly indicate that longer years of work result in higher severance payments to be paid to the employees when terminated. On the other hand, employees specialize and gain experience as they get older, which leads to a decline in their unemployment risk. However, unlike men, women from higher

[25] We calculate the change in sectoral unemployment rates as the percent change in the unemployment rate by sector between the beginning of 2008 and the end of 2009. Unemployment rate by sector is computed based on the official statistics reported by TurkStat as the ratio of number of unemployed in each sector over the labor force: total number of unemployed and employed. The number of unemployed newly entered in the labor market is distributed among the three sectors according to each sector's share in total unemployed. Official statistics reported are provided by four sectors: agriculture, industry, construction, and services. Here, we include construction in the industrial sector.

age groups seem to face a higher unemployment risk in Turkey, which increases at a decreasing rate. Elderly women having less formal education and experience in the labor market might lead to this result. Positive and significant influence of education for both women and men indicates that populations with a higher level of education face a higher risk of unemployment in Turkey. Official statistics reported by the Turkish Statistical Institute also provide supporting evidence for this result: except for the group with university degrees, the average unemployment rate increases with the level of education for both women and men living in Turkey (TurkStat 2006). In addition, research on the youth population establishes that the highly-educated, youth population faces a much higher risk of job insecurity and unemployment in Turkey due to the rise in unemployment rates of white collar workers (Bora et al., 2011). The joint effect of education and age in our results suggests similar facts as well. Significant and negative coefficient of the interaction term implies a lower unemployment risk for individuals who are in higher age groups and have relatively higher education levels, while younger individuals with higher education face higher unemployment risk. As expected, the coefficients for the instrumental variable present a positive relationship between individuals' unemployment risk and actual regional unemployment rates for both women and men indicating that the likelihood of being unemployed depends on the labor market conditions where the individual is living as well as the individual's sex (Table 5).

Regarding the household characteristics, the negative relationship between unemployment risk and the ownership of domestic appliances for men indicates a lower risk when they own domestic appliances in the household. Despite the controversy in the literature about whether domestic appliances actually save time or not, our results here suggest the fact that, for men, domestic appliances might release time from housework which influences the time they spend on job seeking, i.e., the job search intensity (Bittman, Rice, and Wajcman 2004). On the other hand, as mentioned above, the ownership of domestic appliances signifies status (the way of living) and men seem to have a lower unemployment risk if they are living in households with relatively higher standards. However, as can be observed by the results in Table 5, for women, we do not get a significant effect of domestic appliances on unemployment risk, which suggests that unlike men, domestic appliances do not save women's time in Turkey,

supporting the arguments by Özbay (1990, 2002).[26]

Turning to our main results, the second-step estimation results, figures in Tables 6 and 7 present our findings on the relationship between spouses' unemployment risk and work time for women and men respectively. We provide the estimates both at the national level as well as at the regional level for the couples living in urban and rural areas separately. Results show significant differences among women and men. As can be seen in Table 6, except for women living in rural areas, there is a significant and positive relationship between husbands' unemployment risk and time devoted to paid and unpaid work by women. In other words, married women in Turkey spend more time on both unpaid and paid work activities, when the unemployment risk of their spouses' increases. In rural areas, this positive effect is only observed for women's paid work time.

On the other hand, figures in Table 7 show that unlike the case for married women, there is no significant relationship between wives' unemployment risk and men's paid work time. While men also spend more time doing unpaid work, when their spouse's unemployment risk increases, the impact is much higher for women than men. The coefficients reported in Tables 6 and 7 show the marginal effects of the independent variables on work time conditional on the outcome being uncensored. To give an example of how to interpret these results, if there is a 1 percent (0.01) increase in husbands' unemployment risk, women's unpaid work time rises by 3 minutes/day (311.4 multiplied by 0.01) at the national level, whereas in urban areas the increase is 5 minutes/day (496.5 multiplied by 0.01). Corresponding figures for men are 0.9 minutes/day (87.4 multiplied by 0.01) and 0.9 minutes/day (92.6 multiplied by 0.01) respectively. Thus, nationwide averages show that given a 1 percent change in the husband's unemployment risk, in addition to an increase in their paid work time (3.5 minutes/day), women's total work time rises approximately eight times (7.6 times) more than that of men and in urban areas the change is nine times (8.9 times) more than men.

As far as the effects of other individual characteristics we controlled for are concerned, we observe that for both women and men, paid work time significantly increases at a decreasing

[26] See Özbay 1990 and 2002 on the role of domestic technology on housework within the context of the modernization and urbanization experience in Turkey. As she argues, even though domestic technology played a critical role in the transformation of housework activities (changing the composition of housework) in Turkey in the 1950s and 1960s, the amount of time women spend on housework has not actually changed (see also Davidoff 2002).

rate with age and for unpaid work time we obtain the opposite. Education increases women's paid work time while decreasing their unpaid work time (Table 6). This might reflect the fact that women with higher education have higher bargaining power both at home with regards to the allocation of time within the household, as well as in the labor market. Consistent with earlier evidence based on American households, figures in Table 7 indicate that educated men do more unpaid work in Turkey (e.g., Huber and Spitze 1983).[27] On the other hand, the education and age interaction term shows that women's paid work time significantly decreases, while unpaid work time increases (row 4 in Table 6), which might point particularly to the status of middle class women in Turkey. Despite their high education level, they do not participate in the labor market partly because they can afford to be housewives and are not forced to do a double shift.

Turning to the effects of the number of children, based on earlier evidence one could expect that regardless of age the number of children increase unpaid work time and the effect is in general found to be stronger in the case of women. However, our results show that both women and men appear to be sharing their unpaid work burden with their daughters in Turkey. Compared to men, however, the impact on women's unpaid work time is much stronger when compared to that of men. In addition, we also observe that there is a positive relationship between the number of daughters and mean duration of paid work time of women, except for those living in rural areas. Couples living in urban areas participate in doing paid work when there are female children who bear the unpaid work, such as caring for siblings, commonly observed in Turkey.

It is also interesting to observe that there is a significant negative relationship between the number of daughters younger than 16 and married women's unpaid work time, except for women living in urban areas. Even if they are not grownup yet, they share the unpaid work burden within the household like other female members. This might indicate that in urban areas, since school enrollment rates for girls are higher than in rural areas, younger daughters not staying at home do not help their mothers with domestic chores.[28]

Unlike the effects of female children, the number of male children over 15 years of age

[27] See also Goldscheider and Waite 1991, Brines 1994, and Presser 1994.

[28] Nadeem İlahi (2000) points to two opposing effects to explain children's effect on women's housework time: income effect (as mother's income increases her demand for children's education increases) and substitution effect (children have to step in for mother's forgone housework) and here, the income effect might dominate.

does not appear to have any significant impact on women's work time, whereas we observe a significant influence on men's paid and unpaid work time. The higher the number of male members in the household, the less time has to be devoted to paid work for income by each, although this result is not significant for the households living in rural areas. Moreover, an increasing number of male children older than 15 leads to a decline in unpaid work time for men as, again, larger household size might bring about an allocation among members. This negative impact on unpaid work is particularly significant for those living in rural areas, which might indicate the fact that gender-based allocation of unpaid work is somewhat different in rural areas compared to the urban areas in Turkey. In rural areas, subsistence production mostly depends on unpaid work where men are involved as well (e.g., Özbay 1990).[29]

The number of male children younger than 16 significantly affects both paid and unpaid work time of women regardless of their place of residence. Contrary to the effect of female children, a higher number of sons (younger than 16) results in lower paid work and higher unpaid work time for women, as taking care of children is an important part of women's unpaid work. Unlike female children, male children under 16 years of age do not share the unpaid work burden of women in Turkey. In addition, there is a negative relationship between women's paid work time and number of sons under 16 years of age. Results obtained may also reflect the patriarchal values as male children are more valued than female children. Caring for male children is perceived to be more important and thus, their mothers are released from working for pay. In addition, sons under 16 years of age have a positive and significant effect on men's unpaid work time, except for the men living in rural areas, which supports the argument in the literature that men who have male children spend more time on caring activities (e.g., Yeung, et al., 2001; Lundberg, Romich, and Tsang 2007).[30] Finally, as expected, estimation results show that domestic appliances increase paid work time while decreasing the unpaid work time of men. Contrary to expectations, we do not see any significant impact on women's unpaid and

[29]See also Deniz Kandiyoti 1997.

[30] Despite this increase in men's unpaid work time, Memiş, Öneş and Kızılırmak find that the increase in men's unpaid work time is a phenomenon observed mostly in the comparison of families without children and families with only one young child in Turkey (2011). Men stop sharing the burden at home when the number of children increases: the increase does not affect men's time use significantly. Women, on the other hand, are affected significantly by the increase in number of children: their paid work time decreases and unpaid work time increases when the number of children increases from one to two. When the number of children increases from two to three or more, women's total work time rises significantly.

paid work time, except for women living in urban areas where we see that owning domestic appliances increases the amount of time women devote to paid work in Turkey. These findings, as mentioned above, are consistent with earlier studies arguing that "labor saving" domestic technology does not save time for women (Bittman, Rice, and Wajcman 2004).

Now in order to calculate the impact of the recent economic crisis on work time, we use the marginal effects of spouses' unemployment risk on paid and unpaid work time and the actual increase in corresponding unemployment rates officially reported in Turkey. First, we assume unemployment risk for married women and married men rise at a rate equal to the increase in relevant actual unemployment rates for both (Table 4). We calculate the change in paid and unpaid work time of women and men simply by multiplying the percent changes in actual unemployment rates with marginal effects. To illustrate, as can be observed from the actual nationwide average unemployment figures in Table 4, the change in married men's unemployment rate was 3.2 percent during the crisis period, rising from 7 percent at the beginning of 2008 to 10.2 percent by the end of 2009. Multiplying the change (3.2 percent) by the marginal effects of spouses' unemployment risk variable obtained for women's paid and unpaid work time, which are 349.61 and 311.35 respectively (see row 5, column 1 and 2 in Table 6), we get an average estimate that shows the change in mean duration of paid and unpaid work time spent by women due to the crisis: married women living in nuclear couple households work almost half an hour longer/day (21 minutes/day=change in total work time=(0.032 X 349.61)+(0.032 X 311.35)) given the relationship between the husband's unemployment risk and their work time.

In our second scenario, given that not all sectors were equally affected by the crisis, to capture sector-specific impacts, we assume unemployment risk for married women and married men rise at a rate equal to the increase in actual unemployment rates by sector (see figures in Table 4). Similar to the computation we follow in scenario one, we obtain the sector-specific results of the crisis on work time by using the marginal effects of spouses' risk of unemployment and the changes in actual unemployment rate by sector. Our conclusions are reported in Tables 8 and 9. Results show that married women's total work time on average increases by 21 minutes/day (5 percent), whereas the corresponding rise for their spouses is only 2.7 minutes/day (1 percent) at the national level, widening the existing gap between women and

men by 25.6 percent. In urban areas, the percentage change in women's total work time is 7 percent (30.4 minutes/day), much higher than men, which is again 1 percent (3.7 minutes) for married men. Thus, the gap between women and men increases by 49 percent in urban areas. In rural areas, married women's total work time on average rises by 3.2 percent, whereas men's mean duration of paid and unpaid work time do not change.

In scenario two, the percent increase in women's total work time ranges from 3 percent to 12 percent depending on the sector their spouses are employed in. The change is highest for women whose spouse is employed in the industry sector, which has been hit hardest by the recent crisis. Note that in urban areas, mean duration of total work time spent by women increases by almost an hour/day (54 minutes/day) if their spouses are employed in industry.

In both scenarios, the percent increase in paid work time devoted by women is higher than the increase in their unpaid work time and the reverse is true for men. This is because the original mean duration of time spent on unpaid work/paid work activities is much higher/lower for married women than married men in Turkey (see actual figures for paid and unpaid work time in Table 8). In both scenarios, the gap between women and men in paid work time decreases, whereas it widens as far as the time devoted to unpaid work is considered.

Given these results, in this study, we provide supporting evidence for the arguments that household members' job losses disproportionately affect women's work burden. In addition, the argument that adjustments in hours of work differ among women and men is also maintained by our results. Husbands' job losses urge women to do more paid work to compensate the loss in household income. At the same time, women are compelled to spend more time doing unpaid work, since a fall in household income necessitates the home production of some goods and services previously purchased in the market.

CONCLUSION

This paper provides estimates of the impact of the recent crisis on work time in Turkey by focusing on its usually neglected dimension: work time. Based on the first national Turkish Time Use Survey conducted in 2006, we model time spent on paid and unpaid work using a two-step estimation specification, where we first estimate the unemployment risk of women and

men living in couple households and secondly, we estimate the impact of unemployment risk faced by each on their spouses' unpaid and paid work time. Estimation results show that according to the nationwide averages, given a 1 percent change in spouses' unemployment risk, both paid and unpaid work devoted by married women in Turkey rises significantly, whereas we only observe a significant change in men's unpaid work time where the impact is much stronger for women than men: women's unpaid work time rises approximately four times more than that of men and in urban areas the change is five times more than men.

Based on the estimation results, we calculate the recent crisis' impact constructing two different scenarios. To provide an average estimate, first we assume unemployment risk for married women and married men rise at a rate equal to the increase in relevant actual unemployment rates for both. Secondly, in order to reveal the sector-specific impact of the crisis on work time, we assume unemployment risk for married women and married men rise at a rate equal to the increase in actual unemployment rates by sector. Our findings support the argument that preexisting gender inequalities in work time are deepened by the economic crises and that the impacts of economic crises take a gender-biased form, putting most of the work burden upon women's shoulders.

This study not only helps to complete the picture of cost of the recent economic crisis by providing empirical estimates of the possible impacts of the recent economic crisis on paid and unpaid work time, but also introduces a methodology to investigate possible effects of labor market conditions on time-use patterns when frequency of collection of time-use data does not allow the researcher to do a direct comparison using two distinct data sets collected in different times.

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Appendix. Descriptive Statistics and Tables

Table 1: Descriptive Statistics of the Data

	Data		Sample	
	Women	**Men**	**Women**	**Men**
Number of Observations	5,193	4,642	2,491	2,491
Age group	2.64	2.77	2.91	3.22
Marital Status (%)	44	44	100	100
HOUSEHOLD				
Urban (%)	62	63	68	68
Ratio of couples with no children (%)	37	37	32	32
Number of children aged less than 16 years	1.37	1.31	1.30	1.30
Number of people in household	4.45	4.45	3.86	3.86
Household Income (%)				
Less than 300 TL	10	9	8	8
301-450	14	14	16	16
451-600	18	17	18	18
601-750	11	11	12	12
751-1000	18	19	19	19
1001-1250	8	8	7	7
1251-1750	9	10	9	9
1751-2500	7	7	7	7
2501-4000	3	3	3	3
More than 4000 TL	1	1	1	1
EDUCATIONAL STATUS (%)				
Illiterate	24	7	19	6
Primary school	39	39	53	49
Secondary school	15	22	8	14
High School	16	22	14	20
University or above	6	10	6	12
LABOR MARKET STATUS (%)				
Employed	25	72	20	82
Unemployed	2	5	1	3
Homemaker	61	0	75	0
Student	6	8	0	0
Retired	3	11	3	13
Economically inactive (elderly/unable to work)	2	0	1	1
Other	2	3	0	1
SECTOR (%)				
Agriculture	47	20	45	15
Manufacturing	16	31	13	31
Services	37	49	42	54
TYPES OF EMPLOYMENT (%)				
Employed (regular)	41	49	40	54
Employed (irregular)	7	12	9	11
Unpaid family worker	39	6	38	0
Employee	0	7	1	9
Self employed	11	26	12	26

Source: Authors' calculations based on Turkish Time Use Survey Data, Turkish Statistical Institute, 2006.

Table 2. Household composition according to the number of earners

	Frequency	%
No earner	466	18.71
One earner (female)	44	1.77
One earner (male)	1,509	60.58
Dual earner	472	18.95
Total	2,491	100

Source: Authors' calculations based on Turkish Time Use Survey Data for couple households, Turkish Statistical Institute, 2006.

Table 3. Paid, Unpaid and Total Work (hours/day), Weighted Averages for the Sample

	Women			Men		
	Unpaid Work	Paid Work	Total Work	Unpaid Work	Paid Work	Total Work
Labor Market Status						
Employed	4.74	4.06	8.80	0.82	6.19	7.01
Unemployed	6.46	0.03[1]	6.49	1.54	0.67	2.22
Retired	6.07	0.00	6.07	1.40	0.47	1.87
Economically inactive (elderly/unable to work)	4.90	0.00	4.90	1.11	0.00	1.11
Homemaker	6.94	0.09	7.03	-	-	-
Employmet Status						
Employed (regular)	4.48	4.13	8.62	0.89	6.39	7.28
Employed (irregular)	4.95	3.45	8.40	0.72	5.51	6.23
Employee	3.57	5.00	8.57	0.75	6.35	7.10
Self employed	5.36	3.23	8.58	0.76	5.87	6.63
Unpaid Family Worker	5.08	3.85	8.93	0.75	5.07	5.82

Source: Authors' calculations based on Turkish Time Use Survey Data for women and men living in couple households, Turkish Statistical Institute, 2006.

[1] Positive paid work time for unemployed is due to categorization of time spent looking for a job as paid work time by the survey.

Table 4. Average Unemployment Rates by Sex, Age 15 Years and Over (%)

	Pre-crisis (beginning of 2008)		2009	
Married	***Women***	***Men***	***Women***	***Men***
National	6.0	7.0	9.1	10.2
Urban	10.8	7.6	14.9	11.3
Rural	1.6	5.7	3.1	7.6
Unemployment Rates By Sector	***Women***	***Men***	***Women***	***Men***
Agriculture	1.9	5.7	3.0	7.0
Industry	16.7	13.9	23.0	22.0
Services	19.0	8.0	19.0	11.0

Source: Unemployment rates by sector are calculated based on 2007 and 2009 Household Labor Force Survey Data (TurkStat, 2007, 2009). First time job seekers are distributed among sectors proportional to the percentage distribution of unemployed among the three sectors. Industry includes the construction sector.

Table 5. Logit Estimates of Probability of Being Unemployed

VARIABLES	**Women (1)**	**Men (2)**
Individual Characteristics		
Age (group median)	0.528*	-0.013
	(0.278)	(0.062)
Age^2	-0.007*	0.0003
	(0.004)	(0.001)
Education years	0.953***	0.276***
	(0.172)	(0.078)
Education*age	-0.027***	-0.007***
	(0.007)	(0.002)
Actual average unemp. rates by sex, education, age group and rural/urban location	0.594*	0.056***
	(0.040)	(0.016)
Household Characteristics		
Ownership of domestic appliances (1=own)	0.041	-1.46
	(0.587)	(0.195)
Constant	-14.101***	-2.00
	(4.333)	(1.345)
N	1,717	5,148
Mc Fadden's pseudo R^2	0.27	0.10
Logit Log Likelihood	-1396422	-4873364
Probit Log Likelihood	-1402356	-4875947
Wald (Chi2)	119.66	189.98

Note: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Given the very low level of unemployment rate and labor force participation rate among married women, we include all the women and men aged over 15 years living in couple households in order to estimate the unemployment risk. In our second-step estimation we use the predicted unemployment risk for the final sample 2,491 couples retrieved from the sample used in logistic estimation.

Table 6. Multivariate Tobit Estimates of Paid and Unpaid Work Time Spent by Women: Marginal Effects Conditional on the Outcome Being Uncensored

Row	Dep. Var.: Daily Minutes	National (2,491 couples)		Urban (1,694 couples)		Rural (797 couples)	
		(1)	(2)	(3)	(4)	(5)	(6)
	VARIABLES	Paid Work	Unpaid Work	Paid Work	Unpaid Work	Paid Work	Unpaid Work
	Individual Characteristics						
(1)	Age (group median)	11.63***	-8.11***	8.53***	-4.63*	17.97***	-18.51***
		(9.72)	(1.99)	(17.42)	(2.35)	(11.84)	(3.74)
(2)	Age^2	-0.12***	0.07***	-0.11***	0.04	-0.18***	0.17***
		(0.11)	(0.02)	(0.22)	(0.03)	(0.13)	(0.04)
(3)	Education years	8.41***	-6.31***	4.99**	-3.13	4.81	-18.72***
		(12.70)	(2.75)	(20.10)	(3.13)	(17.63)	(6.13)
(4)	Education*age	-0.11**	0.10**	-0.02	0.00	-0.08	0.50***
		(0.29)	(0.06)	(0.48)	(0.07)	(0.41)	(0.14)
(5)	Husband's/partner's unemp. risk	349.61***	311.35***	315.62***	496.46***	746.92***	-104.26
	(predicted)	(473.13)	(134.22)	(782.51)	(178.581)	(611.87)	(210.14)
	Household Characteristics						
(6)	Rural/Urban (1=Rural)	61.29***	-3.78	-	-	-	-
		(24.87)	(6.27)				
(7)	# of daughters (older than 15 years)	1.48	-28.97***	10.90**	-33.61***	-11.62	-20.26*
		(23.27)	(5.09)	(41.08)	(5.91)	(27.15)	(10.19)
(8)	# of sons (older than 15 years)	-4.87	-3.42	-1.47	-6.29	-4.99	0.99
		(24.86)	(5.59)	(47.78)	(6.79)	(26.65)	(10.17)
(9)	# of sons (younger than 16 years)	-11.22***	31.38***	-10.90**	36.46***	-12.48**	25.64***
		(17.18)	(4.05)	(32.13)	(5.33)	(17.70)	(6.52)
(10)	# of daughters (younger than 16 years)	5.80	-8.39*	1.19	-5.62	13.136	-14.32
		(23.90)	(5.10)	(43.08)	(5.94)	(26.67)	(9.78)
(11)	Ownership of domestic appliances	-0.21	0.77	50.61**	9.08	15.80	-32.74*
	(1=Own)	(58.98)	(16.43)	(195.98)	(29.74)	(57.20)	(18.64)
	N	4,971		3,380		1,591	
	Lnsigma1	6.264***		6.503***		5.983***	
		(0.025)		(0.034)		(0.038)	
	Lnsigma2	5.096***		5.086***		5.098***	
		(0.012)		(0.015)		(0.020)	
	atrh0	-0.730***		-0.762***		-0.709***	
		(0.030)		(0.045)		(0.040)	

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1, p<0.15

Note: 1. Scale factor used to calculate marginal effects for women is 0.99 and 0.18 for unpaid work and paid work equations respectively at the national level. Corresponding figures for women living in urban areas are 0.99 and 0.12 and for women in rural areas are 0.99 and 0.31 for unpaid work and paid work equations. Scale factors are calculated as the proportion of non-zero respondents, i.e., 0.99 indicates 99 percent of women participate in doing unpaid work and spend positive number of minutes > 0.

2. Observation numbers (N) are higher than number of respondents (2,491). There are two observations for 99 percent of the respondents who report their time-use data in both diaries. Half of the diaries were collected on a weekday and the other half on the weekend. Diary weights used are provided by TUS, 2006.

3. Coefficients show marginal effects. Thus, for significance, these marginal effects need to be converted to their original values then divided by the standard errors provided in parentheses.

Table 7. Multivariate Tobit Estimates of Paid and Unpaid Work Time Spent by Men: Marginal Effects Conditional on the Outcome Being Uncensored

Row	Dep. Var.: Daily Minutes	National (2,491 couples)		Urban (1,694 couples)		Rural (797 couples)	
		(1)	(2)	(3)	(4)	(5)	(6)
	VARIABLES	**Paid Work**	**Unpaid Work**	**Paid Work**	**Unpaid Work**	**Paid Work**	**Unpaid Work**
	Individual Characteristics						
(1)	Age (group median)	21.60***	-3.17***	26.89***	-3.50***	7.46	-3.98
		(5.88)	(2.06)	(7.34)	(2.50)	(10.15)	(3.66)
(2)	Age^2	-0.34***	0.04***	-0.44***	0.04***	-0.15**	0.05**
		(0.07)	(0.02)	(0.08)	(0.03)	(0.11)	(0.04)
(3)	Education years	-0.30	3.11**	-4.46	2.75**	-9.03	0.67
		(6.69)	(2.36)	(7.95)	(2.76)	(14.12)	(4.91)
(4)	Education*age	-0.08	-0.02	0.03	-0.02	0.16	0.07
		(0.15)	(0.05)	(0.19)	(0.06)	(0.31)	(0.11)
(5)	Wife's/partner's unemp. risk	-143.23	87.42**	-141.89	92.62**	-78.99	-39.06
	(predicted)	(195.59)	(68.00)	(205.15)	(72.68)	(646.14)	(218.92)
	Household Characteristics						
(6)	Rural/Urban (1=Rural)	8.05	3.20	-	-	-	-
		(13.99)	(4.90)				
(7)	# of daughters (older than 15 years)	22.98***	-11.08***	31.77***	-14.31***	7.69	-2.92
		(12.32)	(4.27)	(14.34)	(5.08)	(23.34)	(7.89)
(8)	# of sons (older than 15 years)	-28.52***	-6.41***	-23.44**	-4.38	-19.31	-13.71**
		(12.78)	(4.45)	(16.42)	(5.27)	(19.66)	(8.15)
(9)	# of sons (younger than 16 years)	1.47	4.21**	9.17	4.95**	-8.59	3.68
		(7.79)	(2.96)	(9.56)	(3.72)	(14.18)	(5.04)
(10)	# of daughters (younger than 16 years)	0.16	-2.42	-4.78	-2.87	9.33	-1.77
		(10.57)	(3.76)	(12.07)	(4.32)	(21.11)	(7.44)
(11)	Ownership of domestic appliances	100.29***	-16.61***	110.22***	-5.71	73.05***	-28.67***
	(1=Own)	(27.28)	(10.18)	(49.59)	(15.88)	(32.70)	(13.43)
	N	4,967		3,376		1,591	
	Lnsigma1	5.86***		5.86***		5.85***	
		(0.02)		(0.02)		(0.03)	
	Lnsigma2	4.82***		4.80***		4.87***	
		(0.03)		(0.04)		(0.04)	
	atrh0	-0.52		-0.52***		-0.54***	
		(0.02)		(0.03)		(0.04)	

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1, p<0.15

Note: Scale factor used to calculate marginal effects for men is 0.74 and 0.56 for unpaid work and paid work equations respectively at the national level. Corresponding figures for men living in urban areas are 0.74 and 0.55 and for men in rural areas are 0.73 and 0.60 for unpaid work and paid work equations. Scale factors are calculated as the proportion of non-zero respondents, i.e., 0.74 indicates 74 percent of men participate in doing unpaid work and spend positive number of minutes > 0. Also see additional notes for Table 6.

Table 8. Summary results for Scenario 1 (time in minutes/day)

Row	*National*	*Actual*			*Scenario 1*		
		Paid	***Unpaid***	***Total***	***Paid***	***Unpaid***	***Total***
		(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
(1)	Women	53	387	440	65	397	462
(2)	Men	313	55	369	313	58	371
(3)	*Gender Gap*	-260	332	72	-249	339	90
	% Change in Work Time						
(4)	Women				21.0	2.6	4.8
(5)	Men				0.0	4.9	0.7
(6)	*Gender Gap*				-4.3	2.2	25.6
	Urban	***Actual***			***Scenario 1***		
		Paid	***Unpaid***	***Total***	***Paid***	***Unpaid***	***Total***
(7)	Women	42	387	428	54	405	459
(8)	Men	320	54	374	320	58	378
(9)	*Gender Gap*	-279	333	54	-267	347	81
	% Change in Work Time						
(10)	Women				28.7	4.8	7.1
(11)	Men				0.0	7.0	1.0
(12)	*Gender Gap*				-4.3	4.4	49.1
	Rural	***Actual***			***Scenario 1***		
		Paid	***Unpaid***	***Total***	***Paid***	***Unpaid***	***Total***
(13)	Women	78	389	467	93	389	482
(14)	Men	298	58	356	298	58	356
(15)	*Gender Gap*	-220	330	111	-205	330	126
	% Change in Work Time						
(16)	Women				19.4	0.0	3.2
(17)	Men				0.0	0.0	0.0
(18)	*Gender Gap*				-6.9	0.0	13.6

Source: Authors' calculations based on Turkish Time Use Survey Data, Turkish Statistical Institute, 2006, 2007, and 2009 Household Labor Force Survey Data (TurkStat, 2007, 2009).

Note: We calculate the gender gap and percentage change in work time in the following way: gender gap at the national level is computed by subtracting the figures in row 1 from the figures in row 2, and percentage change in paid work time for women is calculated by subtracting the figure in row 1 column 1 from the figure in row 1 column 4 and dividing by the former.

Table 9. The results for Scenario 2 (time in minutes/day)

Row	*National*						
	Spouse's Sector	***Agriculture***	***Industry***	***Services***	***Agriculture***	***Industry***	***Services***
		Women's Work Time			***Men's Work Time***		
		(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
(1)	Paid	60	81	64	313	313	313
(2)	Unpaid	394	412	397	57	62	55
(3)	Total	454	494	460	370	376	368
	Gender Gap						
(4)	Paid	-253	-232	-249	-260	-260	-260
(5)	Unpaid	338	357	341	330	325	332
(6)	Total	86	125	92	70	65	72
	% Change in Work Time						
(7)	Paid	13.1	52.4	19.7	0.1	0.1	0.0
(8)	Unpaid	1.7	6.5	2.5	3.2	12.7	0.0
(9)	Total	3.1	12.1	4.6	0.6	2.0	0.0
	% Change in Gender Gap						
(10)	Paid	-2.7	-10.8	-4.0	0.1	0.1	0.0
(11)	Unpaid	2.0	7.6	2.9	-0.5	-2.1	0.0
(12)	Total	18.8	73.8	27.9	-2.9	-10.2	0.0

Source: Authors' calculations based on Turkish Time Use Survey Data, Turkish Statistical Institute, 2006, 2007, and 2009 Household Labor Force Survey Data (TurkStat, 2007, 2009).

Note: Since we provide the actual averages in Table 8, in this table we only present the estimated results under scenario 2. Thus, gender gap in work time is computed by subtracting the corresponding actual work time provided in Table 8 from the figures obtained under the second scenario, i.e., figures in each cell in rows 1, 2, and 3. For example, if the spouse is employed in agriculture, under scenario 2, women's paid work time rises to 61 minutes/day (row 1 column 1). Subtracting men's actual paid work time 313 minutes/day (row 2 column 1 in Table 8) from 61 minutes/day we obtain the gender gap.

Table 9 (cont.) The results for Scenario 2 – Urban/Rural Locations (time in minutes/day)

Row	*Urban*						
	Spouse's Sector	***Agriculture***	***Industry***	***Services***	***Agriculture***	***Industry***	***Services***
		Women's Work Time			***Men's Work Time***		
		(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
(1)	Paid	48	68	52	320	320	320
(2)	Unpaid	397	426	402	56	61	54
(3)	Total	445	494	453	376	382	374
	Gender Gap						
(4)	Paid	-272	-252	-268	-278	-278	-278
(5)	Unpaid	343	372	348	331	326	333
(6)	Total	71	120	79	53	47	55
	% Change in Work Time						
(7)	Paid	15.1	61.4	22.8	0.1	0.1	0
(8)	Unpaid	2.5	10.2	3.8	3.2	13.5	0
(9)	Total	3.7	15.2	5.6	0.6	2.1	0
	% Change in Gender Gap						
(10)	Paid	-2.3	-9.3	-3.4	0.2	0.2	0
(11)	Unpaid	2.9	11.8	4.4	-0.5	-2.2	0
(12)	Total	28.9	11.5	43.8	-3.9	-14.0	0
	Rural						
	Spouse's Sector	***Agriculture***	***Industry***	***Services***	***Agriculture***	***Industry***	***Services***
		Women's Work Time			***Men's Work Time***		
(1)	Paid	94	142	102	298	298	298
(2)	Unpaid	389	389	389	58	58	58
(3)	Total	483	530	490	356	356	356
	Gender Gap						
(4)	Paid	-204	-156	-196	-220	-220	-220
(5)	Unpaid	330	330	330	330	330	330
(6)	Total	127	174	135	111	111	111
	% Change in Work Time						
(7)	Paid	20.4	81.6	30.6	0.0	0.0	0.0
(8)	Unpaid	0.0	0.0	0.0	0.0	0.0	0.0
(9)	Total	3.4	13.6	5.1	0.0	0.0	0.0
	% Change in Gender Gap						
(10)	Paid	-7.2	-29.0	-10.9	0.0	0.0	0.0
(11)	Unpaid	0.0	0.0	0.0	0.0	0.0	0.0
(12)	Total	14.4	57.5	21.5	0.0	0.0	0.0