Evidence of Added Worker Effect from the 2008 Economic Crisis*

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January 2015

Abstract

This paper contributes to the research on interdependencies in spousal labor supply by analyzing labor supply response of married women to their husbands' job losses ("added worker effect"). It empirically tests the hypothesis of added worker effect relying on a case study on Turkey during the global economic crisis of 2008. Identification is achieved by exploiting the exogenous variation in the output of male-dominated sectors that were hit hard by the crisis and the high degree of gender segmentation that characterizes the Turkish labor market. Findings based on the instrumental variable approach suggest that the probability of entering the labor force for a woman increases by up to 29% in response to her husband's unemployment. However the effect is not contemporaneous; it appears with a quarter of lag and remains existent only for two quarters.

Keywords: spousal labor supply, added worker effect, discouraged worker effect, global economic crisis.

JEL Classification: C26, D13, J16, J21.

*I am deeply grateful to Margherita Fort and Riccardo Rovelli for their guidance, advice and criticisms throughout my research. Special thanks to Erich Battistin, Richard Blundell, Fabian Lange, Harmut Lehmann, Maria de Paola, Silvia Pasqua, Chiara Pronzato and Rudolf WinterEbmer for invaluable comments and suggestions. I also thank to all the seminar participants at the University of Bologna, the 6th VPDE Workshop in Applied Economics in Collegio Carlo Alberto, the 29th annual AIEL Conference as well as VfS Annual Conference 2014. Last but not least, I wish to express my gratitude to the IZA research team for their comments which helped me a lot to finalize the paper. All errors are my own.

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1 Introduction

"Added worker effect" (AWE) has been extensively discussed in the literature to explain the labor supply response of wives to their husbands' unemployment by entering the labor force (extensive margin) or increasing their working hours (intensive margin). This paper empirically assesses the *extensive margin* of AWE for the period of the global economic crisis of 2008 in Turkey.

Turkey suffers from low rate of female labor force participation with a declining trend over the last three decades. Contrary to this general trend, the female participation rate reached 27 percent with more than 3-percentage point increase during the 2008 economic crisis, while the male participation rate showed a barely increase. It is because the increase in the unemployment rate among men associated with an almost proportional decrease in their employment rate, whereas an increase in the female unemployment rate did not translate into a decrease in their employment rate. Rather there was an approximately 3-percentage-point increase in the female employment rate between 2007 and 2009, which was completely attributable to married women (Table 1). This opposite movement of spouses' labor supply constitutes the main motivation of the paper. In particular, the goal of this paper is to analyze to what extent this opposite movement (of spousal labor supply) is caused by AWE.

Identification of AWE is a challenging task given the potential endogenity problems primarily arising from complementarity between leisures of spouses, assortative mating as well as joint determination of spousal labor supply. The Turkish labor market offers an ideal setting to empirically assess AWE: there is a high degree of gender segregation in the sectoral distribution of employment, and the male-dominated sectors are those that were hit hard by the 2008 crisis. This variation in the output of male-dominated sectors is used as an instrument for the husband's unemployment *after removing* the covariation in the output of other sectors with higher female participation, the variation attributed to individual characteristics and the variation in time trend. The control for the output of other sectors enables us to capture demand side factors that might have a direct effect on female participation.

Panel data used for this analysis allow for controlling the time-invariant unobserved heterogeneity via family fixed effects. The strongly negative correlation between the instrument and the husband's unemployment found in first stage estimation prevents us from worrying about the weak instrument problem. The instru-

mental variable estimation results suggest that the probability for entering the labor force of women increase by up to 29 percent in response to their husbands' unemployment. This supporting evidence of AWE appears with a one-quarter delay and remains only two following quarters. After one year of the husband's unemployment, the AWE seems to be dominated by the so-called "discouraged worker effect". The results can be interpreted as an outcome of the heterogeneity in the reservation wages of wives across time.

Empirical evidence from the previous literature is quite mixed. Bredtmann *et al.* (2014) links the diversity of the evidence to the type of welfare regimes in Europe. In particular, generous unemployment benefit systems and social assistance schemes might set disincentives for women to enter the labor market after their husbands become unemployed. Much of the empirical literature also reveals that the AWE is more present in countries in which a traditional division of labor within the household is more prevalent and the labor force attachment of women is comparatively low. This paper contributes to this strand of the literature by providing causal evidence of AWE from a country like Turkey to be classified an absolute non-welfare state with dramatically low rate of female participation rate.

Relatively few studies address the potential endogeneity problems involved while assessing AWE[1]. This paper is methodologically closest to Goux *et al.* (2014) that exploits an exogenous variation in spousal work hours induced by a regulation introducing a shorter workweek in France in the late 1990s. There are three studies exploring the same issue using pooled cross-sectional data from Turkey for different periods of time. While Baslevent and Onaran (2003) address endogeneity by modeling spouses labor participation decision simultaneously, Degirmenci and Ilkkaracan (2013) and Karaoglan and Okten (2012) control for a large set of observable characteristics to mitigate the endogeneity problem. As a consequence, their empirical findings differ substantially: the former study finds strong evidence of AWE only for the crisis year (of 1994), which is largely in line with the findings of Degirmenci and Ilkkaracan. On the other hand, Karaoglan and Okten observe the evidence of AWE during expansionary years.

The previous literature has generally addressed the inability of cross-sectional data to uncover the true estimate of AWE (Cullen and Gruber, 2000). An obvious shortcoming of the cross-sectional data is that they cannot adequately capture the inter-temporal decisions of wives to enter the labor force in response to the un-

[1]The leading studies are Blundell *et al.* (2012), Cullen and Gruber (2000), Goux *et al.* (2014), Heckman and MaCurdy (1980) and Maloney (1991).

employment of their husbands (Spletzer, 1997). This paper examines for the first time AWE in Turkey using longitudinal data. Moreover, my empirical analysis is conducted on a quarterly basis which allows for capturing the transitory response of a wife to a brief spell of unemployment faced by her husband. It also enables me to account for potential delays in the labor supply response of wives to their husbands' unemployment. This is unlikely to be analyzed by the early work in Turkey using annual measures of labor supply.

The remainder of the paper is organized as follows. Section 2 discusses the theoretical reasons why AWE may or may not arise. Section 3 introduces the data and provides some descriptive statistics. Section 4 presents the identification strategy. Then Section 5 discusses the estimation results along with some falsification exercises and Section 6 concludes.

2 Conceptual Framework

Theoretical grounds of AWE developed by Mincer (1962, 1966) and Long (1958) date back to half a century ago. However, the first attempts at an empirical analysis of the AWE were made after two decades, in the early 1980s, by Heckman and MaCurdy (1980, 1982) and Layard *et al.* (1980). Currently there is a large number of empirical studies examining AWE mostly from the developed countries. Much of the literature relies on simple probit and tobit analyses depending on the extensive or the intensive margin of AWE of their interest. Some studies, on the other hand, rely on either a structural equation model or a non-linear latent variable model (with fixed effects) grounded on a theoretical basis, or an instrumental variable approach in order to deal with the potential endogeneity problems[2]. In parallel to the diversity of the empirical strategies, there is no conclusive evidence. While some early work found small but significant AWE[3], some others revealed no evidence of it[4]. On the other hand, more recent work has generally documented supporting evidence for AWE[5]. Given the diversity of the findings in the previous literature, the remainder of this section explains the channels why AWE may and

[2]See the references in footnote 1.

[3]See studies from the *U.S.* by Cullen and Gruber, 2000; Heckman and MaCurdy, 1980, 1982; Lundberg, 1985.

[4]See studies from *France* by Goux *et al.*, 2014; from the *U.K.* by Layard *et al.*, 1980; and from the *U.S.* by Juhn and Murphy, 1997; Maloney, 1987, 1991.

[5]See studies from *Japan* by Kohara, 2009; from *Turkey* by Baslevent and Onaran, 2003; Degirmenci and Ilkkaracan, 2013; Karaoglan and Okten, 2012; and from the *U.S.* by Blundell *et al.*, 2012; Mattingly and Smith, 2010; Spletzer, 1997; Stephens, 2002.

may not arise or why it may not be empirically detected.

In a static model of household labor supply, a husband's job loss might lead to an increase in the labor supply of his wife in two ways. First, in order to compensate for the transitory reduction in family income due to the husband's unemployment, the nonparticipating wife would be more likely to enter the labor force, and similarly the participating wife would be more willing to increase her working hours under the assumption that leisure is a normal good (*income effect*). Secondly, the increased non-market time of the husband would reduce the relative value of the wife's non-market time and lower the opportunity cost of her market work given the substitutability of the wife's leisure with the husband's through home production (*substitution effect*). Replacement of the wife's time in household activities with the husband's non-market time would make the wife tend to work more (Lundberg, 1985).

In a life-cycle model, on the other hand, the presence of liquidity constraints is regarded as the main motive to justify a transitory impact on the wife's labor supply during her husband's unemployment spell. If families are liquidity-constrained or face fixed consumption commitments, they would be unable to smooth consumption over the husband's unemployment spell, hence the wife would tend to work more in order to compensate for the reduction in the family income. Conversely, AWE would not arise in the absence of any liquidity constraint given that an effective unemployment insurance system along with a well- functioning credit market would serve as an income compensation mechanism in the event of an adverse income shock.

In the life cycle context, it is also important to consider whether the income loss is anticipated or not. The fully anticipated income loss would not produce any income effect on the present values of the wealth providing that there is no liquidity constraint[6]. In such a scenario the only reason for the AWE to rise is the substitution effect which is expected to be small as pointed out by the previous research (Lundberg, 1985)[7]. On the other hand, an unanticipated income loss is likely to give rise to an AWE regardless of the presence of liquidity constraint. Once unemployment happens the uncertainty could appear with regard to the timing of job

[6]One may argue that income effect could still appear in a scenario of a fully-anticipated job loss through labor supply response to the anticipation of the unemployment rather than the realized unemployment. This issue is difficult to investigate empirically with the available data and is left for further research.

[7]The effect of substitubility in leisure between spouses through home production is expected to be small also in Turkey given the prevalence of traditional division of labor in households.

offers and accordingly the duration of the unemployment spell.

As mentioned above, much of the previous literature is not able to detect supporting evidence for AWE. This is because it is not easy to disentangle 'permanent' and 'transitory' factors leading to husband's unemployment. As stated by Maloney (1991:174) the husband's unemployment might proxy for predominantly 'transitory' factors that are unrelated to the personal characteristics of the household, such as the closure of a plant that directly results in the layoff the husband. On the other hand, there are predominantly 'permanent' characteristics of the household that might lead to husband's unemployment. For instance, the husband's unemployment propensity might be correlated with unobserved characteristics of the household, such as the sorting mechanism that initially formed the household matches spouses with similar phenotypes (*e.g.* similar levels of human capital and/or similar preferences for leisure) more frequently. This sorting mechanism, known as '*assortative mating*', might yield a spurious estimate of AWE as it measures the tendency of men who are more likely to become unemployed to be married to women who are more likely to transit into labor force. Similarly, there might be a complementarity in leisure between a wife and a husband in the same household (namely, if spouses enjoy spending time together), and if husbands with a higher taste for leisure also have a higher probability of losing their jobs, then this would bias against finding the true estimate of AWE (Maloney, 1991; Lundberg, 1985). I deal with this endogeneity problem by exploiting an exogenous variation in the husband's labor supply induced by the 2008 crisis in addition to controlling for family fixed effects along with a variety of individual and household characteristics to be correlated with husband's unemployment probability.

Last issue worthy of note is the identification of the discouraged worker effect. As spouses are subject to the same macroeconomic conditions, the economic downturn that caused the husband's unemployment might directly reduce the wife's employment propensity through a reduction in her shadow wage although she may wish to increase her labor supply in response to her husband's unemployment. In this case, wives would be reluctant to enter the labor force, accordingly the AWE would not arise as it is dominated by DWE (Gruber and Cullen, 2000). Whether it is the case for my sample will be touched on later while discussing the estimation results.

3 Data

The main data come from the 2007-2010 panel of the "Survey on Income and Living Conditions (SILC)" which has been conducted by the Turkish Statistical Institute (Turkstat) since 2006. SILC is the first attempt in Turkey in consideration of its panel structure. The survey provides detailed information on demographic characteristics such as age, education, marital status; labor force characteristics such as employment status, tenure, past work information, income, as well as household characteristics and living conditions.

Although SILC is designed on a yearly basis, the monthly information related to the labor market status of individuals enables us to conduct a short-run analysis of the AWE by constructing a *quarterly* measure of labor supply. Thus, this study is able to dispense with the concerns addressed by Lundberg (1985) and Spletzer (1997) about the inability of the annual measures of labor supply in capturing the transitory response to a brief spell of unemployment faced by the husband.

The identification strategy exploited in this paper relies on an exogenous variation in sectoral output induced by the crisis of 2008. The final data set for the empirical analysis is thus built by complementing SILC with additional information on sectoral output that comes from the "Survey on National Accounts". These two data sets are merged based on the information of the survey period[8].

The specific question addressed in this paper is well-defined only for married and cohabiting couples. Thus, the sample is restricted to only couples who do not change their marital status or their partners over the sample period, and those who divorce, become widowed or change their partners are excluded from the sample. Since the paper focuses specifically on the *extensive margin* of AWE, the initial sample is restricted to nonparticipating wives married with working men. This subsample is indeed a good represenatative for the full sample of couples given the very similar means of observable characteristics that are presented in Table 2. In this subsample, the empirical counterpart of AWE is the difference between the probability of entering in the labor force among nonparticipating wives whose husbands become unemployed in a following period and the same probability among those whose husbands remain employed. The sample is further restricted for the regression analysis to the job losses that occured during the crisis period, namely between the third quarter of 2008 and the fourth quarter of 2009 in order to mitigate the potential endogenity problems that will be discussed in the following section.

[8]Further information on the data sources is presented in Appendix A.1.

4 Identification Strategy

In order to estimate the labor supply response of wives to their husbands' job losses, the analysis starts with a regression of the wife's labor force participation on husband's unemployment:

$$Y_{ift} = \alpha + \beta D_{ift} + X'_{ift}\Omega + \epsilon_{ift} \tag{1}$$

where: Y_{ift} is a binary variable indicating participation status of the nonparticipating wife i of couple f which is equal to 1 if she enters in the labor force (as either employed or unemployed) at time t and 0 if she stays inactive; D_{ift} is a binary variable indicating displacement status of the husband i of couple f which is equal to 1 if he loses his job at time t and 0 if he stays in employment; X_{ift} is a vector of individual characteristics including age, completed years of schooling, past labor market experience of both wives and husbands, as well as some household characteristics such as number of children aged up to 5 years and aged between 6-14 years, and number of elderly people in the household that do not work. The control for 'past labor market experience' is of particular importance in order to capture the 'permanent' unobserved characteristics of the individuals that were mentioned in Section 2. Specifically, the corresponding control for husbands is the duration of unemployment (in terms of number of months) in previous year, which aims to capture his unemployment incidence over the life cycle including unobserved characteristics related to his productivity. On the other hand, the control for women is a dummy variable for her past work experience (*i.e.* if she worked before or not). This variable intends to capture the nonparticipating wives' propensity to work (Spletzer, 1997).

β is the parameter of interest in regression equation (1). The critical question is whether the OLS estimate of β can be interpreted as AWE. One concern is the endogeneity problem arising from voluntary unemployment of the husband. As pointed out by the early work, the more likely the wife increases her labor supply, the more easily the husband may choose to resign from his job (Kohara, 2009). A solution to rule out such a problem is to restrict the sample to "involuntary separations" by excluding resignations. However, the husband's unemployment could still be endogenous in the labor supply decision of his wife, unless it is unexpected. If the family anticipates the job loss, the wife may adjust her labor supply according to their expectancy before the unemployment occurs. In this case the wife's labor supply response would be smoothed over time and an OLS estimate of β -from

equation (1)- would be downward biased (towards zero). Focusing on job losses that occurred during the period of the 2008 economic crisis could be a possible way to rule out voluntary and expected job losses. Even if we may assume that the crisis has caused unexpected job losses, we cannot distinguish job losses due to the crisis from those due to some other reasons given the data limitation. The easiest way to deal with this issue would have been to focus on layoffs due to plant closures which by their nature bring about involuntary and unexpected unemployment, if the survey had involved such information.

Alternatively I follow an instrumental variable approach to eliminate the potential sources of endogeneity problem, most importantly the simultaneity in labor supply behaviors of spouses. In fact, the Turkish labor market provides an ideal setting to employ this empirical strategy: There are some sectors dominated by male labor force such as '*manufacturing*', '*construction*', '*wholesale and retail trade*', and '*transport, storage and communication services*' in which the proportion of female labor force fluctuates no more than 15% (Figure 1). These male-dominated sectors are the ones hit hardest by the 2008 economic crisis in terms of output losses (Figure 2). On the other hand, there are some sectors such as '*education*', '*health*' and '*social work related services*' where female labor force is relatively higher (above the average female employment rate)[9]. In these sectors the production levels were barely affected by the crisis (Figures 1-2)[10].

This sector specific characteristics of the output shock is exploited as an instrument for the husband's unemployment. In particular, the instrument is constructed based on the variation in the output of the male sectors induced by the crisis *conditional on* the variation in the output of female sectors, the variation attributed to individual characteristics and the deterministic trend.

Equation (2) presents the first-stage regression[11]:

$$D_{ifst} = \alpha_0 + \alpha_1 Z_{st} + \alpha_2 F_{st} + \alpha_3 T + X'_{ift}\Psi + \varepsilon_{ifst} \tag{2}$$

[9]For the sake of brevity, the male-dominated sectors and the other sectors where female participation is relatively higher will henceforth be called *male sectors* and *female sectors*, respectively.

[10]In parallel to the output losses during the crisis, manufacturing and construction, followed by trade and transportation services, saw the severest decline in the employment rate between 2008 and 2009. On the other hand, the employment rate in the female sectors did not show a considerable change during the period. The overall change in the employment rate of the male- versus the female-sectors can be seen in Figure 3.

[11]To avoid confusion it is worthy of note that differently from equation (1), two additional control variables are included in equation (2), namely a control for female sectors' output (F_{st}) and a control for time trend (T). However they are not included in the vector X_{ift}, but specified individually.

where: D_{ifst} is the dummy variable for the husband's unemployment as described in equation (1); the variable Z_{st} indicates the output of sectors s in which male labor force dominates, and the variable F_{st} indicates the output of sectors s in which female labor force is relatively higher. Notice that Z_{st} and F_{st} are aggregated variables over a set of sectors including male- and female-sectors respectively, as explained above.

One may be concerned about the crisis effects going beyond the male sectors. It is likely that the recession has led to a general worsening of macro-economic conditions which might have a direct effect on female participation decision. In fact, the variable F_{st} is included in the regression to capture such demand-side factors. The variable T indicates a reference time period running through the set of $\{1, 2, ..., 6\}$ which is identified with the set of $\{(2008, quarter3), (2008, quarter4), ..., (2009, quarter4)\}$, where $T = 1$ corresponds to $(2008, quarter3)$, $T = 2$ corresponds to $(2008, quarter4)$, and so forth. Including the time variable allows to control for the deterministic trend in sectors. The vector X_{ift} includes the same control variables previously considered in equation (1).

The main identifying assumption of this empirical analysis is that the only link between the output changes in the husband's sector and the wife's participation decision is the husband's unemployment. Two key observations corroborate this assumption. First is the high degree of gender segregation in the sectoral distribution of employment along with the diverse effects of the crisis on male- versus female-sectors (Figures 1-2). Given the initial sample restricted to nonparticipating wives, the change in the production level of the male sectors are not expected to have a direct effect on the female participation decision, as long as the output change in the female sectors is controlled.

The second observation supporting the internal validity of the instrument is represented by Figure 4. The instrumental variable proposed for this analysis has to be interpreted as the "unpredicted" component of the male sectors' production: identification exploits the output variation in the male sectors that is left *after removing* the covariation with the production in the female sectors, the variability attributed to individual characteristics and the variability in time trend. If this "unpredicted" component is exogenous to the husband's unemployment, it should exhibit an unusual fluctuation during the crisis and rather a smooth trend for the rest of the period. I check this argument by considering the pattern of the output of the male-

and female-sectors. I consider equation (3) and (4) below.

$$Z_{st} = \gamma_{1,0} + \gamma_{1,1} T + X'_{ift} \Phi_1 + \upsilon_{1,ifst} \tag{3}$$

$$F_{st} = \gamma_{2,0} + \gamma_{2,1} T + X'_{ift} \Phi_2 + \upsilon_{2,ifst} \tag{4}$$

Equations (3) and (4) present the regressions of the output of the male- and female-sectors respectively, conditioning on individual characteristics (X) and time trend (T). Figure 4 plots the residuals from equations (3) and (4) which are denoted by a dashed line and a dotted line, respectively. It also plots the difference between the two residuals which does refer to the "unpredicted" component, denoted by a solid line. This difference has a stable and a smooth trend till the onset of the crisis, exhibits a sudden fall with the outburst of the crisis after the third quarter of 2008, and then it levels out. The slump observed between the third and fourth quarters of 2008 is unusual to the overall trend. In other words, the largest source of variation in the "unpredicted" component comes from the 2008 shock and the output fall in this period was largely unexpected. This unanticipated change in the output of the male-dominated sectors is exploited as an instrument for the husband's unemployment.

5 Results

This section presents the estimation results of the effect of a husband's job loss on his wife's participation decision based on different specifications. As a matter of fact it may take time for a wife to adjust her labor supply in response to her husband's job loss. To take into account potential delays in the wife's response, six separate regressions are estimated each of which belongs to a different delay period ranging from zero to five quarters. Table 3 presents estimation results of each regression in a different column. For instance, the first column reports the change in the probability of entering in the labor force of a nonparticipating wife in the quarter when her husband has become unemployed, while the last column indicates how this probability changes five quarters after the husband's unemployment.

The main estimator of this analysis is the IV estimator as described in the previous section. A threat to identification could be an omitted variables problem if other (unobserved) factors that affect a wife's participation decision are also correlated with the husband's unemployment. To mitigate this potential problem the specification is extended in a way to include *family fixed-effects*. Usage of family

fixed effects helps to control for the unobserved heterogenity due to the 'permanent' characteristics of the household, such as the assortative mating that initially formed the household, which might be correlated with the husband's unemployment propensity as discussed in Section 2[12]. The results in Table 3. are reported both with and without fixed effects.

To benchmark the IV results, the tables also display the OLS estimates of the parameter β in equation (1). According to the OLS estimates reported in Table 3, the labor force participation decision of married women generally has a negative association with their husbands' unemployment throughout the delay periods, although the coefficient estimates are not statistically significant. OLS estimates are relatively small in magnitude and generally of the unexpected sign. They are likely to be biased toward zero due to the attenuation bias and thus lead to less positive coefficients. All in all, OLS estimates do not provide support to the presence of AWE[13].

We now turn to the results based on the IV strategy illustrated in Section 4. The IV approach generates uniformly larger estimates for the parameter β than the OLS estimates. One possible explanation for the sizable difference between IV and OLS estimates is that measurement error in the treatment might bias the OLS estimates downwards. Another explanation common in the IV literature is that the IV estimate identifies a local average treatment effect parameter and that the group of compliers particularly benefits from the treatment. This might be the reason why a larger effect is estimated through IV.

Including family fixed effects in the estimation makes a substantial difference within the IV results. While the signs are consistent, the magnitudes of the estimates are larger -in absolute terms- in fixed effects estimation, as presented in the bottom panel of Table 3. This might result from the positive and high correlation in unobserved tastes for leisure between wives and husbands in the operational sample. As discussed in Section 2, if those husbands with a higher taste for leisure also have a higher probability of losing their jobs, then this would yield a downward bias in the AWE estimate. Therefore, sweeping away this unobserved heterogeneity via family fixed effects would result in a larger estimate. In other words, larger fixed effects estimates point out the importance of (time-constant) unobserved het-

[12]The importance of mating characteristics also explains why family fixed effects are used in stead of individual fixed effects.

[13]The endogenity test of the endogenous regressor (husband's displacement) has a p-value of 0.000 for all specifications suggesting that my sample data overwhelmingly reject the use of OLS in favor of IV.

erogenity that is positively correlated with the treatment and negatively correlated with the outcome variable. Given this, the discussion that follows focuses on the IV results with fixed effects.

The first stage estimation results indicate a sizable, negative and statistically significant relationship between the husband's unemployment and the corresponding instrumental variable for every delay period. As the sectoral output declines, the probability of being displaced for a husband increases. To illustrate, the entry in the third column of Table 3 indicates that a 10 percentage point fall in the production level is associated with around 4 percentage point increase in the probability of becoming unemployed for a husband working in certain sectors. The F-statistics of the instrument are above 10 for every specification (except for the last one) and consequently do not suffer from a weak instrument problem (Staiger and Stock, 1997).

The IV results suggest that women waited for a quarter to respond, probably until they became sure that their husbands were unlikely to find a job and/or until they arranged their responsibilities regarding household chores and childcare (given the scarcity of public care services in child care). After one quarter following their husbands' unemployment wives became 24 percentage point more likely to enter the labor force than those with a continuously employed husband. This probability increases to 29% after two quarters following the husband's unemployment. These results support the presence of AWE with a certain period of delay. On the other hand, the effect disappears in the third quarter and the coefficient estimate turns into a negative sign (although at the border line significance) in the fourth quarter of delay. This can be explained by the heterogeneity in the reservation wages of women. In particular, women with lower reservation wages, maybe due to a higher substitubility in leisure with husbands' through home production and/or due to a tighter liquidity constraint they face, could have responded quickly; in first few quarters of their husbands' unemployment. Women left outside the labor market should be those with higher reservation wages. Those women were probably discouraged by the long-term unemployment faced by their husbands. This finding can be interpreted as the predominance of *discouraged worker effect* after a certain period of the husband's unemployment. The IV (with fixed effects) estimate reported in the fifth column of Table 3 indicates that the probability of a woman decreases by 17% after four quarters following her husband's unemployment. It is in line with the estimate of the control variable for the husband's duration of unemployment: the longer the husband stays in unemployment, the lower probability the

wife enters the labor force. The coefficient estimate remains negative but becomes statistically insignificant after the fifth quarter of the husband's unemployment[14].

We have so far talked about how the probability of entering the labor force of a woman has changed in response to her husband's unemployment. It is also interesting to see whether those women who entered the labor force could find a job or just transited into unemployment. This issue is explored by disaggregating the dependent variable into two parts: transition into employment and that into unemployment. Table 4 presents that the evidence of AWE found in the first and second quarter of the husband's unemployment is mainly driven by wives' transitions from inactivity to employment. The probability of finding a job for women increases by 23 to 27 percent within the first half year of their husbands' unemployment. This accounts for an overall 3-percentage point increase in the female employment rate during the crisis that is reported in Table 1. It is also consistent with the output growth in the female sectors which had an upward trend during the crisis as shown in Figure 2. On the other hand, the negative effect found in the third and fourth quarter of the husband's unemployment is mostly attributable to the transition from inactivity to unemployment. Strictly speaking, wives become less likely to start searching a job after three quarters following the husband's job loss as they are discouraged by a long term unemployment faced by their husbands.

All the regressions include several control variables though not presented in Table 3. Recalling the discussion in Section 4, the independent variables that are essential to construct the instrumental variable are the output of other sectors with a higher female participation and the time trend. While the former variable enables the control for the general worsening of macro-economic conditions which are likely to have a direct effect on married women's participation decisions, the latter allows for capturing the deterministic trend. Other control variables are those that are likely to have explanatory power for married women's participation decisions. Personal characteristics utilized in the regression analysis are the ages of the husband and wife (included quadratically), their years of schooling, their past labor market experiences, the number of children they have in the 0-5 and 6-14 age groups and the number of nonworking adults in the household other than wives and husbands.

The results are overall as expected from economic theory. For the sake of

[14]Notice that the economic recovery started by the end of 2009, which roughly corresponds to the fifth quarter of delay period. Given the validity of the instrument depends on the output variation induced by the economic shock, the correlation in the first stage estimation weakens since then. Therefore, it is not plausible to interpret the IV results for the 5 quarter of delay period.

brevity, Table 5 presents estimates of the coefficients of control variables just for one specification, namely the 2-quarter delay period, since they are very stable across different specifications. The left and right panels of the table show the results without and with family fixed effects, respectively[15]. To see the effects of the control variables on the husband's unemployment, one should look at the columns (1) and (4) of Table 5 which display the results for the first stage of the IV results without and with fixed effects, respectively. Other columns of the table obviously show the results for the wife's participation.

A higher educational attainment makes the wife around 1.2 percentage point more like to enter the labor force. The husband's educational attainment, on the other hand, has a negative but a small effect both on the probability of losing his job and on his wife's participation probability (though the estimate is only at the borderline significance). The negative correlation between the husband's education and the wife's labor supply supports the usual division of labor argument that husbands' higher market wages (proxied for by the years of schooling here) reduce wives' participation due to the income effect (Onaran and Baslevent, 2003). The wife's participation probability increases by her age and peaks at around the age of 35. On the other hand, the probability of the husband's unemployment decreases with his age after 25 years old.

The wife's participation probability is positively correlated with her past work experience. Specifically, wives who had worked before are 4.2 percentage point more likely to enter the labor force. So is a positive correlation between the husband's unemployment probability and the duration of unemployment he experienced before. Interestingly there is a negative association between the unemployment duration of the husband and the wife's participation probability. It indicates that a longer unemployment duration the husband faces would make his wife (0.7 percentage point) less likely to enter the labor force. This might be because a longer term unemployment makes discouraged worker effect predominates, which is consistent with the estimates of the 'AWE' variable turning into a negative sign after three quarters of the husband's unemployment (as explained while discussing Table 3).

In line with the findings from the earlier literature, having more children younger than 6 years old decreases the probability of their mother's participation in the la-

[15]In Table 5 one could easily notice that the controls such as education, age and experience supposed to be time-constant are not dropped from the estimation when using family fixed effects. It is because these variables have reasonable amount of variation within each family, which shows the existence of extended families in households where more than one couple is living.

bor force, whereas the elderly children have a positive effect on their mothers' participation decisions. This may have to do with their help in housework and their siblings' care[16]. The control for other nonworking adults within the same household is expected to have an explanatory power in the participation decision of the wife as they are also potential caregivers for children or helpers in household chores. In contrast to expectations, this covariate is found to have a negative and fairly large effect on the wife's participation decision. This could be because these elderly people are in need of special care and wives are in deed the caregivers for all in the household.

5.1 Heterogenity in the Added Worker Effect

The analysis of the AWE has so far focused on the working age couples (between 15 and 64 years old). However, it is likely that older wives close to the age of retirement postpone their labor supply responses. Moreover, elderly people would face a relatively loose liquidity constraint given a larger amount of saving compared to their younger counterparts. If this argument is true, then restricting the sample to a younger age group would yield a stronger AWE[17]. To check this argument, the sample is restricted to women aged 15 to 44 to exclude women potentially close to being eligible for retirement[18]. This restricted sample accounts for 80% of the total sample size. The analysis performed in the previous section is replicated for this narrower age group to check whether the results are robust to the changes in the ages of spouses.

Table 6 presents the estimation results for the restricted samples. Comparing the bottom panel of Table 3 with the top panel of Table 6 indicates that the AWE is uniformly stronger for the younger age cohort in all delay periods in line with

[16]Note in Table 5 that the estimates of the controls for children (as well as some others) become statististically insignificant (or less significant) when family fixed effects are included in the specification mostly due to the larger larger standard errors. Larger standard errors in fixed effects estimation indicate a great variation in the predictor variables across groups despite a little variation over time for each group (namely, within family in our case). An outcome would be less precise estimates even if the magnitudes of the coefficients are the same.

[17]The minimum age for retirement was first regulated in 1999, but since then it has undergone many changes over years (Law No. 4759, 2002; Law No 5510, 2006). Before the regulation, women and men were qualified to be retired regardless of their age provided that they have 20 and 25 years of service, respectively. Therefore, it used to be possible for women to retire at around the age of 40. Currently eligibility for retirement depends on the gender, age and service duration. The age limit, which is now a minimum of 58 for women and 60 for men, has gradually been pushed up for those who had a certain duration of service at the time the law was enacted.

[18]Notice that a restriction on the wife's age is also a restriction on the husband's age as the share of couples with wives older than their husbands is ignorable in the sample (i.e. less than 1%).

the expectations. As for the older cohort (aged 45-64 year), no stable and strong correlation is found in the first stage of the estimation. This could be due to the fact that employers prefer not to fire older workers during an economic contraction to avoid incurring in higher firing costs: older workers are more likely to have longer service duration and hence a higher severance pay.

Next, heterogeneity in AWE is explored along an additional dimension, namely education. Indeed, it is reasonable to expect that low-educated people are more likely to be subject to a tighter liquidity constraint under the assumption of a positive correlation between educational level and earnings (savings). Therefore, the expectation is towards finding a stronger AWE among the low-educated couples. The bottom panel of Table 6 presents the estimation results for the couples with low-educated husbands. The results suggest that the AWE estimated for the full sample of couples (presented in Table 3) is largely attributable to these low-educated couples. Quite similar results are found if the sample is further restricted in a way that both husbands and wives are low-educated (though not displayed in a table)[19]. Similar to what is observed for the older group, the first stage of the estimation does not work for the couples with high-educated husbands (see the bottom panel of Table 6). This is not surprising as high-educated people are generally the least affected group by an economic shock in terms of job losses. As a result it is unlikely to identify to what extent the AWE is relevant for the high educated people.

5.2 Falsification Exercises and Extensions

The credibility of my IV results and their internal validity relies on the assumption that the proposed instrument affects the wife's participation only through the husband's unemployment. To provide a sense of plausibility of the identification assumption, I conduct a falsification exercise by relaxing the restriction on the timing of the job losses[20]. There is a steady decline in the number of observations as

[19]The similarity in the results is due to the tiny difference in the size of the two subsamples. Table 6 relies on couples in which low-educated husbands are married with either low- or high-educated wives. The latter only accounts for 3.6% of the sample, while the low-educated husbands married with low-educated women, representing the largest component of the estimation sample, accounts for 68% of the whole sample.

[20]A related discussion is whether the estimated AWE reflects the wife's labor supply response to the anticipation of the husband's unemployment. One way to check the so-called 'anticipation effect' would be to estimate a specification (similar to those reported in Table 3) using leads of quarters of (husband's) unemployment as the key independent variable along with quarterly leads of the instrument. This would enable us to answer the question how the probability of entering the labor force of a wife changes 1 to 5 quarters before her husband becomes unemployed. However, the data

going from zero to five quarters of delay, as can be seen in Table 3. It is because the lagged variables (of the husband's unemployment) are constructed with respect to the previous quarter, starting from the third quarter of 2008. To keep the sample size fixed in order not to lose information over the delay periods, new lagged variables of the displacement are constructed by relying on data before the third quarter of 2008. In this new sample not only the job losses that occurred during the crisis but also those before the crisis are included[21].

Recall that it is the crisis that provides the exogenous variation in the production level of some specific sectors, and this variation is exploited as an instrument for the husband's unemployment. When job losses that occurred before the crisis are added to the sample, naturally the association between the instrument and the unemployment loosens. To express this in technical terms, the coefficient estimates in the first stage are no longer strongly statistically significant in this new sample (see Table 7). This falsification exercise provides a sense of plausibility of my identification assumption with the following reasoning inspired by Angrist and Pischke (2009: 97). If the only reason for the instrument effects on the wife's participation is the husband's displacement, then the instrument effects on the wife's participation should be zero in samples where the instrument is unrelated to the endogenous regressor.

I furthermore investigate the plausibility of the restriction on the initial sample by constructing a new sample including both active and inactive wives. The dependent variable remains the same, namely the transition into labor force. The obvious expectation would be towards finding a lower estimate as the participating wives are also added to the operational sample. However, it is also likely to find an estimate so similar to the original one (based on the sample of nonparticipating wives) if the participating wives who had planned to exit the labor force but did not because of their husbands' job loss. Table 8 provides supporting evidence in favor of the former argument, namely all the IV estimates become statistically insignificant and mostly become substantially lower when using a full sample of wives.

are available only up to 2010. Therefore, a lot of information is lost while creating quarterly leads, which makes unlikely to conduct such an analysis.

[21] See Appendix A.2. for more information about the construction of a sample with a fixed size.

6 Conclusion

The debate on interdependencies in spousal labor supply, having been central to the family economics literature, has escalated with the outburst of the global economic crisis of 2008. This paper contributes to the current debate through an empirical analysis of the the extensive margin of added worker effect during the 2008 crisis, relying on Turkey as a case study. To rule out the potential endogeneity problems, especially those arising from the simultaneity in spouses' labor supply decisions, this paper exploits an exogenous variation in the output level of male-dominated sectors induced by the crisis as an instrument for the husband's job loss and the high degree of gender segregation in the Turkish labor market. The instrumental variable results provide strong evidence of added worker effect that appears with a one-quarter lag. The effect remains existent only two quarters, then it is dominated by discouraged worker effect after one year of husband's unemployment. The added worker effect is stronger among the more financially constrained (younger and less educated) couples, which points to the prevalence of income effect in spousal labor supply decision.

The empirical evidence supporting the existence of added worker effect in Turkey during the recent economic crisis is supported by the findings from the previous literature that the added worker effect is more prevalent in countries where female labor force participation is relatively low, like in most of the Mediterranean countries (Bredtmann *et al.*, 2014). The crisis could have brought about a change in favor of female labor force situation, however this change does not have a permanent characteristics. Rather the added worker effect has been replaced by discouraged worker effect as the duration of unemployment gets longer. This finding is in line with Turkey's past crisis experiences: what we learnt is that the increase in female participation during the recession is likely to be temporary. Demand side improvements are rather more likely to lead to a permanent increase in women's participation (Onaran and Baslevent, 2003).

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Appendix

A. More About the Data Sets

Survey on Income and Living Conditions is designed as a rotating panel in which the sample of households and corresponding individuals are traced annually for four consecutive years. The interviews are administered once a year. Every year the survey is conducted for four subsamples. One quarter of the sample is replaced by a new one in each year, thus three fourths of the sample remains unchanged with respect to the previous year. The samples are selected and assigned survey weights so as to be nationally representative. Moreover, the sample size is designed considering possible non-responses, thereby no replacement is undertaken.

On the other hand, the **Survey on National Accounts** records the output levels, namely gross domestic product by kinds of economic activity at constant (1998) prices. The economic activities are classified into 17 sub-sectors, namely Agriculture, Hunting and Forestry; Fishing; Mining and Quarrying; Manufacturing; Electricity, Gas and Water Supply; Construction; Wholesale and Retail Trade; Hotels and Restaurants; Transport, storage and Communication; Financial Intermediation; Ownership and Dwelling; Real Estate, Renting and Business Activities; Public Administration and Defense, and Compulsory Social Security; Education; Health and Social Work; Other Community, Social and Personal Service activities and Private Housekeeping Services.

For the specific aim of the empirical analysis, some sub-sectors are aggregated into two groups based on some specific characteristics. The first group includes the male-dominated sectors which were hit severely by the crisis (manufacturing; construction; wholesale and retail trade; and transport, storage and communication services), whereas the second group involves the sectors with higher female participation (education; health and social work; other community, social and personal service activities and private housekeeping services). These two groups of sectors totally account for 74% of non-agricultural GDP and 85% of non-agricultural employment.

A.2. Falsification Exercise Using a Fixed Sample Size

The number of observations used for the regression analysis changes across the delay periods, as can be seen in Table 3. It is due to the fact that the lagged variables (of the husband's unemployment) are constructed with respect to the previous quarter, starting from the third quarter of 2008. While there is no missing value in the variable of unemployment, there is one missing value in the first lag of the variable, two missing values in the second lag of the variable, three missing values in the third lag of the variable and so forth. The lagged variables are constructed in the following way.

	D_0	D_1	D_2	D_3	D_4	D_5
2008Q3	1	.	.	.	.	.
2008Q4	0	1	.	.	.	.
2009Q1	0	0	1	.	.	.
2009Q2	1	0	0	1	.	.
2009Q3	0	1	0	0	1	.
2009Q4	0	0	1	0	0	1

where: D_q for $q \in (0, ..., 5)$ denotes the variable of husband's displacement with a lag of 0 to 5 quarters. The sample period is the crisis period, ranging between the third quarter of 2008 ($2008Q3$) and the fourth quarter of 2009 ($2009Q4$).

To avoid information loss across the specifications, a new sample is created by keeping the sample size fixed over the delay periods. To this end, new lagged variables of the unemployment are constructed by relying on data before the third quarter of 2008 (which is before the outburst of the crisis). The way of constructing the lagged variables in the new sample is demonstrated in the matrix below. The sample period of interest is still the crisis period, namely the area within the rectangular frame. To illustrate, as for the survey period of the third quarter of 2008, the first lag of the variable is

constructed exploiting the information from the second quarter of 2008, the second lag is constructed based on the information from the first quarter of 2008, and so forth. In doing so, the missing values in the matrix above (drawn for the original sample) are completed by exploiting the information prior to the crisis, which enables a fixed sample size over the delay periods. In this new sample, the focus is on not only the job losses that occurred during the crisis, but also those before the crisis.

	D_0	D_1	D_2	D_3	D_4	D_5
2007Q2	0	$\ddots$	$\cdots$	$\cdots$	$\cdots$	$\cdots$
2007Q3	1	0	$\ddots$			$\vdots$
2007Q4	0	1	0	$\ddots$		$\vdots$
2008Q1	0	0	1	0	$\ddots$	$\vdots$
2008Q2	0	0	0	1	0	$\ddots$
2008Q3	1	0	0	0	1	0
2008Q4	0	1	0	0	0	1
2009Q1	0	0	1	0	0	0
2009Q2	1	0	0	1	0	0
2009Q3	0	1	0	0	1	0
2009Q4	0	0	1	0	0	1

Tables and Figures

Table 1- Labor market indicators by gender and marital status

	2007	2008	2009	2010
Labor Force Participation Rate	46.2	46.9	47.9	48.8
of which: Female	23.6	24.5	27.0	27.6
of which: Single	34.4	35.3	35.8	36.0
Married	21.6	22.4	25.3	26.4
of which: Male	69.8	70.1	70.5	70.8
of which: Single	57.7	58.3	58.5	59.2
Married	75.9	76.2	76.0	77.0
Employment Rate	41.5	41.7	41.2	43.0
of which: Female	21.0	21.6	23.9	25.0
of which: Single	27.6	28.2	27.6	28.3
Married	20.3	20.9	23.1	24.2
of which: Male	62.7	62.6	59.7	61.7
of which: Single	46.6	46.8	44.8	47.0
Married	70.6	70.3	67.7	70.7
Unemployment Rate	10.3	11.0	14.0	11.9
of which: Female	11.0	11.6	13.3	13.0
of which: Single	19.8	20.0	23.9	22.6
Married	6.0	7.0	9.1	8.2
of which: Male	10.0	10.7	14.9	11.4
of which: Single	19.2	19.8	24.7	20.6
Married	7.0	7.8	11.2	9.2

Source : Turkstat, 2013.

Table 2- Summary statistics for couples

	Mean	Std. Dev.	Min	Max	Obs.
	Full sample of couples				
Wife's age	34.19	9.91	15	64	18877
Wife's education	5.69	3.96	0	15	18877
Wife's experience	0.43	0.49	0	1	16110
Husband's age	37.93	9.65	17	64	18877
Husband's education	7.27	3.53	0	15	18877
Husband's experience	1.12	2.53	0	12	18877
Children aged 0-5	1.71	2.26	0	19	18877
Children aged 6-14	0.77	1.02	0	7	18877
Other adults	0.22	0.62	0	10	18877
Couples with nonparticipating wives & employed husbands					
Wife's age	34.15	10.19	15	63	9816
Wife's education	5.34	3.72	0	15	9816
Wife's experience	0.41	0.49	0	1	9764
Husband's age	37.97	9.91	17	64	9816
Husband's education	7.11	3.47	0	15	9816
Husband's experience	1.13	2.52	0	12	9816
Children aged 0-5	1.83	2.33	0	19	9816
Children aged 6-14	0.78	1.02	0	7	9816
Other adults	0.25	0.65	0	10	9816

Note: The statistics are restricted to the working age population (aged 15-64) and to the sample period (between third quarter of 2008 and fourth quarter of 2009)

Table 3- Estimation results over a period of 5-quarter delay
(*Dependent variable: Transition into labor force*)

	(1) No delay	(2) 1-quarter delay	(3) 2-quarter delay	(4) 3-quarter delay	(5) 4-quarter delay	(6) 5-quarter delay
First Stage						
Male sectors' output	-.352***	-.413***	-.438***	-.413***	-.473***	-.347**
	(.045)	(.056)	(.052)	(.055)	(.051)	(.112)
F test	62.39	54.09	72.08	57.05	87.24	9.40
IV estimation						
Husband's unemployment	.085	.221**	.229***	.018	-.126*	-.179
	(.107)	(.100)	(.091)	(.091)	(.077)	(.279)
OLS estimation						
Husband's unemployment	-.012*	-.002	-.005	.008	-.010	-.009
	(.007)	(.007)	(.006)	(.008)	(.006)	(.007)
No. Obs.	13035	12850	11811	10805	10034	9302
	with Fixed Effects					
First Stage						
Male sectors' output	-.370***	-.457***	-.467***	-.366***	-.441***	-.240*
	(.049)	(.061)	(.057)	(.058)	(.052)	(.125)
F test	57.76	56.15	67.93	40.34	72.66	3.67
IV estimation						
Husband's job loss	.105	.239***	.287***	-.029	-.165**	-.573
	(.092)	(.092)	(.087)	(.097)	(.080)	(.494)
OLS estimation						
Husband's job loss	-.007	.000	-.003	.012	-.010	-.013
	(.008)	(.007)	(.006)	(.008)	(.008)	(.009)
No. Obs.	12897	12682	11522	10566	9943	9152

Notes: [1] *Controls*: age, age-square, years of schooling and past labor market experience of both wives and husbands, number of children (aged up to 5 and between 6-14) and number of other adults in the household, as well as female sectors' output and time trend.
[2] Robust standard errors in parenthesis (clustered at household level). ***: p<0.01, **: p<0.05, *: p<0.1

Table 4- Disaggregating Transitions into Labor Force
(*including fixed effects*)

	No delay	1-quarter delay	2-quarter delay	3-quarter delay	4-quarter delay	5-quarter delay
	Dependent Variable: Transition from Inactivity to Employment					
First Stage						
Male sectors' output	-.370***	-.453***	-.471***	-.362***	-.443***	-.244*
	(.049)	(.061)	(.057)	(.058)	(.052)	(.125)
IV estimation						
Husband's unemployment	.063	.227***	.268***	.004	-.143*	-.502
	(.091)	(.090)	(.084)	(.097)	(.079)	(.460)
No. Obs.	12891	12672	11511	10562	9937	9149
	Dependent Variable: Transition from Inactivity to Unemployment					
First Stage						
Male sectors' output	-.382***	-.475***	-.472***	-.356***	-.445***	-.240*
	(.049)	(.062)	(.058)	(.058)	(.052)	(.127)
IV estimation						
Husband's unemployment	.043**	.011	.022	-.035**	-.022**	-.065
	(.019)	(.015)	(.017)	(.017)	(.013)	(.079)
No. Obs.	12639	12441	11315	10357	9731	8962

Notes: [1] The same *control variables* are included as to those in Table 3.
[2] Robust standard errors in parenthesis (clustered at household level). ***: p<0.01, **: p<0.05, *: p<0.1

Table 5- Estimation results for 2-quarter delay period

	(1) **First St.**	(2) **IV**	(3) **OLS**	(4) **First St.**	(5) **IV with Fixed Effects**	(6) **OLS**
Male sectors' output	-.438***			-.467***		
	(.052)			(.057)		
Husband's unemployment		.229***	-.005		.287***	-.003
		(.091)	(.006)		(.087)	(.006)
Female sectors' output	-.036	.047*	.038*	-.106*	.057*	.040*
	(.054)	(.029)	(.023)	(.058)	(.034)	(.023)
Time trend	-.019***	.002**	.002*	-.019***	.003***	.004***
	(.002)	(.001)	(.001)	(.002)	(.001)	(.001)
Wife's age	.001	.010***	.010***	.001	.008*	.009**
	(.002)	(.002)	(.002)	(.007)	(.005)	(.004)
Wife's age square	.001	-.011***	-.010***	-.001	-.010**	-.012**
	(.001)	(.002)	(.002)	(.001)	(.005)	(.006)
Wife's education	-.001	.012***	.011***	.000	.013***	.014***
	(.001)	(.001)	(.001)	(.004)	(.003)	(.002)
Wife's experience	.001	.021***	.021***	.006	.042***	.038**
	(.003)	(.003)	(.003)	(.020)	(.014)	(.019)
Husband's age	-.004**	.009***	.008***	-.007	.012**	.011**
	(.002)	(.003)	(.002)	(.008)	(.006)	(.005)
Husband's age square	-.005**	.011**	.011***	-.005*	-.013*	-.012*
	(.002)	(.005)	(.004)	(.003)	(.008)	(.007)
Husband's education	-.002**	-.001*	-.001*	-.002	-.005*	-.005*
	(.001)	(.000)	(.000)	(.005)	(.003)	(.003)
Husband's experience	.044***	-.009**	.001	.030***	-.006**	.002
	(.002)	(.004)	(.001)	(.002)	(.003)	(.001)
No. children aged 0-5	.001	-.003***	-.003***	.002	-.003	-.002
	(.001)	(.001)	(.001)	(.005)	(.004)	(.003)
No. children aged 6-14	.000	.004***	.004***	-.008	.004	.002
	(.002)	(.002)	(.001)	(.008)	(.006)	(.005)
No. other adults	.006	-.006***	-.005***	-.003	-.022**	-.023***
	(.004)	(.002)	(.002)	(.014)	(.010)	(.008)
Constant	2.314**	.543	-.580	2.788***	.047	-1.267***
	(0.971)	(.566)	(.364)	(0.957)	(.553)	(.363)
No. Obs.	11811	11811	11811	11522	11522	11522

Notes: Robust standard errors in parenthesis (clustered at household level). ***: p<0.01, **: p<0.05, *: p<0.1

Table 6- Heterogeneity in AWE

(*including fixed effects*)

	(1) No delay	(2) 1-quarter delay	(3) 2-quarter delay	(4) 3-quarter delay	(5) 4-quarter delay	(6) 5-quarter delay
	Aged 15-44 years					
First Stage						
Male sectors' output	-.395***	-.451***	-.481***	-.347***	-.439***	-.287*
	(.056)	(.070)	(.066)	(.066)	(.062)	(.152)
IV estimation						
Husband's unemployment	.173	.266***	.298***	-.034	-.162*	-.614
	(.101)	(.110)	(.101)	(.120)	(.097)	(.516)
No. observations	10456	10255	9271	8513	7992	7354
	Aged 45-64 years					
First Stage						
Male sectors' output	.007	-.376***	-.138	-.284**	.093	-.532**
	(.121)	(.139)	(.153)	(.136)	(.144)	(.229)
IV estimation						
Husband's unemployment	-1.071	-.091	.929	-.392	.957	-.081
	(4.184)	(.240)	(1.178)	(.324)	(1.080)	(.330)
No. observations	2441	2427	2251	2053	1951	1798
	Educated below high-school					
First Stage						
Male sectors' output	-.461***	-.592***	-.584***	-.453***	-.558***	-.270*
	(.063)	(.078)	(.074)	(.075)	(.067)	(.155)
IV estimation						
Husband's unemployment	.061	.174**	.203**	-.007	-.113	-.516
	(.086)	(.088)	(.082)	(.096)	(.077)	(.508)
No. observations	9178	9011	8168	7490	7091	6557
	Educated at high-school or above level					
First Stage						
Male sectors' output	.049	-.081	-.129	-.121	.039	-.222
	(.068)	(.084)	(.080)	(.075)	(.098)	(.193)
IV estimation						
Husband's unemployment	-1.834	.706	1.270	-.335	-1.095	.099
	(2.755)	(1.161)	(.937)	(.556)	(3.456)	(.834)
No. observations	3719	3671	3354	3076	2852	2595

Notes: [1] Each column reports the coefficients of six separate regressions from different delay periods (same as those in Table 3) for restricted subsamples of couples: those with *wives* aged 15-44 (top panel), those with *wives* aged 45-64 (the second panel from the top), those with low educated *husbands* (the second panel from the bottom), those with high educated *husbands* (bottom panel).
[2] The same *control variables* are included as to those in Table 3.
[3] Robust standard errors in parenthesis (clustered at household level). ***: p<0.01, **: p<0.05, *: p<0.1

Table 7- Falsification exercise using a fixed sample size
(*including fixed effects*)

	No delay	1-quarter delay	2-quarter delay	3-quarter delay	4-quarter delay	5-quarter delay
First Stage						
Male sectors' output	-0.083**	-0.079**	-0.094**	-0.075*	-0.072*	-0.103
	(0.037)	(0.041)	(0.040)	(0.040)	(0.042)	(0.081)
IV estimation						
Husband's job loss	1.526	0.598*	0.660**	0.597*	0.505	1.325
	(1.366)	(0.289)	(0.272)	(0.262)	(0.312)	(1.384)
No. observations	12897	12897	12897	12897	12897	12897

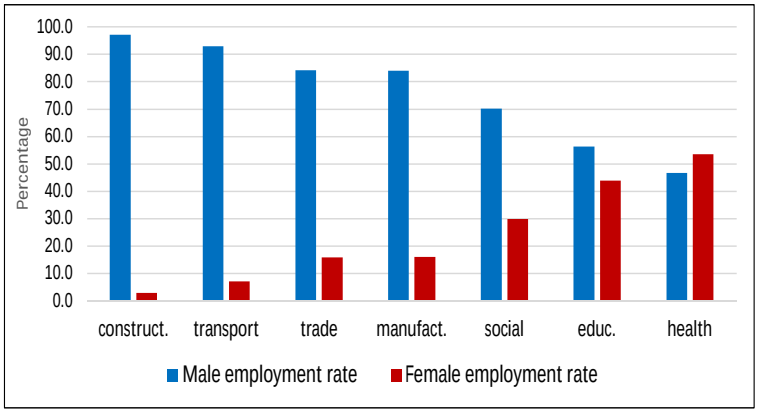
Notes: [1] The same *control variables* are included as to those in Table 3.
[2] Robust standard errors in parenthesis (clustered at household level). ***: p<0.01, **: p<0.05, *: p<0.1

Table 8- Estimation results based on a full sample of wives
(*including fixed effects*)

	No delay	1-quarter delay	2-quarter delay	3-quarter delay	4-quarter delay	5-quarter delay
First Stage						
Male sectors' output	-.333***	-.455***	-.468***	-.341***	-.414***	-.196
	(.048)	(.058)	(.054)	(.054)	(.049)	(.117)
IV estimation						
Husband's unemployment	-.158	-.122	.164	.169	-.082	-.710
	(.130)	(.123)	(.107)	(.137)	(.107)	(.738)
No. observations	14305	14056	12890	11776	10958	10205

Notes: [1] The same *control variables* are included as to those in Table 3.
[2] Robust standard errors in parenthesis (clustered at household level). ***: p<0.01, **: p<0.05, *: p<0.1

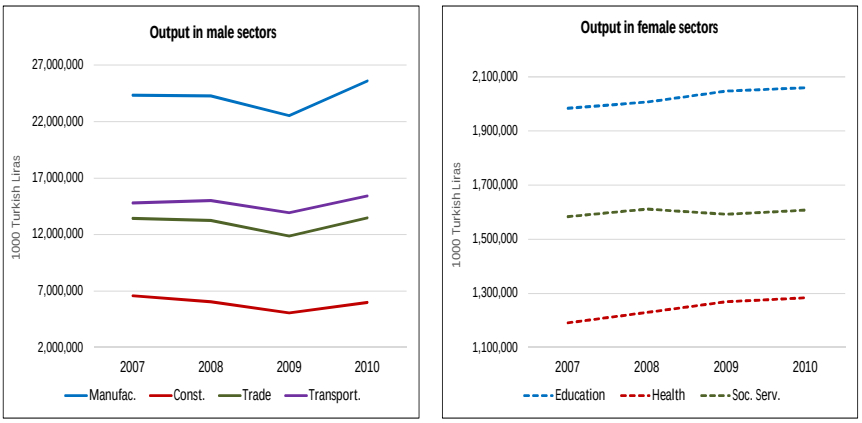
Figure 1- Sectoral distribution of employment by gender, 2007
(as a share of total employment in the corresponding sector)



Source : Turkstat, 2013.

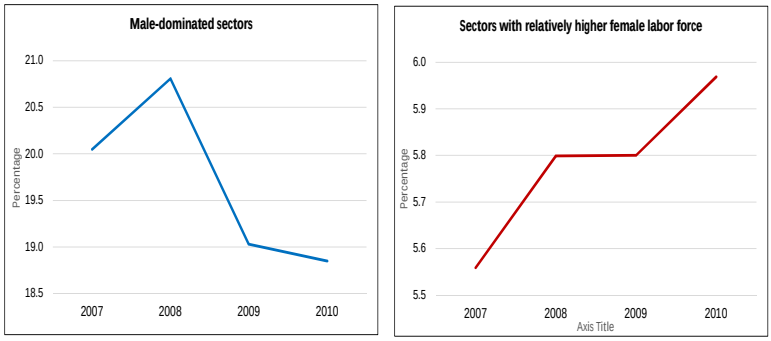
Note : The sectors in sequence are Construction; Transport, Storage and Communication; Wholesale and Retail Trade; Manufacturing; Social Services; Education Services; Health and Social Work.

Figure 2- Sectoral output over the crisis period
(gross domestic product in constant prices)



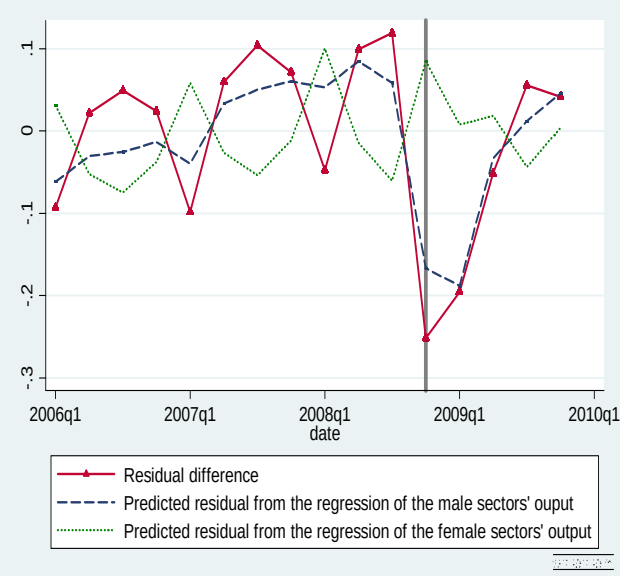
Source : Turkstat, 2013.

Figure 3- Employment rate by sectoral groups over the crisis period
(as a share of population aged 15-64)



Source : Author's own calculations based on micro data from Turkstat.

Figure 4- Internal Validity



Source: Author's own calculations based on micro data from Turkstat.
Note: The dashed line represents the *predicted residual from the regression of male sectors' output*. The dotted line represents the *predicted residual from the regression of female sectors' output*. The solid line denoted by *residual difference* refers to the difference between the residuals predicted from the male and female sectors.