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RETHINKING TIME ALLOCATION OF EGYPTIAN WOMEN: A MATCHING ANALYSIS

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Abstract

To our knowledge, the present research is the first to explore the extremely biased division of labor within Egyptian households. Time activities in respect of paid and unpaid work are an important aspect of this study. The classical dichotomy of "work in the market" versus "leisure" may serve as a good approximation of the role the male plays in the production activity of the household but does grave injustice to the female since it overlooks the whole time she spends outside the market—on domestic activities. Moreover, studying the females' invisible unpaid work is crucial since it remains the females' main occupation. Time-use profiles are constructed using the Egyptian time-use data available, only for females, in the Egyptian Labor Market and Panel Surveys of 1998 and 2006. On the one hand, the empirical exercise analyzes the main features of Egyptian females' time allocation relying on both cross-sectional and longitudinal analysis. On the other hand, we estimate a Propensity Score Matching model in order to evaluate the effect of marriage on the female market and domestic labor supplies. Results show that marriage significantly affect both types of work. Married females spend about 8 hours less on market work relative to their single counterparts. And interestingly, marriage as a treatment increases the domestic labor supply by 30 hours on average.

ملخص

يستكشف هذا البحث، ولأول مرة على قدر علمنا، القسمة شديدة التحيز للعمالة المنزلية المصرية. تعتبر الأنشطة وما ينبثق من وقت، فيما يتعلق بالعمل مدفوع الأجر وغير مدفوع الأجر، عاملا مهما في هذه الدراسة. فالقسمة الثنائية التقليدية بين العمل في السوق والفراغ قد يشكل تقريبا جيدا للدور الذي يلعبه الذكور في النشاط الإنتاجي المنزلي ولكنه يشكل ظلما فادحا للإناث، حيث انه يغفل كل الوقت الذي تقضيه، خارج السوق، على الأنشطة المنزلية. وتعتبر دراسة العمل غير مدفوع الأجر للإناث من الأمور الأساسية حيث تظل الوظيفة الأساسية للمرأة. وتعتمد صور استخدام الوقت على استخدام البيانات المتاحة عن استخدام الوقت في مصر، للنساء فقط، في سوق العمل المصرية ومسح الجداول في 1998 و 2006. وقد خصصت أول ممارسة تجريبية لتحليل المحددات الرئيسية لاستخدامات الوقت من قبل الإناث المصريات. وبالاعتماد على نموذج مطابقة درجة الميل(PSM) ، ثم نحلل إلى أي مدى يؤثر الزواج والخصوبة على استخدام الإناث للوقت بمضي الزمن. تستخدم الأخيرة في المعتاد كما لو كان مسح الجدول تصميما تجريبيا. أضف إلى ذلك،إن التقديرات الحديثة للمنتج الحقيقي في مصر والتي تأخذ في الاعتبار الإنتاج المحلي (إذ يمثل قيمة حقيقية للناس الذين يقومو بإنتاجها واستهلاكها) تعتبر من الإسهامات الإضافية لهذا البحث.

1. Introduction

In the present study, we explore time allocations of Egyptian females. We properly distinguish between single and married females. The need to adopt the household as a unit of analysis is particularly significant if the focus of attention is females' economic behavior as they tend to invest more time in activities that remain outside the cash economy. Economists have made a large effort to explain the market behavior of married women (i.e., patterns of participation, number of hours worked, determinants of wives earnings, etc...). However, very little has been done to analyze the allocation of time within the home sector itself (Gronau, 1976).

The classical dichotomy of "work in the market" versus "leisure" may serve as a good approximation of the role the male plays in the production activity of the household but does grave injustice, especially in developing countries, to the female. As Gronau said thirty years ago, calling the whole time spent by the female outside the market sector "leisure" is to overlook the production activities she engages in work at home. These activities are better termed "domestic production".

According to the UN convention, *all persons of either sex who furnish the supply of labor for the production of economic goods and services should have been included in labor force statistics during the last two decades* (ILO, 1976 and quoted in Beneria 1981). In addition to that, economic activities are, theoretically, all those activities that satisfy human needs through the production of goods and services, regardless of whether they are channeled through the cash market or other forms of exchange. Then, there is no good reason why cooking and food processing should be considered less productive than growing food, especially that cooking for one's employer is an economic activity but cooking for one's own household is not (Waring, 1988). Adoption of such a definition would give visibility to females and children in national figures since they make important economic contributions to the domestic unit (and to the national economy) through these activities. Moreover, correct information on women's work is "crucial for diagnosing the causes of poverty and inequality, and for policy guiding policymakers in their attempts to improve living standards" (Schaffner, 2000a).

In addition to this, Neoclassical theory (Becker, 1965) has convincingly argued that the division between females' participation in nonmarket activities and males' in market activities is based on efficiency and the maximization of utility. However, this does not seem to be justified since females contribution to their household often exceeds that of their male partner and their share of benefits is less (Folbre, 1984). Moreover, while many females contribute more hours of work to support their households than their husbands do, they are often heard to declare "I do not work" or "I am only a housewife", because their labor is not remunerated. And this has significant implications for their status and position not only in their households but also in society (Hoodfar, 1997).

Like in Gronau's (1976), the wife's time is an iceberg: We have plenty of information about the visible tip, the time spent in the market, but almost none about the submerged part spent at home. In other words, the problem of females' activities is that they are often not counted in statistics, not accounted for in representations of the economy and not taken into account when policies are created. Suitable statistical means are necessary to recognize and make visible the full extent of women's work and all their contributions to the national economy including their contribution in the unremunerated and domestic sectors (United Nations, Fourth World Conference on Women, 1995).

Let's start by defining Domestic Production. It represents all unpaid work done to maintain family members and/or a home. This topic has been widely recognized, in developed

countries, as an important area of research study since the nineties. During the last decade, various studies and publications were the result of a strong turn in attention towards the analysis of the division of labor between members of the same household. Fewer studies on this topic have been conducted in developing countries as well as in the Arab world. In addition to this, most of the studies exploring females' participation in Egypt during the last decade concluded that educated females tend to participate less in the labor market. The reasons behind this are usually analyzed relying on the labor market conditions and especially the privatization reforms that took place in the 1990s. However, the present research presents some evidence about new explanations of females' large non-participation rates. The perfectly biased intra-household allocation of time prevents Egyptian married women from increasing the time they spend in the labor market. Husbands are assumed to not participate at all in domestic activities— an assumption that is quite close to reality— and for that, the implementation of more serious family policies calling for a more equitable division of labor within the family are strongly needed to allow married women, specifically the more educated ones, to increase the female market's labor supply. Also, part time jobs taking full account of the burden of females' household responsibilities are crucial to enforce females' insertion into the labor market.

The paper is organized as follows: Section 2 presents some stylized facts on females' time allocation and marriage in Egypt. Sections 3, 4 and 5 are devoted to the presentation of the dataset and the methodology adopted. Section 6 shows the empirical results and Section 7 concludes the paper.

2. New Conceptualizations and Females Time Allocation

In Egypt, as in most of developing as well as developed countries, researchers and policy makers call governments to give a considerable attention to the interaction between work and the family in order to increase females' participation rates. There is an extensive literature on the dilemmas of modern family life (Finking and Willemsen, 1997; Gerson, 1985). It has to be recognized that the division of paid (market) and unpaid (domestic) work does not only concern the family unit but also the whole society, since it has many socioeconomic implications. It also seems that even though women's level of education has considerably increased, differences in paid work, though narrowing, still persist. Regarding the quasi absence of time allocation literature in Egypt (and in the Arab world), the present work aims at studying the allocation of time between market and domestic work to allow for a better measurement and consideration of female's work. This needs to be extended, in future works, to the study of the allocation of time of both sexes in order to allow for a better understanding of modern households and consequently, to implement active family policies. But for this researchers need more detailed time-use data on both sexes in Egypt and in the MENA region in general.

Despite all the changes that have occurred in the cultural and economic contexts in Egypt, domestic production continues to be considered a typically female chore. Studying domestic production is then crucial to illustrate the economic contribution of housewives to the financial affairs of a household and to society at large. Note that the abuse of the housewife concept in collecting data has been a major source of underreporting and misunderstanding of female's gainful employment.

Several questions arise. Did the increase in female participation rates during the last decade imply a substitution of work at home by work in the market? How did the domestic production change over time (especially with the decrease in fertility and increase of time saving devices)? How does marriage affect time use of Egyptian females? Note that the present study remains descriptive and particularly aims at giving a glance on how Egyptian

females use their time, the evolution of time allocation patterns, and the difference between single and married time uses.

As shown in previous empirical studies in Egypt at different points of time (1988, 1998 and 2006), over 65 percent of married females are not actively engaged in market production and during any given year not more than 30 percent participate in the labor market (Assaad, 2007; Assaad and El-Hamidi, 2009). In other words, the wife's sole occupation in Egypt remains being a housewife. The main limitation is that detailed time-use data in Egypt is only available for females. Males are thus assumed not to contribute at all to domestic production. Their time use is then entirely devoted to market work and leisure. A more comprehensive time-use survey on both sexes is crucial to complement studies on time allocation. Despite that, it remains useful to examine the factors that determine the females' time allocation. The first step is presenting the data used. In a second stage, we conduct a cross-sectional analysis aiming at exploring Egyptian females' time uses by different work categories in 2006. Then, using both surveys of 1998 and 2006, we make use of the panel aspect of the data in order to observe differences in females' time uses that result from changes in the marital status. In the analysis below, we distinguish between three main work categories. (1) Market work encompasses all activities that produce goods and services that contribute to national wealth and economic growth (Donahoe, 1999). The latter includes all market and subsistence activities whether these activities are paid in monetary, in kind or unpaid work for family. (2) Domestic work involves all unpaid work done to maintain family members and/or a home. It includes housework and child care activities. (3) Total work regroups the last two categories to account for the total time spent per week in all work categories. Typically, subtracting the latter from the total weekly time available for individuals (24 hours multiplied by 7 days equals 168 hours per week) would allow the calculation of the weekly time of leisure.

3. Data

We are fortunate to have the Egyptian Labor Market Survey 1998 and the Egyptian Labor Market Panel Survey 2006 that include a dedicated section on females and children time spent not only in market and subsistence work but also domestic activities. In the first part of the following section (the cross sectional analysis), our sample includes all women aged between 16 and 64 which total 5,767 women from the 2006 survey. Moreover, a sample for single and married males is created due to the same sample selection. Those constitute a random sample of the population. In the ELMPS of 2006, a whole section is devoted to time use of Egyptian women. We base our analysis on a specific question: How did you spend the preceding week? The domestic activities are classified into 14 groups. However, for the 1998's survey, only three aggregate questions are available. For this reason, we conduct the cross sectional analysis only on the 2006 survey since we are convinced that the latter is able to reflect the real time females spend in domestic activities. The data used also has background information for each respondent including age, education, occupation, work status, spouse's education, individual earnings, family income, family's welfare, and a lot of information regarding parents' background, fertility, marriage costs etc.

In the analysis below, I also explore the panel aspect of the data by making use of both surveys. The idea is to consider all females who were single in 1998 and to follow their marital status till 2006. Some women got married between the two dates while others remained single and did not change their marital status. In the longitudinal analysis, we have a sample of 1,850 females.

4. Descriptive Analysis

4.1 A Cross-Sectional Analysis

As shown in Table 1, all Egyptian married women spend, on average, 46.72 hours per week on domestic chores. As data on men's domestic labor supply is not available, we assume that they do not participate in domestic production. This does not seem to be a strong assumption since since domestic production continues to be considered a typically female chore in Egypt. Table 1 shows that men spend more time in the market than do women and time spent on the market is almost the same for married and unmarried men. Not surprisingly, single women spend more time in the market and less at home than married women. The total time spent on work (at home and in the market) is therefore higher for women than for men whether they are married or singles.

As shown in the Table 2, married females with children spend, on average, 51.72 hours per week on domestic chores. Assuming that males do not participate at all in domestic activities, these women's weekly time spent on total work (hours spent on both market and domestic production) is 60.98. This exceeds the declared time that married males spend in market work. Table 2 also displays the average hours of single and married females without children by work activity. Although the number of hours in market work is similar for these two categories, married women without children spend about 10 hours more in housework activities compared to their singles counterparts. Clearly, marriage seems to significantly increase the female's family burden and reduce her leisure time. This, in turn, affects her participation and labor supply decisions.

Table 3 displays sample means by marital status, work category and age group. Interestingly, single and married women spend similar number of hours in market work. More particularly, those aged between 36 and 45 years old. However, married females tend to spend longer hours in domestic activities than their singles counterparts. For instance, for the 16-35 age group, married and single females spend on average 32.05 and 18.91 hours respectively in domestic activities. This leads to a significant difference between time spent by these women in total work and affects their leisure time. Similarly, married females aged between 46 and 64 years old spend 40.91 hours on average in total work relatively to only 31.75 hours for their singles counterparts. To put into a nutshell, married females in general do not work less in the market but do work much more at home than singles. This should be considered by policy markers by creating more jobs that allow the reconciliation between private and professional lives.

Table 4 presents the impact of the presence of children in the household on married females' time. For the 36-45 age group, we observe that married females without children spend on average 5 hours more in market activities relatively to those with children. Thus, having children imply a significant increase the time spent on child care activities. This is why married females with children spend about 15 hours more than singles on domestic activities. Summing all this points out to the fact that having children largely influences the total work. 60.85 hours for those having children and 50.59 hours for females without children. In Table 4, females with children work in total double the time females without children do. For females aged between 16 and 35, 62.30 and 37.54 hours are spent in total work respectively for females with children and those without. This is also verified for the other age groups. In conclusion, both marriage and fertility are important factors affecting women's market and domestic labor supplies.

Table 5 represents the average hours spent by married females in work category by number of children. It distinguishes between three types of married females: those not having children, those having only one child and those having two or more children. It is worth noting that the first child is the one who matters the most in terms of changing time use

patterns. For instance, females having one, two and more children have similar time use features. However, when married females having no children are compared to those having one child, we find out that the latest group of women spend on average only one hour less in market work and about 20 hours more in domestic work. This is mainly due to the significant increase in time spent in child care activities when having a first child.

Table 6 reveals that women spend a larger weekly number of hours in the private sector relatively to both the public sector and the independent work regardless of their marital status[2]. For this reason, the private sector mainly employs single females since 70.34 percent of all females working in the private sector are singles. This demonstrates the inefficiency of this sector to account for the family/ professional reconciliation issue. Consequently, women are forced to drop out the labor force when they get married and/or when they have children. For this reason, married females with children are largely concentrated in the public sector due to greater prevalence of family-friendly policies such as maternity leave, flexible hours, and work from home jobs. Table 6 shows that 59.68 percent of all females working in the public sector are married females with children. This shows to what extent these family-friendly policies are crucial in order to encourage women to keep their jobs after marriage. In the same line, the independent sector seems to be dominated by married females. As it will be shown later, having a family projet positively increases females' market labor supply. Owners of the latter being mainly members of a same family. This implies in general a flexibility of working hours, which justifies the positive effect it could has on females labor supply.

Table 7 displays sample means of married females by levels of education. Interestingly, we observe that all married females spend the same number of hours in housework activities no matter their level of education. However, more educated females spend longer hours taking care of their children. Consequently, married females with higher levels of education, contrarily to what expected, spend longer hours in domestic activities as a whole. Illiterate females, those having a less than intermediate education, those with intermediate education and those with above than intermediate education spend on average 42.97, 48.23, 51.06 and 48.01 weekly hours respectively on domestic activities. In addition to this, females having intermediate education and above have higher market labor supplies than females with less than intermediate education. Consequently, as shown in Table 7, the more married females are educated, the more they spend time on total work.

In contrast, as presented in Table 8, single females with high levels of education spend between 5 and 10 weekly hours less in domestic work relatively to illiterate single females. Females having an above intermediate education have higher market labor supplies compared to less educated ones. The total work of illiterate single females is significantly higher relatively to females with less than intermediate educated and females with intermediate education (34.79, 20.04, and 29.07 mean hours respectively). This result was expected since working, for illiterate women, is an absolute necessity. Nevertheless, the most educated single females- having an above intermediate education- spend about 41 hours per week on all work categories. This represents the highest labor supply.

Similar results are presented in Figures 1, 2, 3, 4, 5, and 6. Note that, in these figures I distinguish between general and technical education. In conclusion, contrarily to singles, married women tend to spend much more time in domestic activities and fewer hours in market activities.

This result is verified for females of all levels of education except for illiterate and general intermediate education. As shown in Figure 2, married illiterate females spend more hours on both domestic and market work. This is also the case of married females having a general

[2]The private sector encompasses both formal and informal jobs.

education who, contrarily to technical educated ones, spend a larger number of hours in all work categories than their singles counterparts.

4.2 A Longitudinal Analysis

The aim of this section is to understand how does females' time allocation change as they transit into marriage. To address this question, I rely on the panel aspect of the ELMS of 1998 and ELMPS of 2006. I restrict the sample to single females aged from 13 to 35 years old in 1998, which yields to a final sample of 1 144 females. The rational behind this category is due to the fact that age 16 is the legal age of marriage in Egypt.

In the present longitudinal descriptive analysis, I compare time use of females who remained single during the whole 8 years period to those who got married between 1998 and 2006.

Table 9 presents means and standard deviations- by females marital status in 2006- with respect to demographic and socioeconomic variables such as the highest educational attainment, region of residence, age, parental household wealth in 1998, parental education levels, number of children if married, access to basic services in 2006 -as water, electricity etc..- as well as other variables reflecting the working status, market labor supply and domestic labor supply in 1998 and in 2006.

Figure 7 displays the evolution of females time allocation from 1998 to 2006. Females who remained single in both dates- both domestic and market labor supplies do not change significantly between the two dates. Yet, for females aged between 36 and 45 years old in 2006, their market labor supply increases from 30 weekly hours in 1998 to reach 48 weekly hours in 2006. This could be due to the fact that these women are discouraged and decided to stop the spouse's search at the age of 40 and are, in 2006, devoting all their time to market work.

By contrast, time uses of females who transited into marriage have significantly changed between 1998 and 2006 as reflected in Figure 8. The transition into marriage increases dramatically the time spent on domestic activities. This result is valid for all age groups. Females aged from 26 to 39 in 2006 (and from 18 to 31 in 1998), experienced an increase in their domestic labor supply from 22 to 53 mean hours in 1998 and 2006 respectively as a result of transition into marriage. Despite this large change in domestic labor supply, market labor supply after marriage tend to be quite similar to that before marriage.

Table 10 displays the transitions from/into market activities by females marital status in 2006. Clearly, a large part of females who were active in 1998 continue to participate in market work in 2006 conditional on remaining single. For instance, 75 percent of singles continue to participate in the labor market between the two periods. Contrarily, when they transit into marriage, about 60 percent of females dropped out of the labor force. Thus, marriage seems to increase the probability of exiting the labour force.

When looking at the impact of transition into marriage on participation in domestic work, we observe that whether the woman participated or not in domestic activities in 1998, marriage results in the transition of 100 percent of those women into domestic work.

Both cross-sectional and longitudinal analysis presented above illustrated that females who transited into marriage are less likely to pursue their market work and more likely to be involved in domestic work than their unmarried peers.

5. Methodology: Propensity Score Matching Estimator

The main objective of the present section is to estimate the Average Treatment Effects on both the treated population- females who moved into marriage- and the untreated population- females who remained single- with regards to market and domestic females labor supplies as

an output. To do this, I opt for a matching estimation in order to establish a causal relationship between females marital status, domestic labor supplies and market labor supply.

In observational studies, by definition there are no experimental controls. Therefore, there is no direct counterpart of the Average Treatment Effect ATE calculated as a mean difference between the outcomes of the treated and non-treated groups. In other words, the counterfactual is not identified. As a substitute, following, Rosenbaum and Rubin (1983), we may obtain data from a set of potential comparison units that are not necessarily drawn from the same population as the treated units, but for whom the observable characteristics, X_i, match those of the treated units up to some selected degree of closeness.

The method of propensity score (Rosenbaun and Rubin, 1983) is a popular inexact matching method. Rather than matching on the regressors, it matches on the propensity score. Even here an exact match is not possible, so the comparison units are those whose propensity scores are sufficiently close to the treated unit. The propensity score (being the conditional probability of receiving treatment given X_i denoted $p(X_i)$, was suggested by (Rosenbaun and Rubin, 1983) as a matching measure. The idea here is that, if the data justify matching on X_i, then matching based on propensity score is justified.

In the present analysis, I start by running a the following logistic regression,

$$y_{it} = \beta X_{it} + \delta X_{i(t-1)} + \varepsilon_{it} \qquad (1)$$

Where y_{it} is a dummy variable that equals to one if the woman got married between 1998 and 2006 and to zero otherwise. X_{it} being a vector of explanatory variables at date t (2006) that determine the probability of marriage such as the age, the level of education, and the residential region. And, $X_{i(t-1)}$ is vector of lagged variables at date t-1 (1998) as the woman's working status and the wealth of her parental household. The latter is used because all females in my sample were single in 1998 and were then living in their parental household. As I estimate a probit model, ε_{it} represents the error term that follows a normal distribution $N:(0,\sigma)$.

The propensity score $p(x)$ is then estimated by controlling for a particular function of the covariates X_{it} and $X_{i(t-1)}$, specifically the conditional probability of treatment,

$$Pr[D_i = 1 \mid X_{it}, X_{i(t-1)}] \qquad (2)$$

That is, matching is on the propensity score.

If selection bias is eliminated by controlling for $X_i t$ and $X_{i(t-1)}$, it is also eliminated by controlling for the propensity score. Conditioning on the propensity score is often simpler than conditioning on a large dimension vector X_i.

When treatment is not by random assignment but depends stochastically on a vector of observable variables X_i, as in observational data, or when the treatment is targeted to some population defined by some observable characteristics (such as age, sex, or socioeconomic status), then the concept of propensity scores is useful. This is a conditional probability measure of treatment participation given X_i and is denoted $p(X_i)$ (Cameron and Trivedi, 2005).

Now that the propensity score id estimated, each treated woman is matched to one or more untreated women on $p(X)$. To do this, I opt for the Heckman's difference-in-difference matching estimator,

$$D_{t,t'}(X_{it}, X_{i(t-1)}) = E(y_{1t} - y_{0t'} \mid X_{it}, X_{i(t-1)}, D=1) - E(y_{0t} - y_{0t'} \mid X_{it}, X_{i(t-1)}, D=0) \quad (3)$$

The first part of the right side of the equation above presents the average difference in outcome y_{it} for treated women with characteristics X_{it} and $X_{i(t-1)}$ between pre-marriage t' and post-marriage t. It represents, in other words, the treated before-after difference. Similarly, the second part is the non-treated before-after difference. Note that the above equation holds only when each treated individual matches to one non-treated.

However, if each treated women matches to multiple non-treated individuals then we need the following difference-in-difference estimator (Guo et al.; 2004),

$$\alpha'_{KDM} = \frac{1}{n_1} \sum_{i \in I_1 \cap S_p} \{(y_{1t_i} - y_{0t'_i}) - \sum_{j \in I_0 \cap S_p} W(i,j)(y_{0t_j} - y_{0t'_j})\} \quad (4)$$

Where n_1 represents the total number of treated females. S_p is the set of Common-Support (matched to i). And, to determine the weight $W(i,j)$ or the distance between i and j, I use the Kernel matching,

$$W(i,j) = \frac{G(\frac{P_j - P_i}{A_n})}{\sum_{K \in I_0} G\frac{P_K - P_i}{a_n}} \quad (5)$$

$G(.)$ being the Kernel function and a_n is a bandwidth parameter.

To put into a nutshell, using a sample of 1 144 women, the average treatment effect is estimated relying on the propensity score matching estimator. First, the propensity score is estimated. Then, for each treated female i, all non-treated women j who match on the propensity score are identified (i.e., determine the Common Support set). As a third step, the before-after difference is calculated for each treated and non treated female using Kernel weights. Difference-in-difference can then be evaluated.

6. Empirical Results

Table 12 displays the results of the determinants of the first step, i.e, the probability of being treated (which corresponds to getting married between 1998 and 2006). Clearly, the probability of being treated increases with the level of education. In other words, females having a less than intermediate level of education as well as those having a general intermediate level of education have higher probabilities of getting married between 1998 and 2006 relative to their illiterate peers.

Turning the analysis to regions, we can observe that- with Cairo and Alexandria as reference- living in rural areas increases significantly the probability of being treated. I also controlled for other covariates as whether the female was working in 1998 as well as for the parental household wealth in 1998. The latter do not seem to have significant effects the treatment.

Table 13 shows the matching estimates. Two outcomes are considered. These are domestic and market labor supplies[3]. Results of the Average Treatment Effects (ATE) show the

[3] These are number of weekly hours.

difference-in-difference in outcomes. In other words, the ATE shows the difference in market and domestic labor supplies between the treated and the untreated women. Treated women spend on average about 30 hours more on domestic work and 8 hours less on market work compared to their untreated peers.

These results seem to confirm our hypothesis that marriage alone explains an important part of the low females participation in Egypt. Again, Egyptian married females need more equitable allocation of domestic activities within their own households as well as more efficient family-friendly policies in the labor market.

7. Contribution and Policy Implications

We have plenty of information and studies about the time that females spend in the labor market but none on the submerged part spent at home. Economists have made a large effort to explain the market behavior of married women, such as, their pattern of participation, the number of hours worked, the determinants of wives earnings, their occupational choice, and the male- female wage differential. However, the present research is the first to analyze the allocation of time within the home sector. This allocation which may have an impact on the well- being of the family that is not less important than the change in the woman's working habits.

Actually, it seems quite difficult to detect the influence of policy measures on the actual individual behavior, especially with regard to work, child care and housekeeping. It is necessary though to calculate how much time is spent on each of the above activities. No money is involved in work like cooking, taking care of the children or house cleaning, though much time is needed for this kind of work. If women have to pay for the value of domestic work for reconciling family and working life, the risk for them to leave their labor market position as well as their independent incomes becomes higher.

Thus, Egypt, as most of developing and developed countries, needs many regulation reforms to reduce the persistent gender biased intra household division of labor. For this, policies that support women's access to productive employment, with equal wages for equal jobs, taking full account of the burden of women's family and household responsibilities are strongly needed to be considered. An example of such kind of jobs could be part time jobs and also the supply of day care for children.

We expect the results of this study to be of great importance to policymakers and non governmental organizations; especially when designing family policies. Policies affecting not only women's participation in the labor force but also people's attitudes towards the division of paid and unpaid work are needed. It turns out that the existing policies in Egypt are not sufficient in the respect.

The aim of this project is then to explore this new area of research in Egypt in order to gain insight into policy measures that are effective in influencing women's time allocation. Our target is thus to propose, relying on empirical results, more effective policies in Egypt that would allow not only the increase of women's participation to paid work but also a more equitable division of labor within families. Best practice arrangements could be: employee sovereignty over working times, equal access to productive employment with equal wages for equal jobs (for men and women), promotion and benefits, the reconciliation of paid work and family life. It is surely important to find appropriate forms of intervention for supporting the family, which should combine financial support for beneficiaries, without undermining the structure of family life. Organized voluntarism could also play an important role, while the informal networks, which have traditionally sustained the family, should be reinforced.

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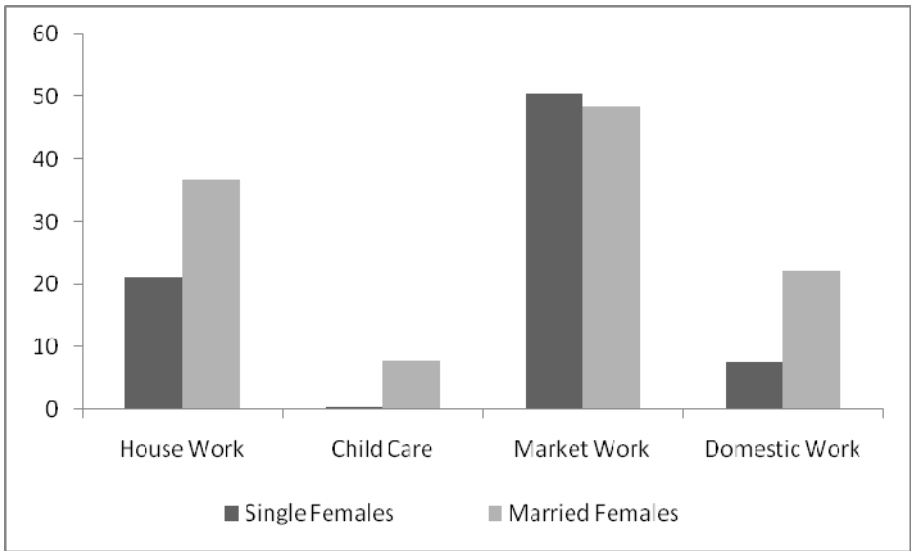
Figures and Tables

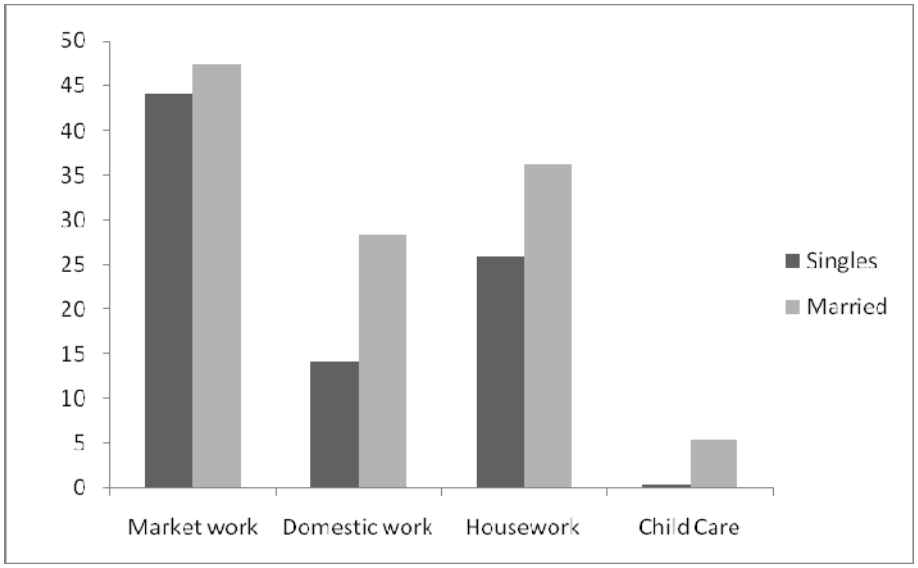
Figures:

Figure 1: Time Allocation by Marital Status



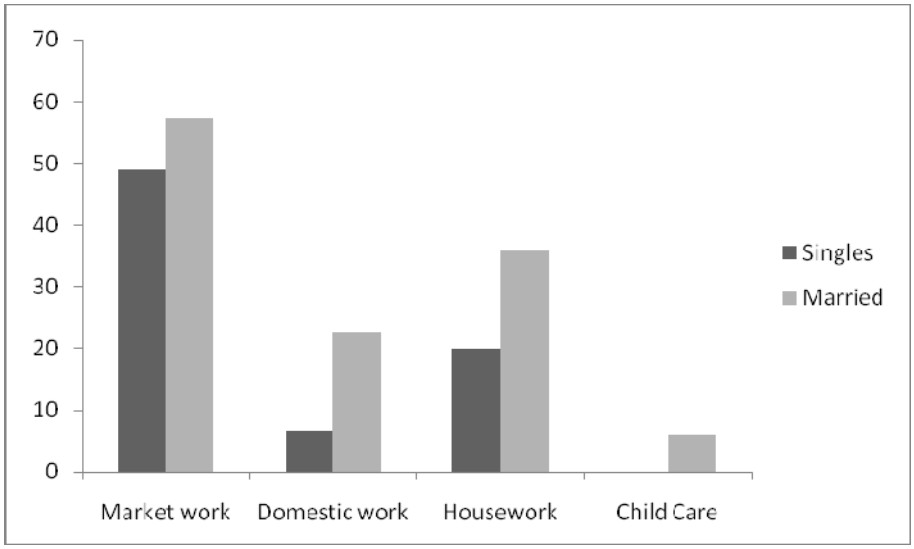
Source: Constructed by the author using the ELMPS 2006.

Figure 2: Time Allocation by Marital Status for Illiterate



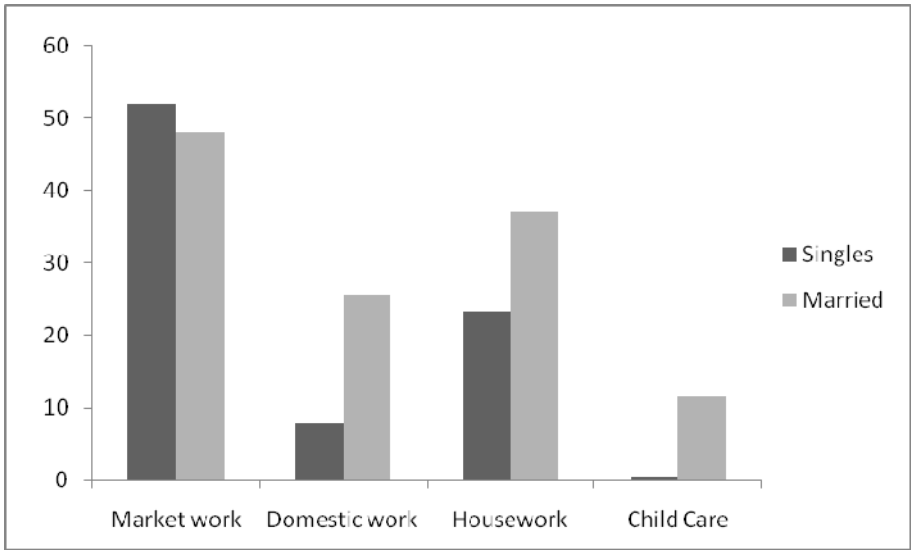
Source: Constructed by the author using the ELMPS 2006.

Figure 3: Time Allocation by Marital Status for General Intermediate



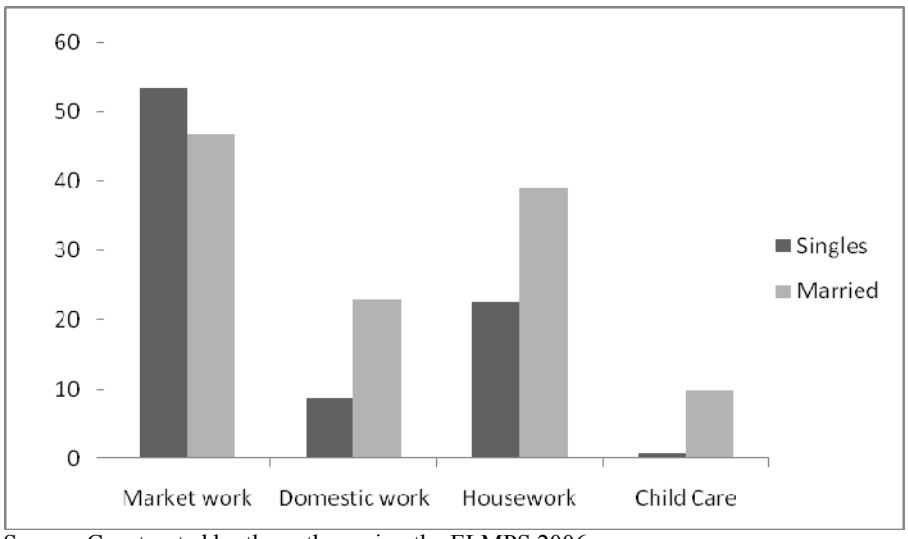
Source: Constructed by the author using the ELMPS 2006.

Figure 4: Time Allocation by Marital Status for Technical Intermediate



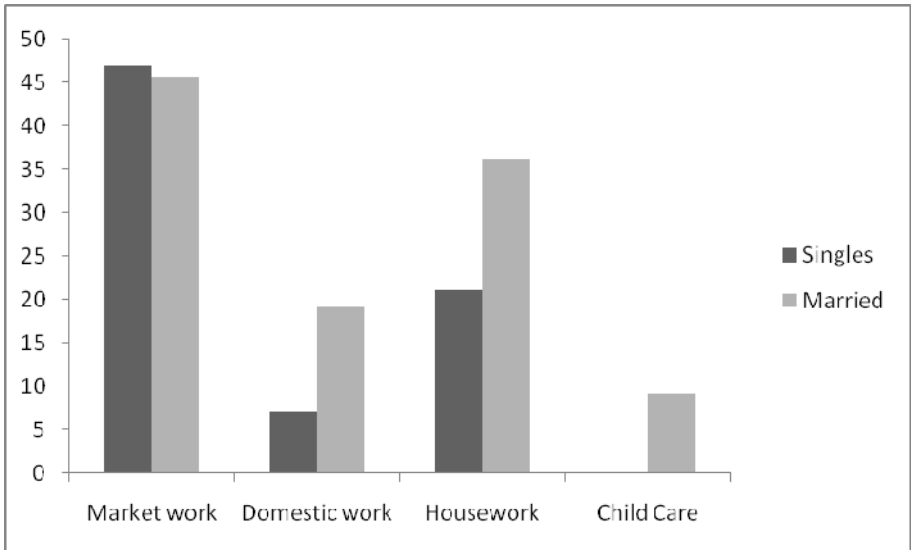
Source: Constructed by the author using the ELMPS 2006.

Figure 5: Time Allocation by Marital Status for Above Intermediate



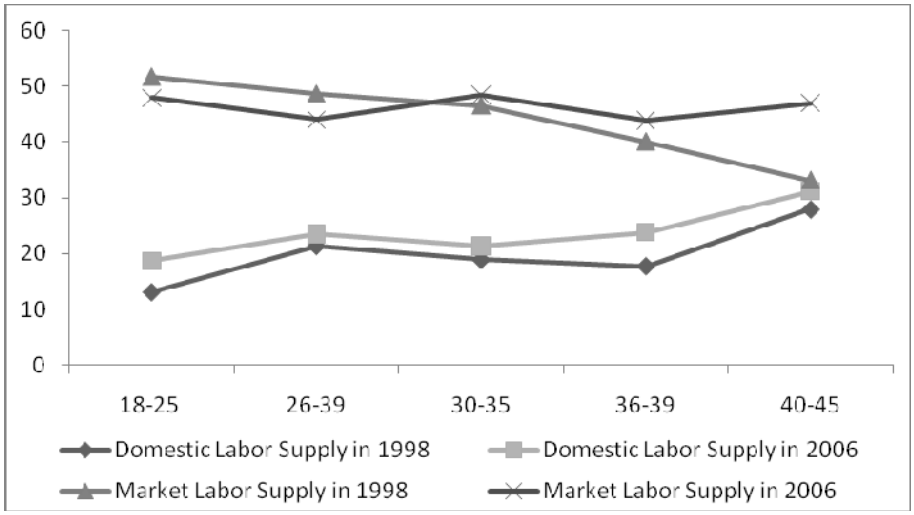
Source: Constructed by the author using the ELMPS 2006.

Figure 6: Time Allocation by Marital Status for University



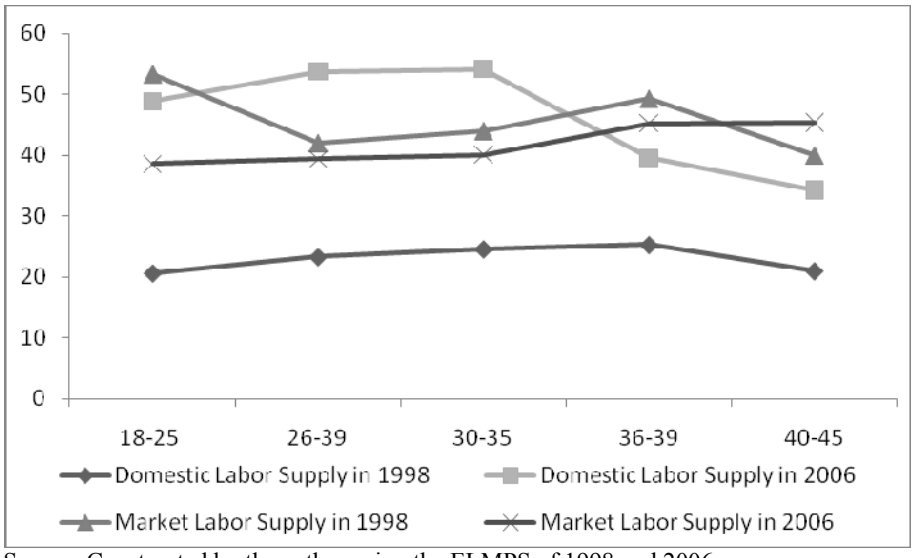
Source: Constructed by the author using the ELMPS 2006.

Figure 7: Evolution of Time Allocation by Age Group 1998-2006: Singles



Source: Constructed by the author using the ELMPS of 1998 and 2006.

Figure 8: Evolution of Time Allocation by Age Group 1998-2006: Married



Source: Constructed by the author using the ELMPS of 1998 and 2006.

Tables:

Descriptive Statistics

Table 1: Time Uses by Gender and Marital Status in 2006

Time use (Hours in mean)	Women		Men	
	Married	**Not Married**	**Married**	**Not Married**
Work at home	46.72	19.09	-	-
Housework	37.15	18.58	-	-
Child care	9.57	0.51	-	-
Work in the market	37.34	43.86	50.92	50.01
Total Work	**84.04**	**62.95**	**50,92**	**50,01**
Leisure	27.96	49.05	61,08	61,99

Notes: i. - means that this information is not available in the ELMPS 2006.
ii. Total work represents the sum of all time spent on work in the market and work at home.
iii. Leisure is calculated as the difference between total time available per week (24-8 ``time for sleeping'' multiplied by 7) minus the total time spent on work.

Source: Constructed by the author using the panel sample 1998-2006.

Table 2: Sample Means by Marital Status, Work Category and Presence of Children in the Household*

	Singles	**Married without children**	**Married with children**	**All**
Time use *				
Market Work	8.87	7.56	9.26	8.83
Domestic Work	20.84	32.58	51.72	37.53
Housework	19.97	31.74	38.86	30.97
Child Care	0.87	0.84	12.86	6.56
Total Work	**29.71**	**40.14**	**60.98**	**46.36**
N	4103	2000	5526	11629

Notes: i. * This table shows females time uses using weekly hours of work.
ii. Childcare represents the time spent taking care of children.
iii. Total work represents the sum of all time spent on work in the market and work at home.

Source: Constructed by the author using the ELMPS of 2006.

Table 3: Sample Means by Marital Status, Work Category and Age Group

	Singles			Married		
	16-35	**36-45**	**46-64**	**16-35**	**36-45**	**46-64**
Time Use						
Market Work	7.89	19.26	8.81	5.49	18.31	8.05
Domestic Work	18.91	34.49	22.94	32.05	32.28	32.86
Housework	18.28	31.35	21.99	31.92	32.03	31.64
Child Care	0.63	3.14	0.95	0.12	0.25	1.22
Total work	**26.80**	**53.75**	**31.75**	**37.54**	**50.59**	**40.91**
N	2954	284	865	640	65	1295

Source: Constructed by the author using the ELMPS of 2006.

Table 4: Sample Means of Married Females by Presence of Children, Work Category and Age Group

		Age 16-35	Age 36-45	Age 46-64
Married No children				
	Market Work	5.49	18.31	8.05
	Domestic Work	32.05	32.28	32.86
	Housework	31.92	32.03	31.64
	Child Care	0.12	0.25	1.22
	Total Work	**37.54**	**50.59**	**40.91**
	N	640	65	1295
Married With Children				
	Market Work	6.46	13.83	13.11
	Domestic Work	55.84	47.02	39.42
	Housework	38.98	39.24	36.80
	Child Care	16.86	7.77	2.62
	Total Work	**62.30**	**60.85**	**52.53**
	N	3379	1645	502

Source: Constructed by the author using the ELMPS of 2006.

Table 5: Time Uses of Egyptian Married Females: Sample Means by Number of Children

Number of Children

	Zero	One	2 and more	Total
Time Uses				
Market work	**7.61**	**6.43**	**10.08**	**8.83**
Domestic work	**32.74**	**53.91**	**51.15**	**46.72**
Housework	31.9	36.23	39.65	37.04
Child care	0.84	17.68	11.49	9.68
Total work	**40.35**	**60.34**	**61.23**	**55.5**
N	1989	1229	4293	7511

Source: Constructed by the author using the ELMPS of 2006.

Table 6: Sample Means by Marital Status, Presence of Children and Working Sector (Only for Working Females)

	Singles	Married without Children	Married with Children	All
Public	**41.11**	**41.41**	**40.55**	37.72
	(23.3%)	(17.03%)	(59.68%)	(100%)
Government	40.93	41.16	40.42	
Public entrep.	42.84	44.92	43.25	
Private	**54.27**	**47.12**	**43.2**	51.70
	(70.34%)	(6.3%)	(23.36%)	(100%)
Formal	51.09	45.15	44.7	
Informal	55.93	49.45	45.84	
Independ.	**36.99**	**31.43**	**32.89**	33.75
	(27.23%)	(17.58%)	(55.18%)	(100%)
N	**830**	**409**	**1369**	**2608**
	(31.83%)	(15.68%)	(52.49%)	(100%)

Source: Constructed by the author using the ELMPS of 2006.

Table 7: Sample Means of Egyptian Married Females by Level of Education

Level of Education

	Illiterate	Less than interm.	Interm.	Above interm.	Total
Age	40.17	34.78	31.36	33.99	36
Time Uses					
Market work	**6.68**	**3.14**	**9.79**	**17.66**	**8.83**
Domestic work	**42.97**	**48.23**	**51.06**	**48.01**	**46.72**
Housework	36.42	38.51	37.87	36.08	37.04
Child care	6.55	9.72	13.18	11.94	9.68
Total work	**49.65**	**51.37**	**60.85**	**65.67**	**55.5**
N	3241	955	2146	1167	7511

Source: Constructed by the author using the ELMPS of 2006.

Table 8: Time Uses of Egyptian Single Females: Sample Means by Level of Education

Level of Education

	Illiterate	Less than interm.	Interm.	Above interm.	Total
Age	42.73	22.45	23.05	28.02	29.41
Time Uses					
Market work	**8.73**	**3.77**	**9.02**	**19.66**	**8.97**
Domestic work	**26.06**	**16.27**	**20.05**	**21.35**	**21.05**
Housework	24.76	15.70	19.20	20.73	20.17
Child care	1.29	0.56	0.85	0.62	0.88
Total work	**34.79**	**20.04**	**29.07**	**41.01**	**30.02**
N	1211	1026	1296	522	4056

Source: Constructed by the author using the ELMPS of 2006.

Table 9: Variables Mean and Standard Deviation by Marital Status in 2006

	Singles			Married			All		
Variable	**N**	**Mean**	**Sd. Dev.**	**N**	**Mean**	**Sd. Dev.**	**N**	**Mean**	**Sd. Dev.**
age 1998	469	20,49	4,78	675	19,99	3,43	1144	20,19	4,04
age 2006	469	27,55	4,90	675	27,09	3,52	1144	27,28	4,15
Age Marriage	-	-	-	675	23,49	3,64	675	23,49	3,64
Market hrs. 1998	54	11,72	7,95	110	10,74	6,58	164	11,06	7,05
Market hrs. 2006	166	45,60	12,50	121	41,04	10,78	287	43,68	12,00
Domestic hrs. 1998	469	18,79	17,65	675	23,48	16,97	1144	21,56	17,40
Domestic hrs 2006	469	21,65	17,80	675	52,22	31,60	1144	39,69	30,74
Father Educ2006	160	3,06	2,31	664	2,90	2,23	824	2,93	2,25
Mother Educ2006	59	1,53	1,29	655	1,98	1,80	714	1,94	1,77
Nbr. Children 2006	-	-	-	675	1,35	0,86	675	1,35	0,86
Nbr. Children 1998	-	-	-	-	-	-	-	-	-
Working in 2006	469	0,35	0,48	675	0,17	0,38	1144	0,25	0,43
Working in 1998	469	0,17	0,37	675	0,15	0,35	1144	0,15	0,36
low Wealth 1998	469	0,84	0,36	675	0,86	0,34	1144	0,85	0,35
high Wealth 1998	469	0,16	0,36	675	0,14	0,34	1144	0,15	0,35
Educ1 2006	469	0,08	0,27	675	0,09	0,29	1144	0,09	0,28
Educ2 2006	469	0,12	0,32	675	0,13	0,34	1144	0,13	0,33
Educ3 2006	469	0,01	0,09	675	0,01	0,12	1144	0,01	0,11
Educ4 2006	469	0,30	0,46	675	0,39	0,49	1144	0,35	0,48
Educ5 2006	469	0,07	0,25	675	0,06	0,24	1144	0,06	0,25
Educ6 2006	469	0,36	0,48	675	0,29	0,45	1144	0,32	0,47
HH size 2006	469	5,30	2,18	675	3,55	1,37	1144	4,27	1,95
HH size1998	469	6,36	2,69	675	6,56	2,82	1144	6,48	2,77
Cairo 2006	469	0,21	0,41	675	0,15	0,36	1144	0,17	0,38
Alex. 2006	469	0,16	0,36	675	0,15	0,36	1144	0,15	0,36
Region1 2006	469	0,19	0,39	675	0,15	0,35	1144	0,16	0,37
Region2 2006	469	0,20	0,40	675	0,19	0,39	1144	0,19	0,39
Region3 2006	469	0,13	0,33	675	0,22	0,42	1144	0,18	0,39
Region4 2006	469	0,12	0,32	675	0,15	0,35	1144	0,13	0,34
Basic services 2006	469	3,12	1,25	675	3	1	1144	2,86	1,17

Notes: i. Region1 represents Urban Lower Egypt, Region2 represents Urban Upper Egypt, Region3 represents Rural Lower Egypt, and Region4 represents Rural Upper Egypt.
ii. Educ1 is Illiterate, Educ2 is less than intermediate education, Educ3 is the general intermediate education, Educ4 is technical intermediate, Educ5 is above intermediate, and Educ6 is university level of education.

Source: constructed by the author using the ELMS of 1998 and the ELMPS of 2006.

Table 10: Transitions from/into Market Work by Marital Status in 2006

	Singles			Married		
	Market work 2006			Market work 2006		
Market work 1998	**No**	**Yes**	**Total**	**No**	**Yes**	**Total**
No	285	106	391	500	76	576
	72,89	27,11	100	86,81	13,19	100
	93,75	64,24	83,37	89,45	65,52	85,33
Yes	19	59	78	59	40	99
	24,36	75,64	100	59,6	40,4	100
	6,25	35,76	16,63	10,55	34,48	14,67
Total	304	165	469	559	116	675
	64,82	35,18	100	82,81	17,19	100
	100	100	100	100	100	100

Note: All females are single in 1998.
Source: Constructed by the author using the panel sample 1998-2006.

Table 11: Transitions from/into Domestic Work by Marital Status in 2006

	Singles			Married		
	Domestic work 2006			Domestic work 2006		
Domestic work 1998	**No**	**Yes**	**Total**	**No**	**Yes**	**Total**
No	21	133	154	0	142	142
	13,64	86,36	100	-	100	100
	43,75	31,59	32,84	-	21,04	21,04
Yes	27	288	315	0	533	533
	8,57	91,43	100	-	100	100
	56,25	68,41	67,16	-	78,96	78,96
Total	48	421	469	0	675	675
	10,23	89,77	100	-	100	100
	100	100	100	-	100	100

Note: All females are single in 1998.
Source: Constructed by the author using the panel sample 1998-2006.

Empirical Results

Table 12: Probability of the Treatment

Treated	Coefficient	Std. Err.	z	P>z	[95% Conf.	Interval]
age 2006	0.657***	0.102	6.420	0.000	0.457	0.858
age square 2006	-0.011***	0.002	-6.530	0.000	-0.014	-0.008
Educ2 2006	0.283*	0.157	1.800	0.072	-0.025	0.592
Educ3 2006	0.608	0.375	1.620	0.106	-0.128	1.343
Educ4 2006	0.366***	0.132	2.780	0.005	0.108	0.624
Educ5 2006	0.203	0.192	1.060	0.290	-0.173	0.579
Educ6 2006	0.141	0.143	0.990	0.323	-0.139	0.421
Region2	-0.096	0.117	-0.820	0.410	-0.326	0.133
Region3	0.038	0.111	0.340	0.735	-0.179	0.254
Region3	0.377***	0.123	3.060	0.002	0.135	0.618
Region4	0.249*	0.139	1.790	0.074	-0.024	0.522
Working 1998	-0.038	0.118	-0.320	0.748	-0.269	0.193
wealth 1998	-0.075	0.053	-1.430	0.153	-0.179	0.028
Constant	-9.536***	1.511	-6.310	0.000	-12.498	-6.574
Pseudo R2	0.055					
Log likelihood	-728.841					
Prob > chi2	0.000					
N	1140.000					

Notes: i. Dependent Variable is a binary variable that is equal to one if the female got married between 1998 and 2006 and, equals to zero if the female remained single at least till 2006.
ii. *** statistically significant at the 1% level, ** statistically significant at the 5% level, * statistically significant at the 10% level.

Table 13: Matching Estimates

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
Domestic Hrs 2006	Unmatched	52.231	21.672	30.560	1.618	18.880
	ATT	52.269	21.542	30.727	1.823	16.850
	ATU	21.718	49.884	28.166		
	ATE			29.678		
Market Hrs 2006	Unmatched	7.368	16.208	-8.840	1.170	-7.550
	ATT	7.340	16.539	-9.199	1.868	-4.930
	ATU	16.088	9.817	-6.271		
	ATE			-7.999		

Notes: i. ATT: Average treatment effect on the treated.
ii. ATU: Average treatment effect on the untreated. iii. ATE: Average treatment effects.

Appendix: Definitions

The Market Definition of Labor Force includes all females engaged in economic activities for purposes of market exchange (Assaad and El-Hamidi, 2009).

The Extended Definition of Labor Force includes those engaged in the production and processing of primary products, whether for the market, for barter, or for their own consumption; the production of all other goods and services for the market; and, in the case of households that produce such goods and services for the market, the corresponding production for their own consumption. The extended definition includes many women engaged in animal husbandry and the processing of dairy of products for purposes of household consumption, in addition to those engaged in market activity (Assaad and El-Hamidi, 2009).

Domestic Activity is identified as the unpaid work done to maintain family members and/or a home. In the present study, we distinguish between two categories of domestic work. The first category is housework and the second is childcare. In our data, housework includes agriculture activities, raising poultry, producing butter/cheese, cooking, washing dishes, doing laundry, cleaning house, collecting water, collecting firewood, helping in construction work, caring for the sick/the elderly and shopping for the household. Childcare represents the time spent taking care of children.

The Extra-Extended Definition of Labor Force includes those considered as working due to the market definition, the extended definition, or engaged in domestic activities.