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Abstract

This paper investigates how large shocks on the Egyptian labor market following the 2011 uprising impacted youths' time allocation. We estimate the effects of reported changes in the father's working conditions on youths' work participation and school enrollment in bivariate probit models, using the 2012 round of the Egypt Labor Market Panel Survey. Our contribution lies in exploring the association between mother's empowerment and shock transmission. We find that reported positive changes reduce daughters' participation in intensive domestic work but only when the mother has a high level of bargaining power. This suggests that a woman's say in household decisions can affect the reallocation of resources following a change in the family income.

Keywords: Labor market shocks, Schooling decisions, Work decisions, Women's empowerment, Egypt
JEL: D13, J16, J21

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1. Introduction

While the developing world has made substantial improvements in primary education enrollment,[1] there are still too few young people continuing to secondary education. Understanding what affects youths' exit from schooling and entry into the labor force is key to taking advantage of the so-called youth dividend. Political and economic shocks induce changes in households' resources and time allocations, which are crucial determinants of these trajectories. However, empirical findings on the impacts of shocks on children's and youths' human capital differ greatly, making these impacts hard to predict.

The recent Egyptian uprising leading to the removal of President Hosni Mubarak on January 25, 2011 engendered a period of political instability that damaged the Egyptian economy. Workers were affected by this shock in different ways: for some, working conditions deteriorated, while others saw improvements to their job stability and earnings. This unusual setting provides the opportunity to simultaneously observe two opposite shocks on the father's labor market.

The aim of this paper is twofold. First, we explore how positive and negative shocks on fathers' labor market conditions following the political regime reversal in Egypt affected 16-20-year-olds' investment in human capital. Second, we study the association between the mother's bargaining power and the transmission of these shocks. Mothers may wield some influence in resource reallocation decisions. To our knowledge, this paper provides one of the first analyses taking into account the association between household decision-making and shock transmission. Focusing on the 16-20 age group allows us to capture major decisions: whether or not to enter secondary and tertiary education and whether or not to work. While schooling is almost universal up to age 15, school enrollment rates drop significantly after this age. Moreover, this age group is not as independent as might be expected. Unmarried youth remain at home and under the authority of their parents until marriage (Singerman 2007; Assaad and Krafft 2014). Therefore, parental income and relative influence in household decisions have a major impact on youths' investment

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[1]91% of children are enrolled in primary education according to the United Nations (http://www.un.org/sustainabledevelopment/education/).

in human capital. This is especially true for daughters: in the 2014 Survey of Young People in Egypt, 79.8% of 13-35-year-old married women reported that they were not autonomous in their decision on when and who to marry, as compared to 45.9% of young married men (Roushdy and Sieverding 2015). Household decision-making can therefore be expected to be correlated with the transmission of shocks to daughters' time allocation.

Whatever the type of shock, positive or negative, we do not identify any significant correlation with schooling. However, while neither positive nor negative changes appear to impact schooling, we do find a negative association between the 16-20-year-olds' probability of working and a positive change in their fathers' working conditions, principally for daughters' participation in domestic work. Interestingly, this effect only holds when maternal bargaining power is relatively high. We find asymmetrical results in the effect of the father's labor shock, there being no significant association between a negative change and youth labor.

The impact of shocks on child and youth work and schooling has been addressed in an extensive literature, to which this analysis contributes. Studies on positive shocks explore mainly, but not solely, the impact of the receipt of new social benefits (e.g., Edmonds 2006a; De Carvalho Filho 2012; Melguizo, Sanchez and Velasco 2016). Negative shocks encompass a decrease in wages, an economic crisis, unemployment of the household head, death or illness of one parent (e.g., Beegle, Dehejia and Gatti 2006; Coelli 2011; Hilger 2016). Various determinants mitigate the overall impacts of shocks, such that their a priori effects are uncertain (Ferreira and Schady 2008). Differences arise from the interplay of two conflicting effects, that of income and substitution. A change in income induces a counter-cyclical investment in human capital, while the substitution effect affects opportunity costs of home production, leisure and schooling. Which effect dominates will depend notably on the level of household wealth and of the country's economic development (Skoufias 2003; Ferreira and Schady 2008), as well as on its traditions and socio-cultural characteristics (Mottaleb, Mohanty and Mishra 2015).

We can go one step further by taking into account a mitigating factor too often ignored: household decision-making. A flourishing literature links a woman's increased ability to make

choices to an improvement in children's human capital outcomes (e.g., Thomas 1994; Lundberg, Pollak and Wales 1997; Quisumbing and Maluccio 2003; Hou 2011; Reggio 2011). Hou (2011) jointly estimates women's participation in household decisions, per capita expenditure and budget shares, and shows that a woman's greater say has a positive effect on education expenditure and on children's schooling in Pakistan. Reggio (2011) shows that an increase in maternal bargaining power decreases child labor in Mexico, but only that of daughters. These analyses provide empirical evidence that, first, households with the same characteristics and income constraints may allocate their resources differently, and second, that an increase in maternal bargaining power or an increase in the mother's budget leads to a greater allocation of resources to the benefit of children (Blundell, Chiappori and Meghir 2005). Our work supplements these empirical analyses by taking into account maternal empowerment due to subsequent reallocation of household resources when a shock does not directly affect the woman, but affects her husband. In our study, the possibility of a direct labor shock impacting mothers is extremely low, as only 3.4% of females declared that they were workers and affected by a change following the revolution. The theoretical background of our paper is related to the collective models in which different household members have distinct preferences and households make decisions that are Pareto-efficient. Households maximize the sum of utility functions weighted according to the relative power of each spouse (Pareto weights). In this type of model, Reggio (2011) has explicitly included child labor in the utility functions of parents. She shows that if the parent with higher marginal disutility for child labor has more power and/or the parent with lower marginal utility for consumption has more power, then child labor decreases with increasing parental bargaining power. In the collective models, household decisions can be considered as a two-step process. The first step is the sharing of total income according to the Pareto weights. In the second step, each member maximizes her/his utility subject to own budget constraint. The relative power of the spouses represented by the share obtained by each individual is a function of prices, household income, and the so-called distribution factors. These are variables that do not affect preferences or budget but influence the decision process, such as relative income of each spouse,

sex ratio or legal environment.

In this framework, a shock on the father's labor market can change household decisions through two effects. First, a change in the total household income affects the Pareto frontier and consequently the budget of each spouse. Second, a change in the mother's relative income affects her bargaining power and therefore the sharing rule on total household income (movement along the frontier). Suppose that the father's income decreases following a negative shock on the labor market, thereby decreasing the total household income and the budget under the control of each spouse. We can expect a modification of resource allocation to the detriment of the children. At the same time, the decrease in the father's income increases the relative income of the mother, giving her more bargaining power within the household. This second effect counteracts the first one, and the overall impact on the children's work or schooling is uncertain. Now consider an increase in the father's income following a positive shock on the labor market. Total household income and the budget of each spouse increase, which may reduce child labor and/or increase school enrollment. At the same time, the increase in the father's income decreases the mother's relative income, reducing her bargaining power. The overall impact on youth human capital depends on which effect dominates.

Can taking into account the initial level of maternal bargaining power reduce the uncertainty of this overall effect? To answer this question, we need to consider the relationship between the mother's power and her relative income, a relationship that we assume to be concave. We thus deduce that when the father's income increases following the shock and maternal bargaining power is high, the first effect dominates and we can expect a decrease in child labor and/or an increase in school enrollment. Contrastingly, the overall effect of a decline in father's income in households with high maternal bargaining power remains unclear. Even if the second effect (i.e., the increase in mother's power) is mitigated, we cannot determine how the decline in father's income will be distributed between father's and mother's budget when maternal power is high. Consequently, we are unable to determine the overall impact on child labor and school enrollment. In the face of such theoretical uncertainties, these issues require empirical analysis.

Some results in the literature may seem a priori counter-intuitive. For example, Tur-Prats (2017) and Bhalotra, Kambhampati, Rawlings and Siddique (2018) point out that a deterioration in male relative to female employment may worsen the situation for mothers and children by increasing the intimate-partner violence of fathers.

The remainder of the paper is organized as follows: section 2 presents the dual shock that followed the Egyptian social uprising; section 3 describes the dataset used in this study and provides descriptive statistics on the variables of interest; section 4 presents our empirical strategy, followed in section 5 by the main results and robustness checks; and section 6 contains concluding remarks.

2. The 2011 social uprising seen as providing a large shock

The Egyptian uprising of January 25, 2011 resulted in economic shocks. Egyptians took to the streets to call for the removal of President Hosni Mubarak and expressed their discontent with lasting poverty, widening inequalities, a lack of labor market opportunities and government corruption (Campante and Chor 2012; World Bank 2012). The size of the protests and the political regime reversal, though essentially driven by economic factors, were unexpected by the population. The ensuing period of political instability resulted in growing concerns about safety on the streets and economic prospects (CountryWatch 2015). As a consequence, economic growth slowed due to market disruptions induced by protests and strikes and by a fall in tourism and foreign investment.

At first sight, the social uprising appears to have had negative effects. Using quarterly data on output and investment for twenty sectors, from 2002 to 2012, Hosny, Kandil and Mohtadi (2013) identify new major constraints on production and investment subsequent to the event, such as greater price variation and real currency depreciation. This study reveals important disparities in the deterioration of economic conditions for the different sectors of activity. The sectors most negatively affected by the revolution include construction, communication and information, internal trade, restaurants and hotels, the Suez Canal and health. Assaad and Krafft (2015) analyze

the evolution of the Egyptian labor market using the three rounds of the Egypt Labor Market Panel Survey (1998, 2006 and 2012). They conclude that working conditions worsened in 2012, particularly for private sector workers. More precarious working conditions were visible through underemployment and irregular employment, rather than through a rise in unemployment. The social uprising also generated a positive shock. The massive protests led to improved working conditions for some workers. A crucial factor was the rise in the minimum wage, first in the public sector in July 2011, followed by the private sector in October. This policy represented the first rise in the minimum wage since 1984, from 35EGP (around 6.5US$) to 700EGP per month (around 110US$).[2] Workers reported improvements not only in terms of wages (hourly wage or total wage), but also in terms of job stability, moving from temporary contracts to permanent ones (World Bank 2012; Assaad and Krafft 2015). According to Assaad and Krafft (2015), it was chiefly the private sector that deteriorated after the revolution, while the public sector was better-organized to respond to post-revolution economic policies and thus benefited from the improvement in working conditions. Therefore, the social uprising resulted in a dual shock on the labor market: one sub-group of workers experienced a negative shock, while another sub-group experienced a positive one.

3. Data and descriptive statistics

3.1. The Egypt Labor Market Panel Survey

This analysis is based on a longitudinal and nationally representative household survey, the Egypt Labor Market Panel Survey (ELMPS) administered by the Economic Research Forum[3] in cooperation with Egypt's Central Agency for Public Mobilization and Statistics. To identify changes following the social uprising, we will mainly focus on the 2012 round, carried out from

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[2]As reported in Beinin (2012) and press articles for instance, see "www.ipsnews.net/2010/02/egypt-minimum-wage-not-enough/". Annual income based on this new minimum wage amount to 32.11% of annual average household expenditures in 2012 (CAPMAS 2014).

[3] OAMDI, 2013. Labor Market Panel Surveys (LMPS), http://www.erf.org.eg/cms.php?id=erfdataportal. Version 2.1 of Licensed Data Files; ELMPS 2012. Egypt: Economic Research Forum (ERF). More details on data collection, sample representativeness and analysis of attrition are available in Assaad and Krafft (2013).

March to June and covering 12,060 households. We will use the 2006 and 1998 rounds for robustness checks. The database contains detailed information on individuals' employment, socio-economic characteristics and women's status. The latter module provides direct evidence of maternal bargaining power, asking married women about their participation in a variety of household decisions.

3.2. Shocks on the household head's labor market

We make use of reported changes in working conditions due to the social uprising as indicators of the dual aggregated shock on the labor market. Workers were asked to compare their economic activity during the three months preceding the date of the survey with that of a month prior to the January 25, 2011. The question is the following: "From your own point of view, has there been a change in your job during the past three months as compared to your job a month prior to the January 25 Uprising? What is the change?". We classified the answers in three categories: negative changes (fall in sales or production, decrease in number of working hours, lack of security, some workers laid off, decrease in wages, increase in cost of production factors), positive changes (increase in number of working hours, improvement in working conditions and increase in pay and incentives), and no change. We focus the analysis on 16-20-year-old children residing with both parents, whose male household heads are married, of prime working age and currently working, and for whom we have complete information on the variables of interest.[4] This sample is composed of 2,084 youths, 17.29% of whose fathers reported negative changes and 8.28% positive changes.

Descriptive statistics on the main characteristics of our sample according to their fathers' reported changes in working conditions are given in Table 1. It is reasonable to say that the labor market shocks were unexpected. However, Table 1 reveals some differences in initial characteristics between the affected groups, suggesting that the shocks are not random. Parents' education level is on average higher for fathers reporting a positive change. There are fewer mothers without any

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[4]More than 97% of youths both of whose parents are present in the household are children of the household head in male headed households. Around 97% of them have a father currently working.

education and more mothers with an intermediate level of education in the positive change group. Household composition appears fairly similar across groups, though the average number of brothers is slightly lower in households reporting a negative change. Some spatial disparities are observed in the reported shocks. Note that we find an almost identical structure for boys and girls.

3.3. Youths' time allocation

We are interested in 16-20-year-olds' decisions regarding time allocation. We focus on two main outcomes: school enrollment and work participation. School enrollment indicates whether the youth of interest is studying at the time of the survey. Schooling is mandatory in Egypt from ages 7 to 15, and 96% of children in this age group are enrolled in school in the 2012 survey round of the ELMPS. Focusing on the 16-20 age group allows us to capture major schooling decisions, those to enter secondary and tertiary education.

In contrast with basic education, secondary education suffers in Egypt from a non-negligible drop-out rate. According to the Egypt Human Development Report (2010), in 2008, 15% of 18-29-year-olds had dropped out of secondary school and nearly 30% of those enrolled in school were repeaters. School fees do not represent a financial constraint for families in Egypt. Egyptian public schools are free and public universities charge low tuition fees in comparison with private institutions. Of our sample of youths, 84.62% are in public sector education. Nor is marriage an alternative to schooling, as only 1.69% of those who left school mention marriage as the main reason for dropping out. One reason may be the low level of returns to schooling compared to other developing countries (Assaad, Aydemir, Dayioglu and Kirdar 2016).

Work participation includes two types of work: non-domestic work, defined as any positive hour spent in a market-oriented activity, and domestic work, for which we consider a threshold of ten hours per week spent in a non-market-oriented activity.[5] For this age group, who can be expected to participate in household subsistence work and chores, it would be inappropriate to weight all

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[5]Domestic work includes agricultural work for household consumption, shopping, maintenance and construction work for one's own home, water and firewood collection, household chores and taking care of children and elderly members of the household.

amounts of domestic work equally. Hence we chose a minimum number of hours, as in other studies (e.g., Assaad, Levison and Zibani 2010; Reggio 2011). However, the results are not sensitive to the choice of this cut-off.[6]

Table 2 shows the youth's time allocation by gender and by work activities. There is a visible tendency towards gender differences: for example 54.8% of girls participating in work are also enrolled in school, while only 28.4% of boys combine both activities. Boys and girls also appear to perform on average different types of work. Among the sample of girls participating in work activities, 94.9% are entirely or partially involved in domestic work, in contrast to only 19.9% of boys. Figure 1 presents the decomposition of youths' domestic chores by type of activities in hours per week. Most of the domestic activities consist of cooking, washing and cleaning, usually considered more as girls' work. This explains the gender difference in participation in domestic work. The remaining analysis therefore distinguishes between domestic and non-domestic work activities and genders.

3.4. Maternal bargaining power

Estimating maternal bargaining power is difficult. We follow a recent strand of the literature on women's empowerment by using the woman's reported participation in household decisions as a direct indicator of maternal bargaining power (e.g., Anderson and Eswaran 2009; Reggio 2011; Lépine and Strobl 2013; see Malhotra and Schuler 2005, for a discussion on these indicators). In the ELMPS, women answer questions regarding the decision-making process related to a variety of household spheres, described in Table A1 of the Appendix. Assumptions still need to be made about how to use these variables, as different decisions will not be equally representative of relative bargaining power or have the same incidence on household members. We first look at decisions affecting women's personal sphere (regarding visits to their friends and relatives, their own health and buying their own clothes) as a proxy for the mother's influence in her household's resource allocations.

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[6]As a robustness check, we alternatively use weekly hours spent in domestic work later in the paper.

As seen with collective models, the social upheaval caused by the shock may have altered maternal bargaining power either directly or indirectly. We find no significant direct association between the shock and maternal bargaining power,[7] but these results need to be treated with caution and should be interpreted more as correlates, due to the risk of endogeneity. Figure 2 shows the youths' time allocation according to their mother's bargaining power estimated at the household level using the method described in section 4.2. Consistent with previous findings in the literature (e.g., Hou 2011; Reggio 2011), the sign of the correlation between maternal bargaining power and youth work is negative (-0.4) and the sign of the correlation between maternal bargaining power and youth education is positive (0.8).

4. Estimation strategy

4.1. Empirical model

The link between shocks and youths' time allocation can be investigated in different ways. Our choice of model is based on assuming that decisions on work and schooling are neither independent nor ordered. First, assuming independence between decisions would imply that one option is not affected by whether or not the other option is available. Second, there is no clear ordering of these decisions in the literature, and changes in the father's working conditions could lead him to take the decisions on his children's schooling and work simultaneously. Multinomial logit models can be used to study dependent categorial variables with more than two alternatives and unordered outcomes (work, schooling, and leisure here), but that would require assuming independence. Conversely, in a bivariate probit model the two decisions are not independent: this model allows for correlation between error terms (Greene 2012).[8] Thus to account for possible interdependence, we estimate the probabilities of work and schooling simultaneously in a bivariate probit model.

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[7]Results are available upon request.

[8]Several papers follow a similar approach (e.g., Duryea and Arends-Kuenning, 2003; Wahba, 2006; Zapata, Contreras and Kruger, 2011). It is to be noted that this model does not account for the endogeneity of these decisions, removing only part of the bias due to the interdependence between school and work.

We could have used the bivariate tobit model to estimate the determinants of the hours spent at work and at school. However, the gains from implementing this model would have been reduced by limited number of hours that can be allocated to schooling in one school day. Thus, we initially analyze threshold rather than intensity.

We define latent variables $S*$ and $W*$ of decisions on schooling and on working respectively. The first dependent variable is defined 1 if the youth is studying at the time of the survey and 0 otherwise. This variable does not shed light on the full scope of the shock's impact on a youth's education, providing no information on attendance. This could be an issue: a youth may be enrolled in school but may not attend due to a lack of parental control and support, or for other reasons such as work. For that reason, we study the time actually spent in school later in the paper. The second dependent variable is defined 1 if the youth participated in a market-oriented activity during the three months preceding the date of the survey or in a minimum of ten hours of domestic work during the week preceding the date of the survey, and 0 otherwise. These probabilities are characterized by a linear combination of a vector of shocks on the father's labor market (**Shock**); a vector of own characteristics (**X**); a vector of household's characteristics (**H**); and in order to capture specific local conditions, community fixed effects consisting of 22 governorate dummies and an indicator of urban residence (**C**). The main variable of interest, **Shock**, consists of a set of dummy variables indicating whether the father reported either no change, a negative change or a positive change in his working conditions after the social uprising. We estimate simultaneously by Full Information Maximum Likelihood the following system:

$$\begin{cases} S*_i = \beta_1 + \beta_2 \textbf{Shock}_i + \beta_3 X_i + \beta_4 H_i + \beta_5 C_i + \mu_i, \text{ with } S_i = 1 \text{ if } S*_i \geq 0 \text{ and } = 0 \text{ otherwise} \\ W*_i = \alpha_1 + \alpha_2 \textbf{Shock}_i + \alpha_3 X_i + \alpha_4 H_i + \alpha_5 C_i + \upsilon_i, \text{ with } W_i = 1 \text{ if } W*_i \geq 0 \text{ and } = 0 \text{ otherwise} \end{cases}$$

$$(1)$$

where i indicates the youth; β_1 and α_1 are constants, β_2, β_3, β_4, β_5, α_2, α_3, α_4 and α_5 are the parameters to estimate and μ and υ the error terms.

A common set of covariates was selected for our two equations from the empirical literature

exploring the determinants of children's and youths' schooling and work (e.g., Levison, Moe and Knaul 2001; Edmonds 2006b; Reggio 2011; Webbink, Smits and de Jong 2012; Lafortune and Lee 2014; Lincove 2015). At individual level, we include the youth's gender, a dummy for being a first-born child, the youth's age and its square. At household level, we include the parents' level of education, the parents' job experience, if the household head work in the public sector and the household socio-economic status, measured by a wealth index. We account for the effects of sibling composition, which reinforces the impact of birth order, by introducing the number of sisters and brothers. In addition, we include the number of household members that are not part of the nuclear family. Community characteristics are aimed at capturing the local impacts of social norms on youth work and marriage, of the labor market and of returns to school. Hence, we include a dummy differentiating between urban and rural residence and governorate fixed-effects.

4.2. Estimation of maternal bargaining power

There are two main challenges in estimating maternal bargaining power. First, women's bargaining power is not directly observed, so either proxy measures or an estimation procedure need to be used. We think that a woman's say in household decisions offers a good indicator of her empowerment within the household. Nevertheless, assumptions still need to be made about how to use these decisions to measure bargaining power. Second, bargaining power is partly determined by unobserved household and individual characteristics that may affect decisions on the youths' time allocation.

To address both concerns, we follow the two-step estimation procedure described by Reggio (2011). First, we estimate maternal bargaining power within the household. Second, we estimate the correlation between maternal bargaining power and the transmission of shocks to youth's time allocation. Following Reggio (2011), we simultaneously estimate multinomial logit models of maternal participation in household decisions. The estimation of a multinomial logit model is based on expected utility maximization. One of its main shortcomings is the strong assumption of independence of irrelevant alternatives (IIA), which is a consequence of the implied assumption that there is no correlation between error terms. The model assumes that the relative probability

of two outcomes is independent of the probability of any other outcome. Adding a third outcome leaves this relative probability unaffected. This implies that, for example, a decision made by the husband alone is independent of other options, and is not affected by whether or not a joint decision is available. We think this assumption is appropriate to model decisions taken by the woman, by the husband or jointly. We include in each multinomial logit model two sets of explanatory variables: variables affecting the decision through the woman's bargaining power (i.e., the distribution factors) and variables affecting the decision directly. Thus, another advantage of this approach is to allow for the consideration of several household decisions at the same time. We choose three decisions to be estimated simultaneously by Maximum Likelihood: on visiting friends and relatives, on own health and on buying clothes for oneself. In each case, a mother can be excluded from the decision, decide jointly with the father or have the final say alone. We define the log likelihood of the multinomial logit model to be estimated as follows:

$$
\boldsymbol{L}_h = \prod_{j=1}^{3} \left(\frac{exp(z_h\theta + \boldsymbol{x}_h\beta_{aj})}{\sum\limits_{j=1}^{3} exp(z_h\theta + \boldsymbol{x}_h\beta_{aj})} \right)^{d_{aj}}
\tag{2}
$$

where h indicates the household, a the household decision, j the decision-making alternatives, z the set of distribution factors, $\boldsymbol{x}$ variables having a direct effect on decision-making and $\boldsymbol{d}$ a dummy. The way we define the log likelihood of the multinomial logit model allows us to estimate the coefficients of the distribution factors separately from the other parameters of the econometric model. Specifically, to identify the model we impose that the impact of each distribution factor is the same across alternatives within and across decisions.[9] The pseudo-likelihood of this simultaneous estimation then consists in the weighted average of the log likelihood functions of each of the three household decisions. We choose to consider equal weights and test the sensitivity of our results to this choice in Section 5.4.

Our measure of bargaining power consists of a function of the distribution factors z and of the set of estimated coefficients θ, as described by equation (3).

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[9]Note that doing so, we estimate the impact of the distribution factors on the probability of having some say, letting the impacts of other explanatory variables of the model vary between deciding together and deciding alone.

$$\mu_h = z_h\theta \tag{3}$$

As distribution factors, we choose the local sex ratio and average contribution of the bride to the costs of marriage. The local sex ratio is defined as the ratio of men to women and was compiled using the 2006 Census at the governorate level for five-year age bands, distinguishing between urban and rural areas. The sex ratio is considered as an indicator of competition on the marriage market at time of marriage and is positively related to a woman's bargaining power, a higher value indicating a relative scarcity of women. This relative scarcity may affect the quality of matching of the couple. The idea is that when there are fewer single women than single men, women can more easily find a partner who will include them more in household decision-making. Several studies refer to the sex ratio as an important determinant of post-marital shares of resources (Chiappori, Fortin and Lacroix 2002; Bulte, Tu and List 2015).

Our second distribution factor is the average contribution of the bride to the costs of marriage, by governorate and five-year age bands using the 2006 and 2012 survey rounds of the ELMPS. Resources contributed at marriage positively affect a woman's outside options as long as she retains control over them whether the outside option is considered as divorce or as an "unproductive marriage" in which each couple member consumes his own resources (Anderson and Bidner 2015). The literature reveals a dual role of pre-marital investments: the money given to daughters at time of marriage acts not only as a pre-mortem bequest but also as a means to compete for higher quality grooms on the marriage market (Iyigun and Walsh 2007; Anderson and Bidner 2015). The two roles have a conflicting effect on a woman's future share of resources. In Egypt, the first role is of primary importance. Amin and Al-Bassusi (2004) document the impact of a girl's *gehaz* (trousseau), whose content is made public to enhance the social status of the bride. Material contributions to the costs of marriage from the bride and the groom are listed in the marriage contract and are a main determinant of a woman's bargaining status in her marriage. Hence, a woman's and her family's contribution to marriage costs is expected to be positively related to her bargaining power. Because its individual value may be endogenous to

other household decisions, we choose to focus on averages, which should allow us to capture spatial and temporal differences in the social norms on marriage.

Like Reggio (2011), we estimate a polynomial function with interactions and squared terms of the distribution factors to better approximate a woman's bargaining power. The squared terms allow us to capture non-linearity in the impacts of the distribution factors. In a collective model of household allocations, Iyigun and Walsh (2007) demonstrate the links between sex ratios and pre-marital investments: a relative scarcity of men increases a woman's pre-marital investments, but decreases the extent to which her contribution to marriage costs can enhance her status within the marriage. An interaction term between the local sex ratio and average contribution to marriage costs will capture such an effect. The impact of distribution factors is net of the impact of explanatory variables that have a direct effect on decision-making. We also include a woman's and her husband's education level and, the level of education of a woman's and her husband's parents, as a proxy for their cognitive capacity and background, and a dummy indicating whether a woman works.

Our measure of bargaining power is derived from the estimation of the polynomial function and consists of an ordinal scale normalized between 0 and 1, from less to more empowerment relative to other women of the sample. To investigate the association with maternal bargaining power during the transmission of the father's labor market shocks, we introduce an interaction of this measure with our indicator of shocks in the system of equations (1) described in Section 4.1. To take into account possible estimation errors in the first estimation, we use the bootstrap method to obtain the standard errors. For each bootstrap sample (500 replications), we repeat both steps.

5. Estimation results and analysis

5.1. Changes in the father's working conditions

The results of the bivariate probit regressions for the probabilities of a youth being enrolled in school and participating in work as a result of the father's labor market shock are listed in Table 3,

for youths whose father did not lose his job after the social uprising.[10] It is the only table where the covariates are also displayed. Our results reveal a negative and significant association between a positive change in father's working conditions and youth work participation. Contrastingly, there is no significant association when the change in the father's working conditions is negative.[11] When we interact the gender of the youth with the measure of the shock, we find a stronger association for girls: daughters whose father reported a positive change have a 15.8% lower probability of working than those whose father was not affected by a shock, while for boys this probability is 8.3% lower and only significant at the 90% confidence level.[12] Significance and sign of the covariates are consistent with the literature.

Differences in the degree of youth autonomy may partially explain the differences between girls' and boys' outcomes. Responding to the ELMPS questions about their main reason for having left school, 28.7% of the 16-20-year-old boys declared that they did not want to continue schooling, as against only 16.4% of the girls. In contrast, only 2.4% of the boys declared that their parents did not want them to continue schooling, compared to 13.6% of the girls. These numbers are suggestive of a higher influence of parental preferences on older girls' decisions and investment in human capital than on those of older boys.

Another partial explanation for the gender difference in results could be the nature of youth work. As discussed in section 3.3, a marked gender division of labor occurs from the youngest age. To account for these differences, we distinguish between non-domestic and domestic work. As Table 4 shows, our significant result appears driven by the effect on female youth domestic work.[13] A positive economic shock has been shown to impact child and youth labor differently depending on the nature of the work (e.g., Del Carpio, Loayza and Wada, 2016). Girls are usually more associated with domestic work than boys (e.g., Edmonds 2006a).

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[10]Households in which the father had lost his job represent 3% of our sample.

[11]Note that only 2% of our sample declared undesired unemployment and the probability of unemployment is not affected by these shocks. Results are not shown but available upon request.

[12]The model strongly rejects independence between the schooling and work participation equations. The correlation ρ between the unobserved characteristics of the two equations is negative and significant.

[13]The results on the probability of participating in non-domestic work are not statistically significant. These are available upon request.

As Tables 3 and 4 show, there is no significant association between a change in fathers' working conditions and youth schooling. This result seems at odds with the literature, which provides compelling evidence of a positive impact of positive income shocks on children's and youths' schooling, essentially in the form of welfare programs (e.g., De Carvalho Filho 2012; Edmonds and Schady 2012; Aizer, Eli, Ferrie and Lleras-Muney 2016; Melguizo et al. 2016). As already noted, returns to schooling are particularly low in Egypt (Assaad et al. 2016), which may partially explain this lack of significant association. The literature, also contains substantial evidence that a negative income shock may result in children and youths being withdrawn from school (e.g., Beegle et al. 2006; De Janvry, Finan, Sadoulet and Vakis 2006; Coelli 2011; Bandara, Dehejia and Lavie-Rouse 2015). Not only is schooling an expense for parents, but leaving children in school also means that parents are deprived of income from their wages. In Egypt, only 5% of the 16-20-year-olds who had left school declared the cost of fees to be the main reason for dropping out. In addition, political instability may have increased the perceived returns to schooling. The perceived opportunity cost of not employing youth may have decreased and encouraged households to keep their children in school. Another potential argument is that the majority of the youth involved in intensive domestic work are also enrolled in school, while the majority of those engaged in non-domestic work are no longer students (Table 2). Thus, the greater compatibility of domestic work with schooling may explain the lack of significant association.

Table 5 shows how data on hours spent at work and school was used to investigate the intensive margin in addition to the extensive margin. We find no significant association between a change in father's working conditions and number of hours spent at school. Choosing to work does not therefore appear to conflict with schooling. Our hypothesis is that the decrease in domestic work might allow girls to allocate more time to studying[14] at home, thereby improving their learning achievement, or to allocate more time to leisure, like any normal teenager. Additional data would be required to explore this further.

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[14]There is evidence that working while in education can decrease study time and learning achievement (e.g., Amin, Quayes and Rives 2006; Kalenkoski and Pabilonia 2011).

5.2. Heterogeneity according to level of household wealth

We investigate the possibility of differences in results between households belonging to the poorest quintile of wealth and other households. In contrast with household income, which is likely affected by labor market shocks, our indicator of household wealth is based on the households' assets and dwelling characteristics. As such, we think this indicator is less reactive to these changes and is a good proxy of the household's initial resources and credit constraints. In the absence of credit constraints, changes in the family income should not affect youth labor and schooling, as parents could borrow against the youth's future income to invest in his/her education (Basu and Van 1998).[15] Thus, poverty is a major determinant of labor and of school drop out. According to the "luxury axiom" (Basu 1999, p.1100), "a household would not send its children out to work if its income from non child labor sources were sufficiently high". By interacting an indicator of belonging to the poorest quintile of wealth with our measure of shocks, we can expect a stronger negative association between a positive shock and girls' domestic work for the poorest households.

The results on the probabilities of girls' schooling and domestic work by level of household wealth are listed in Table 6. They are consistent with the "luxury axiom". We find a stronger negative association for the poorest households between a positive change in the father's working conditions and girls' domestic work.

5.3. Maternal bargaining power in shock transmission

If the parental preferences are different, a greater maternal say in resource reallocation decisions should lead to different outcomes than in households in which the mother has a lower influence. To investigate this possibility, we first estimate maternal bargaining power using the same

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[15]This proposition is questioned in Basu, Das and Dutta (2010), where they provide theoretical foundations for the existence of an inverted U-shape relationship between household wealth and child labor. This is supported by several pieces of evidence of the potential complementarity between households' assets and child labor. Basu et al. (2010) attribute these effects to labor market imperfections. Still, the existence of this non-monotonic relationship does not reject the crucial role of poverty in explaining child and youth labor.

estimation procedure as in Reggio (2011), as described in Section 4.2.[16] To distinguish between higher and lower levels of bargaining power, we create a dummy defined 1 if the mother of the youth has an estimated bargaining power that falls within the highest 50%, and 0 otherwise (discretization as in Bertrand et al. 2015; Calvi et al. 2018). We test the sensitivity of the results by adding a definition of high bargaining power: bargaining power within the highest quartile. Results on the effect of maternal bargaining power on the correlation between a positive shock and the probabilities of girls' schooling and domestic work are given in Table 7.[17] A positive change in the father's working conditions is only significantly associated with a decrease in girls' probability of being involved in domestic work when the mother has a higher relative bargaining power. For these groups, whether defined according to the median or the highest quartile, the probability of participating in intensive domestic work is respectively 26.1% and 32.3% lower than that of girls whose father was not affected by a shock.

These results are consistent with the theoretical predictions and with the literature on intra-household allocations. In a context where parents may have different preferences, the existing correlations between shocks and resource allocation choices may differ according to the level of maternal bargaining power. Such choices may involve the purchase of new household appliances or greater use of child care, for instance registering young children in preschools or paying someone to look after them to reduce daughters' domestic work. Table A3 of the Appendix shows that results are the same and the coefficient increases with the number of children below 6 years old in the household. Lack of data prevents us from going any further in explaining the mechanism at play.

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[16]The impact of the distribution factors is displayed in Table A2 of the Appendix. As expected, the relative scarcity of women and the contribution to marriage costs are associated with a woman's greater say in household decisions. Their impact is non-linear, their squared term being negatively associated with decision-making. However, the effect of the interaction term is negative, though not statistically significant.

[17]Note that the difference in the number of observations between table 6 and table 7 comes from the availability of data concerning maternal decision-making.

5.4. Robustness checks

We now turn to a number of robustness exercises. As related to the 2011 uprising in Egypt, we can consider the timing of the shocks quasi-random but their direction and intensity may be far from exogenous. We start by focusing on the heterogeneity of impacts, before addressing the threat of endogeneity. First, we interact the father's sector of activity (industrial, public and social, agricultural and service) with the measure of a positive shock. When coefficients are allowed to vary systematically across the father's sector of activity through the interaction of a positive shock with dummies for sectors of activity, the effects on work are negative and significant in each category (except for the service sector). These results confirm that our initial findings are not merely driven by a positive effect of individuals connected to the new military power, a threat suggested by Acemoglu, Hassan and Tahoun (2018). We actually find significant results for the agricultural sector, where no firms with military connections were identified.[18]

Second, we allow the coefficients to vary systematically across changes in working conditions rather than grouping them in two categories (positive vs negative). Parameter estimates are shown in Table 8. Each positive change in the father's working conditions (i.e. increase in number of working hours, improvement in working conditions and increase in pay and incentives) is associated with a decrease in the probability of youth work. Negative changes in the father's working conditions are never significant (i.e. fall in sales or production, decrease in number of hours, lack of security, etc.).

Third, we address the threat of endogeneity. We follow a propensity score-matching[19] procedure to control for selection bias by comparing the time allocation of youths whose father reported a positive shock with that of similar youths in other households. It is important to note that a propensity score-matching method assumes that the selection bias is based only on observed characteristics. Results need to be treated with some caution. First-stage probit and balancing-test

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[18]Results are not shown but available upon request.

[19] A propensity score-matching method addresses the threat of endogeneity by constructing a control group whose distribution of initial characteristics is as close as possible to that of the treated group, under the hypothesis that selection for treatment is based solely on observable characteristics (Caliendo and Kopeining 2008).

results are shown in Table A4 and Table A5 of the Appendix. Balancing-test results show that matching is effective in reducing disparities between the two groups in observable characteristics at the individual and household levels. Results of the average treatment effect (ATT) of having a father reporting a positive shock on a youth's school enrollment and work participation are listed in Table A6 of the Appendix. These results are consistent across the matching estimators and confirm our earlier findings. A positive change in the father's working conditions is associated with a decrease in the probability of a youth working, the principal effect being on domestic work, whose probability is reduced by around 9 percentage points.[20]

Next, we take advantage of the longitudinal form of the ELMPS to address the sensitivity of our results to unobserved characteristics on a sub-set of individuals interviewed both in 2006 and in 2012.[21] Following a difference-in-difference approach, we can compare changes in continuous measures of work and schooling for youths whose fathers reported a shock with youths whose fathers did not, holding constant fixed observed and unobserved characteristics that could affect these changes. Results on domestic work and schooling obtained using a difference-in-difference approach are reported in Table 9. Additionally, to test the sensitivity of these results to time-varying unobserved characteristics, we run a placebo experiment using the 1998 round of the ELMPS.[22] Thus, the sample is based on the household head's children between 16 and 20 years old in 2006 and already observed in 1998. Changes in the father's working conditions in 2012 should not affect their children's schooling and work behaviour in 2006; this is confirmed by results presented in Table A7 of the Appendix.

We now test whether our results are sensitive to our measure of shocks by considering an

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[20]We also estimate the ATT on continuous measures of work. A positive shock decreases the youth's time spent on domestic work by around 1.9 hours a week.

[21]More than 62% of our sample was also interviewed in the 2006 survey round of the ELMPS, creating a quasi-experimental setting that lends itself to a difference-in-difference estimation. We believe that this approach suffers from two limitations. First, the time span between the two survey rounds is quite long, which could threaten the parallel trend assumption. Second, this sub-sample may suffer from an attrition bias that does not allow us to generalize the results to the whole population. However, due to the unexpected nature of these shocks, we assume that our setting satisfies the conditional exogeneity of placement to changes in outcomes. Thus, this approach can provide further support for our main results.

[22]Note the large time span between the survey rounds and the threat of attrition bias between the 1998 and the 2012 rounds. These results should be taken with caution.

alternative measure which consists of a reported increase in income after the social uprising. This measure may be perceived as more objective, although it reduces our sample to children of waged workers. Despite this limitation, it allows us to check the consistency of these results with those using a reported positive change in working conditions. Results from the baseline regression are displayed in Table 10. An increase in the fathers' income is associated with a 3.8% decrease in their children's domestic work participation. The effect on girls' domestic work is also confirmed. Finally, we consider alternative measures of maternal bargaining power. In Table A8 of the Appendix, we explore the sensitivity of our results to alternative bargaining power estimations. We start by using alternative weighting schemes for each household decision (columns (1) to (6')). We use two data-driven procedures: Principal Component Analysis (PCA) and Multiple Correspondence Analysis (MCA). The methods generate relative weights based on the correlation of each mode of decision-making to a latent variable, interpreted as maternal bargaining power. For PCA, we use the eigenvectors of the first component as relative weights. One limitation of this method is that it relies on optimal sampling property requirements that are no longer met when qualitative variables are considered (Asselin 2009). As an alternative we turn to MCA, which makes fewer assumptions on the distribution of variables.[23] Both methods give relative weights similar to equal weights. Then, we also compute three series of random weights.[24] Last, we expand the set of distribution factors in the first step in columns (7) and (7') including the difference in level of education between the fathers of husband and of wife, its square and interaction with other distribution factors. Furthermore, we test the robustness of all these results by addressing other decision-making spheres (personal, economic and child-related).

In addition, we check the robustness of our results using a continuous measure of work in Tobit regressions. The results, given in Table A9 of the Appendix, are qualitatively identical to those of

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[23]Lépine and Strobl (2013) use this method to compute an indicator of women's bargaining power based on household decisions, women's work and mobility. For more information on the theoretical foundations of MCA, see Benzécri (1973).

[24]Note that we use the longitudinal nature of the ELMPS database to see whether results are robust to using answers to decision-making questions of 2006 to estimate our bargaining power measures. Results are also robust and available upon request.

Section 5. We also consider other proxies of maternal bargaining power which we introduce directly as interactions with our measure of shocks in our baseline regression. We select three indicators from the literature on women's empowerment: the mother's access to household money, her age at first birth and parental age difference. Results are displayed in Table A10 of the Appendix and remain unchanged, confirming a negative association between a positive change in the father's working conditions and a girl's domestic work when the mother has a higher relative bargaining power.

6. Conclusion

Strengthening youth skills by removing external barriers to schooling and reducing the need for early entry to the labor market is high on the agendas of inclusive development programs. To promote investment in the human capital of children and youths, it is vital to understand how external shocks affect their time allocation. From a theoretical point of view, the impacts of a change in the father's income are uncertain. They may depend on a large number of factors and complex mechanisms. In particular, maternal bargaining power may affect the transmission of these shocks, through her influence in household reallocation decisions, thus constituting another important determinant of the time allocation of children and youths. However, the literature provides no evidence on this channel when the mother may not be directly affected by the shocks. Our aim here was to fill this gap, by shedding further light on the correlation between a dual economic shock and youths' time allocation and taking into account maternal bargaining power during the transmission of these shocks.

In this paper, we first explored how both positive and negative shocks on the father's labor market following the 2011 Egyptian social uprising affected 16-20-year-olds' decisions to work and to attend school. We estimated the probabilities of these decisions simultaneously in bivariate probit regressions, taking reported changes in the father's working conditions in the 2012 survey round of the ELMPS as the main measure of shocks. A positive change in the father's working conditions appears to be negatively associated with the probability of a youth's working. The

greatest correlation is on daughters' participation in intensive domestic work. More interestingly, we find that a positive change is only significantly associated with a decrease in daughters' domestic work when the mother has higher bargaining power. This result is robust to alternative estimation procedures and other indicators of bargaining power. Our results suggest that maternal influence in household decisions allows the mother to direct new resources towards investment in the youth's human capital when there is a positive shock on the father's labor market. This paper provides further support for the need to promote women's empowerment.

We believe that the role maternal empowerment plays in shock transmission deserves further investigation. Future research should test this result in other contexts, examining whether the couple's sharing-out of household decisions is able to mitigate the role of negative shocks. A better understanding of the mechanisms at play would help to guide public policies, so as to reduce impacts of external shocks on children's and youths' investment in human capital.

Table 1: Summary statistics

VARIABLES	Girls				Boys			
			Change in the father's working conditions					
	No change	Negative change	Positive change	Total	No change	Negative change	Positive change	Total
School enrollment (%)	74.4	78.2	83.1	75.61	67.40	70.10	79.17**	68.84
Work participation (%)	34.8	35.2	15.5***	33.37	29.57	25.26	13.54***	27.50
Father's education (%):								
No education	36.84	41.55	11.27***	35.61	45.17	41.24	13.54***	41.86
Less than intermediate	13.30	21.83***	9.86	14.33	14.55	19.07	7.29*	14.71
Inter. and above	32.41	22.54**	56.34***	32.73	28.99	28.87	53.12***	30.98
Uni. and above	17.45	14.08	22.54	17.33	11.29	10.82	26.04***	12.45
Mother's education (%):								
No education	47.78	46.48	28.17***	46.10	56.69	51.03	35.42***	53.96
Less than intermediate	11.50	16.90*	8.45	12.09	12.69	15.98	9.38	12.97
Inter. and above	30.06	26.76	52.11***	31.23	23.75	27.84	47.92***	26.46
Uni. and above	10.66	9.86	11.27	10.59	6.87	5.15	7.29	6.61
Wealth index (%):								
Poorest quintile	17.04	15.49	8.45*	16.15	22.47	18.56	15.62	21.24
Second quintile	20.91	14.79*	12.68*	19.36	23.17	23.20	13.54**	22.37
Third quintile	20.22	16.90	28.17	20.32	20.26	17.01	28.12*	20.37
Fourth quintile	19.11	23.24	23.94	20.11	16.07	15.46	21.88	16.45
Richest quintile	22.71	29.58*	26.76	24.06	18.04	25.77**	20.83	19.58
Number of sisters	1.28	1.30	1.55*	1.31	1.12	1.16	1.21	1.14
Number of brothers	1.57	1.38*	1.62	1.54	1.47	1.28**	1.49	1.44
Number of other members	0.21	0.20	0.04*	0.19	0.29	0.22	0.31	0.28
Region of residence (%):								
Greater Cairo	11.50	16.90*	2.82**	11.66	8.27	12.37*	2.08**	8.44
Alexandria, Suez Canal	8.03	10.56	7.04	8.34	6.87	13.92***	3.12	7.75
Urban Lower	11.36	14.08	5.63	11.34	8.50	12.37*	9.38	9.23
Rural Lower	16.48	8.45**	23.94	15.83	14.90	10.31*	18.75	14.45
Urban Upper	25.48	29.58	36.62**	26.95	26.31	28.87	41.67***	28.02
Rural Upper	27.15	20.42*	23.94	25.88	35.16	22.16***	25.00**	32.11
Observations	722	142	71	935	859	194	96	1,149

Source. Calculations from authors based on the ELMPS-12

Note. Children between 16 and 20 years old. We report the p-value associated with the t-test for the equality of means for corresponding variables between negative change vs no change and positive change vs no change. They are found to be significantly different in means at the *** p<0.01, ** p<0.05 or * p<0.1 level. A wealth index was compiled using Principal Components Analysis. Following Filmer and Pritchett (2001), it is based on asset ownership and housing characteristics, and characterizes a household's economic status.

Table 2: Youths' time allocation, by work activities

	Domestic work	Non-domestic work	Both	Schooling and dom. work	Schooling and non-dom. work	Schooling and both kinds of work
	(%)	(%)	(%)	(%)	(%)	(%)
Girls	37.5	4.8	2.9	54.2	0.3	0.3
Boys	1.3	61.1	9.2	6.6	19.0	2.8

Source. Calculations from authors based on the ELMPS-12

Note. Children between 16 and 20 years old.

Figure 1: Youths' domestic chores (hours per week)
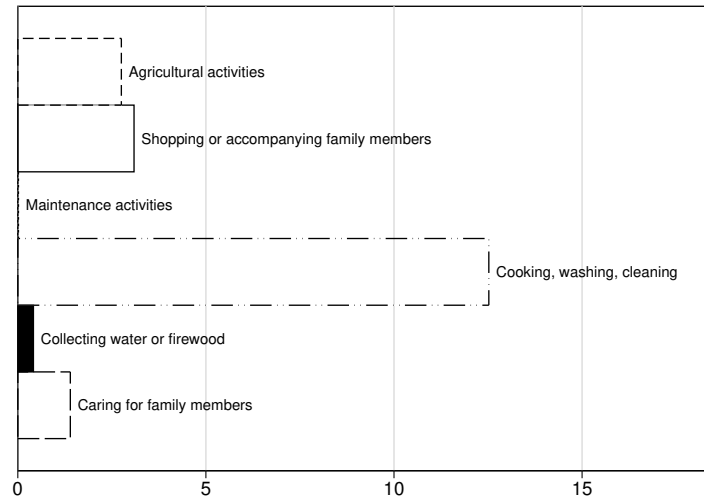
Source. Calculations from authors based on the ELMPS-12
Note: Children between 16 and 20 years old. The sample is based on youths declaring an involvement in domestic work for more than 10 hours a week.

Figure 2: Youths' time allocation, by mother's bargaining power
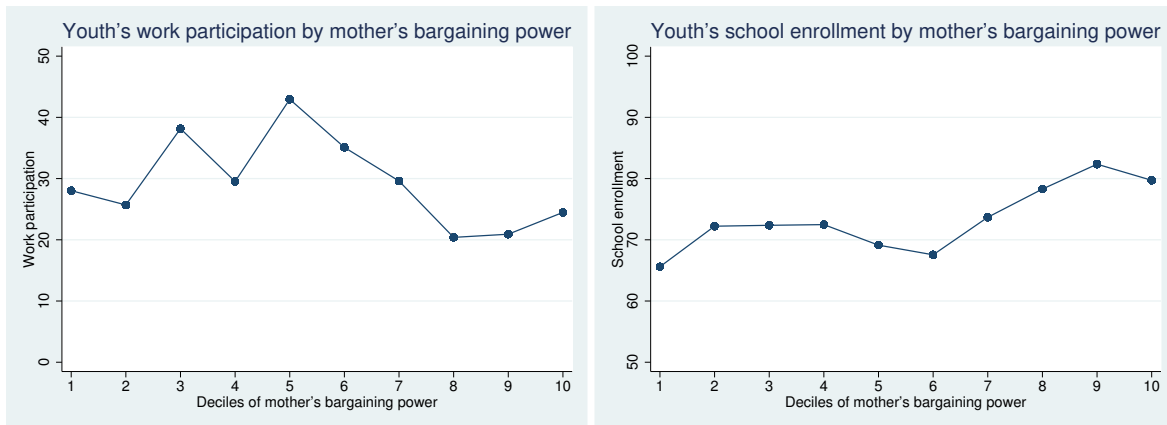
Source. Calculations from authors based on the ELMPS-12
Note. Children between 16 and 20 years old. Mothers' bargaining power is estimated based on their participation in personal decisions following the estimation method described in Section 4.2.

| | All | | Interactions by gender | | | | Equality test | |
| | | | Girls | | Boys | | | |
	School enrol. (1)	Work (any kind) (1')	School enrol. (2)	Work (any kind) (2')	School enrol. (2)	Work (any kind) (2')	(2)	(2')
Negative changes	0.008	-0.019	0.025	-0.006	-0.004	-0.029		
	(0.025)	(0.027)	(0.037)	(0.042)	(0.032)	(0.033)		
Positive changes	0.012	-0.115***	0.028	-0.158***	-0.001	-0.083**		
	(0.035)	(0.033)	(0.052)	(0.042)	(0.046)	(0.049)		
Girl	-0.013	0.104***	-0.013	0.010***	-	-		
	(0.017)	(0.019)	(0.017)	(0.019)	-	-		
Age	0.287	-0.089	0.293	-0.090	0.288	-0.078		
	(0.182)	(0.199)	(0.183)	(0.212)	(0.180)	(0.184)		
Age squared	-0.011**	0.004	-0.011**	0.004	-0.011**	0.003		
	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)		
First-born	0.041**	0.015	0.042**	0.017	0.041**	0.014		
	(0.020)	(0.022)	(0.020)	(0.024)	(0.020)	(0.021)		
Father works in	0.019	-0.018	0.019	-0.020	0.019	-0.017		
the public sector	(0.021)	(0.023)	(0.021)	(0.024)	(0.020)	(0.021)		
Father's education (ref. None)								
Less than intermediate	0.050*	0.012	0.050*	0.012	0.049*	0.011		
	(0.027)	(0.031)	(0.027)	(0.033)	(0.026)	(0.030)		
Intermediate and above	0.091***	-0.095***	0.093***	-0.101***	0.091***	-0.087***	a	
	(0.027)	(0.038)	(0.027)	(0.034)	(0.027)	(0.029)		
University	0.204***	-0.205***	0.208***	-0.228***	0.202***	-0.185***	a	
	(0.036)	(0.038)	(0.037)	(0.043)	(0.035)	(0.033)		
Father's job experience	-0.000	-0.002**	-0.000	-0.002**	-0.000	-0.002**	a	
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)		
Mother's education (ref. None)								
Less than intermediate	0.042	-0.032	0.042	-0.034	0.041	-0.030		
	(0.032)	(0.035)	(0.032)	(0.037)	(0.031)	(0.032)		
Intermediate and above	0.132***	-0.124***	0.134***	-0.134***	0.131***	-0.113***	a	
	(0.029)	(0.032)	(0.030)	(0.036)	(0.029)	(0.029)		
University	0.284***	-0.164***	0.289***	-0.181***	0.279***	-0.149***	a	
	(0.033)	(0.049)	(0.036)	(0.056)	(0.032)	(0.044)		
Mother's job experience	0.000	0.004***	0.000	0.004***	0.000	0.004***	a	
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)		
Household's wealth (ref. Poorest quintile)								
Second quintile	0.028	-0.005	0.028	-0.005	0.028	-0.004		
	(0.027)	(0.030)	(0.028)	(0.032)	(0.027)	(0.028)		
Third quintile	0.041	-0.010	0.041	-0.010	0.041	-0.008		
	(0.028)	(0.031)	(0.029)	(0.033)	(0.028)	(0.029)		
Fourth quintile	0.124***	-0.050	0.124***	-0.053	0.122***	-0.046		
	(0.032)	(0.035)	(0.032)	(0.038)	(0.031)	(0.033)		
Richest quintile	0.148***	-0.087**	0.148***	-0.094**	0.145***	-0.080**	a	
	(0.034)	(0.037)	(0.035)	(0.041)	(0.034)	(0.034)		
Number of sisters	-0.001	0.004	-0.001	0.005	-0.001	0.004		
	(0.008)	(0.009)	(0.008)	(0.009)	(0.008)	(0.008)		
Number of brothers	-0.013	0.016*	-0.013	0.017*	-0.013	0.015*		
	(0.008)	(0.009)	(0.008)	(0.010)	(0.008)	(0.008)		
Number of other HH members	-0.025***	0.017*	-0.025***	0.018	-0.025***	0.016		
	(0.010)	(0.011)	(0.010)	(0.011)	(0.009)	(0.010)		
Rural residence	0.001	0.006	0.000	0.006	0.000	0.005		
	(0.021)	(0.023)	(0.021)	(0.025)	(0.021)	(0.022)		
Governorate FE	YES	YES	YES	YES	YES	YES		
ρ [1]	-0.635***	-0.635***	-0.636***	-0.636***	-0.636***	-0.636***		
Observations	2,084	2,084	2,084	2,084	2,084	2,084		

Source. Calculations from authors based on the ELMPS-12

Note. Standard errors robust to heteroscedasticity in parentheses. Children between 16 and 20 years old. *a* statistically different between girls and boys at 5 percent level. Work is defined as any positive hours in market work or involvement in domestic work for more than 10 hours a week.

[1] Correlation between the error terms of the schooling and work participation equations. A significant ρ indicates that the Wald test rejected independence between the two equations.

*** p<0.01, ** p<0.05, * p<0.1.

Table 4: Determinants of youth domestic work and schooling (Marginal effects)

	All		Interactions by gender				Equality test	
			Girls		Boys			
	School enr.	Dom. work	School enr.	Dom. work	School enr.	Dom. work		
	(1)	(1')	(2)	(2')	(2)	(2')	(2)	(2')
Negative changes	0.007	-0.007	0.022	0.008	-0.003	-0.016		
	(0.025)	(0.021)	(0.037)	(0.042)	(0.032)	(0.016)		
Positive changes	0.007	-0.081***	0.020	-0.174***	-0.004	-0.014		a
	(0.036)	(0.026)	(0.053)	(0.049)	(0.046)	(0.022)		
ρ [1]	-0.352***	-0.352***	-0.353***	-0.353***	-0.353***	-0.353***		
Observations	2,084	2,084	2,084	2,084	2,084	2,084		

Source. Calculations from authors based on the ELMPS-12

Note. Standard errors robust to heteroscedasticity in parentheses. Children between 16 and 20 years old. *a* statistically different between girls and boys at 5 percent level. Domestic work is defined as involvement in household chores for more than 10 hours a week.

[1] Correlation between the error terms of the schooling and work participation equations. A significant ρ indicates that the Wald test rejected independence between the two equations.

*** p<0.01, ** p<0.05, * p<0.1.

Table 5: Tobit model of hours of youth domestic work and schooling (Marginal effects)

	All		Interactions by gender				Equality test	
			Girls		Boys			
	School (Hours/day)	Dom. work (Hours/week)	School (Hours/day)	Dom. work (Hours/week)	School (Hours/day)	Dom. work (Hours/week)		
	(1)	(2)	(3)	(4)	(3)	(4)	(3)	(4)
Negative changes	0.083	-1.532	0.146	-0.364	0.034	-2.930**		
	(0.219)	(0.970)	(0.302)	(1.308)	(0.293)	(1.337)		
Positive changes	0.236	-3.464***	0.470	-5.048***	0.057	-1.603		
	(0.258)	(1.281)	(0.381)	(1.604)	(0.335)	(1.764)		
Observations	2084	2,084	2,084	2,084	2,084	2,084		

Source. Calculations from authors based on the ELMPS-12

Note. Standard errors robust to heteroscedasticity in parentheses. Children between 16 and 20 years old. *a* statistically different between girls and boys at 5 percent level.

*** p<0.01, ** p<0.05, * p<0.1.

Table 6: Determinants of girls' domestic work and schooling, by household wealth (Marginal effects)

	School enrollment		Domestic work		Equality test	
	Other	Poorest quintile	Other	Poorest quintile		
	(1)	(1)	(1')	(1')	(1)	(1')
Negative changes	0.052	-0.024	-0.014	0.073		
	(0.038)	(0.083)	(0.045)	(0.098)		
Positive changes	0.008	-0.147	-0.145***	-0.328***		*a*
	(0.055)	(0.177)	(0.051)	(0.041)		
ρ [1]	-0.489***	-0.489***	-0.489***	-0.489***		
Observations	935	935	935	935		

Source. Calculations from authors based on the ELMPS-12

Note. Standard errors robust to heteroscedasticity in parentheses. *a* statistically different between girls in the poorest quintile and girls in the other quintiles at 5 percent level. Female children between 16 and 20 years old.

[1] Correlation between the error terms of the schooling and work participation equations. A significant ρ indicates that the Wald test rejected independence between the two equations.

*** p<0.01, ** p<0.05, * p<0.1.

Table 7: Determinants of girls' domestic work and schooling, by mother's bargaining power (Marginal effects)

	Median		Last quartile	
	School enrollment	Domestic Work	School enrollment	Domestic Work
	(1)	(1')	(2)	(2')
Positive change	-0.009	-0.085	0.014	-0.123*
if Lower Bargaining Power	(0.065)	(0.077)	(0.057)	(0.063)
Positive change	0.084	-0.261***	0.059	-0.323***
if Higher Bargaining Power	(0.079)	(0.056)	(0.131)	(0.018)
Equality test		*b*		*a*
ρ [1]	-0.411***	-0.411***	-0.410***	-0.410***
Observations	675	675	675	675

Source. Calculations from authors based on the ELMPS-12

Note. Bootstrap standard errors in parentheses (500 replications). *a* and *b* statistically different between high bargaining power and low bargaining power at respectively 5 percent level and 10 percent level. Female children between 16 and 20 years old. Lower bargaining power is defined in two ways, as having a mother belonging to the 50% least empowered or to the 75% least empowered, as defined by their estimated bargaining power from first stage following the method detailed in Section 4.2. Regressions control for reported negative change according to the mother's bargaining power, if the household head works in the public sector, if the youth is the first-born, age and its square, the level of education of both parents, parents' job experience, region of residence, indicators of the household demographic composition.

[1] Correlation between the error terms of the schooling and work participation equations. A significant ρ indicates that the Wald test rejected independence between the two equations.

*** p<0.01, ** p<0.05, * p<0.1.

Table 8: Impacts of a change in father's working conditions by type of shocks (Marginal effects)

| | Positive changes | | | | Negative changes | | | | |
| | Increase in nb of hours | Improv. in working conditions | Increase in pays and incent. | Fall in sales or prod. | Decrease in nb of hours | Lack of security | Some workers laid off | Wage decrease | Increase in costs of factors |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Shocks	-0.302***	-0.106**	-0.191**	0.001	0.069	-0.038	-0.165	-0.088	-0.046
	(0.009)	(0.043)	(0.097)	(0.039)	(0.079)	(0.047)	(0.130)	(0.073)	(0.080)
ρ [1]	-0.683**	-0.683**	-0.683**	-0.683**	-0.683**	-0.683**	-0.683**	-0.683**	-0.683**
Obs.	2084	2084	2084	2084	2084	2084	2084	2084	2084

Source. Calculations from authors based on the ELMPS-12

Note. Children between 16 and 20 years old. Coefficients correspond to the marginal effects of the different changes in the father's working conditions on 16-20-year-olds' probability of working estimated from a bivariate probit regression on youth school enrollment and work participation. The category of reference is no change in the father's working conditions.

[1] Correlation between the error terms of the schooling and work participation equations. A significant ρ indicates that the Wald test rejected independence between the two equations.

*** p<0.01, ** p<0.05, * p<0.1

Table 9: Results of OLS regressions of the impact of a positive shock (Coefficients)

	All		Girls		Boys	
	School (Hours/day)	Dom. work (Hours/week)	School (Hours/day)	Dom. work (Hours/week)	School (Hours/day)	Dom. work (Hours/week)
	(1)	(2)	(3)	(4)	(5)	(6)
Year 2012	-1.002***	2.605***	-1.069**	5.098***	-0.857**	0.332
	(0.272)	(0.930)	(0.416)	(1.771)	(0.358)	(0.746)
Positive change	-0.085	0.342	0.231	1.312	-0.342	-0.370
	(0.144)	(0.546)	(0.190)	(1.000)	(0.195)	(0.279)
Year 2012 X Pos ch	0.414	-1.782**	0.077	-3.803***	0.645*	-0.070
	(0.274)	(0.726)	(0.384)	(1.323)	(0.386)	(0.523)
Observations	2,588	2,588	1,239	1,239	1,349	1,349

Source. Calculations from authors based on the ELMPS-06 and ELMPS-12

Note. The sample is composed of youths aged 16-20 in 2012 who were interviewed in 2006 and for whom there is no missing information on variables of interest. Regressions make use of the two survey rounds as pooled cross-sections. For our measure of shock, the category of reference is having a father not declaring a positive change in his working conditions. Standard errors are clustered at household level. Due to the number of zeros for the youth and boy samples, results should be taken with caution.

*** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 10: Impact of an increase in father's income on youth domestic work and schooling (Marginal effects)

	All		Interactions by gender				Equality test	
			Girls		Boys			
	School enr.	Dom. work	School enr.	Dom. work	School enr.	Dom. work		
	(1)	(1')	(2)	(2')	(2)	(2')	(2)	(2')
Increase in income	0.004	-0.038*	0.002	-0.086**	0.005	-0.001		a
	(0.026)	(0.020)	(0.035)	(0.039)	(0.032)	(0.013)		
ρ [1]	-0.339***	-0.339***	-0.338***	-0.338***	-0.338***	-0.338***		
Observations	1,421	1,421	1,421	1,421	1,421	1,421		

Source. Calculations from authors based on the ELMPS-12

Note. Standard errors robust to heteroscedasticity in parentheses. a statistically different between girls and boys at 5 percent level. Children between 16 and 20 years old. Our results are also robust to inclusion of any type of work participation and available upon request.

[1] Correlation between the error terms of the schooling and work participation equations. A significant ρ indicates that the Wald test rejected independence between the two equations.

*** p<0.01, ** p<0.05, * p<0.1.

Appendix

Table A1: Decision-making module of ELMPS

Question: Who in your family usually has the final say on the following decisions ?
A) Making large household purchases
B) Making household purchases for daily needs
C) Own visits to family, friends or relatives
D) What food should be cooked for each day
E) Getting medical treatment or advice for yourself
F) Buying clothes for yourself
G) Taking child to the doctor
H) Dealing with children's school and teachers
I) Sending children to school on daily basis
J) Buying clothes and other needs for children
Answer: 1. Respondent alone
          2. Husband
          3. Respondent and husband jointly
          4. In-laws
          5. Respondent, husband and in-laws jointly
          6. Others
          7. Not applicable

Source. ELMPS-2012 Individual Questionnaire

Table A2: Effect of distribution factors on bargaining power using decisions in the personal sphere

	θ coefficients
Sex ratio	49.43***
	(10.728)
Sex ratio squared	-24.26***
	(5.384)
Average contribution to marriage costs	0.164**
	(0.062)
Average contribution squared	-0.002***
	(0.000)
Sex ratio X Average contribution	-0.071
	(0.061)
Observations	2,844

Source. Calculations from authors based on the ELMPS-12

Note. Married women 15-49 years old with a husband living in the household. The sex ratio is defined as the ratio of men over women by governorate and urban residence and 5-year age band. It is obtained by authors' calculations based on the 2006 Census (CAPMAS). The average contribution to marriage costs is based on the average of women's reported contribution by their family and themselves to the costs of the celebration of their marriage by governorate and 5-year age bands, with sampling weights.

Regressions control for level of own education, that of spouse, that of own parents and of parents-in-law and if the woman is working, as in Reggio (2011). The first step consists of three simultaneous multinomial regressions on women's participation in decisions on visiting their family and friends, their own health and buying their own clothes. The decisions have an equal weight.

*** p<0.01, ** p<0.05, * p<0.1

Table A3: Determinants of girls' domestic work and schooling, by number of household members below 6 years old (Marginal effects)

	School enrollment			Domestic work		
	No members <6	One member <6	Two members <6	No members <6	One member <6	Two members <6
	(1)	(1)	(1)	(1')	(1')	(1')
Negative changes	0.031	0.026	0.021	-0.001	-0.005	-0.009
	(0.040)	(0.051)	(0.098)	(0.048)	(0.065)	(0.130)
Positive changes	-0.001	-0.026	-0.051	-0.138**	-0.223***	-0.284***
	(0.057)	(0.077)	(0.146)	(0.056)	(0.079)	(0.107)
ρ [1]	-0.498***	-0.498***	-0.498***	-0.498***	-0.498***	-0.498***
Observations	935	935	935	935	935	935

Source. Calculations from authors based on the ELMPS-12

Note. Standard errors robust to heteroscedasticity in parentheses. Female children between 16 and 20 years old.

[1] Correlation between the error terms of the schooling and work participation equations. A significant ρ indicates that the Wald test rejected independence between the two equations.

*** p<0.01, ** p<0.05, * p<0.1.

Table A4: Probit regressions of fathers' labor market shocks (Coefficients)

	Positive shock
Father is in public sector	1.328***
	(0.145)
Household wealth (ref. cat.: poorest quintile)	
Second quintile	-0.074
	(0.172)
Third quintile	0.151
	(0.160)
Fourth quintile	-0.186
	(0.176)
Richest quintile	-0.113
	(0.190)
Mother's education level (ref. cat.: no education)	
Less than intermediate	-0.176
	(0.180)
Inter. and above	0.056
	(0.149)
Uni. and above	-0.084
	(0.226)
Father's education level (ref. cat.: no education)	
Less than intermediate	0.194
	(0.186)
Inter. and above	0.423***
	(0.163)
Uni. and above	0.487**
	(0.202)
Region of residence (ref. cat.: Great Cairo)	
Alexandria	0.304
	(0.291)
Urban Lower	0.433
	(0.276)
Urban Upper	0.699***
	(0.245)
Rural Lower	0.914***
	(0.239)
Rural Upper	0.662***
	(0.245)
No. of sisters	0.046
	(0.039)
No. of brothers	0.077*
	(0.047)
No. of other members	0.029
	(0.069)
Constant	-3.402***
	(0.303)
Pseudo $R^2 a$	0.228
Observations	2,084

Source. Calculations from authors based on the ELMPS-12
Note. Standard errors robust to heteroscedasticity in parentheses. Children between 16 and 20 years old.
*** p<0.01, ** p<0.05, * p<0.1

Table A5: Matching quality indicators before and after matching on a positive shock

	Pseudo R^2	LR χ^2(p)	Mean % absolute standard bias	CS restriction	Total % bias reduction
Before matching	0.228	265.13 (0.000)***	15.49		
After nearest-neighbor matching	0.020	9.01 (0.0983)	5.81	5	62.47
After kernel matching	0.005	2.11 (1.000)	1.80	3	88.39

Source. Calculations from authors based on the ELMPS-12

*** p<0.01, ** p<0.05, * p<0.1

Table A6: Impact of a positive shock on youths' time allocations (ATT)

	School enrollment	Work (any kind)	Non-domestic work	Domestic work
	(1)	(2)	(3)	(4)
Unmatched sample	0.808***	-0.144***	-0.084**	-0.072***
	(0.036)	(0.037)	(0.029)	(0.030)
Nearest-neighbor matching	-0.014	-0.077*	0.025	-0.096**
	(0.046)	(0.048)	(0.032)	(0.041)
Kernel matching	0.019	-0.100***	-0.014	-0.090***
	(0.035)	(0.031)	(0.024)	(0.024)

Source. Calculations from authors based on the ELMPS-12

Note. Children between 16 and 20 years old. We impose a common support condition to reduce poor quality matches. For the nearest-neighbor matching, we use a Caliper equal to 0.02 as the maximum distance between the propensity scores and matching is without replacement. Standard errors for kernel matching are bootstrapped with 500 replications.

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table A7: Placebo test: difference-in-difference regressions of the impact of a positive shock (Coefficients)

	All		Girls		Boys	
	School (Hours/day)	Dom. work (Hours/week)	School (Hours/day)	Dom. work (Hours/week)	School (Hours/day)	Dom. work (Hours/week)
	(1)	(2)	(3)	(4)	(5)	(6)
Year 2006	0.263	-	-0.704	-13.439**	0.877	-
	(0.492)	-	(0.805)	(5.939)	(0.643)	-
Positive change in 2012	-0.041	-	0.053	-2.302	-0.198	-
	(0.263)	-	(0.325)	(4.508)	(0.323)	-
Year 2006 X Pos ch in 2012	-0.118	-	-1.081	4.958	0.409	-
	(0.500)	-	(0.705)	(5.499)	(0.677)	-
Observations	1,272	-	575	442	697	-

Source. Calculations from authors based on the ELMPS-98 and ELMPS-06

Note. The sample is composed of youths aged 16-20 in 2006 who were interviewed in 1998 and for whom there is no missing information on variables of interest. Regressions make use of the two survey rounds as pooled cross-sections. For our measure of shock, the category of reference is having a father not declaring a positive change in his working conditions. Standard errors are clustered at household level. We add interaction terms between the time dummy and the father's sector of activity as controls.

*** p<0.01, ** p<0.05, * p<0.1.

Table A8: Estimation of the role of the mother's bargaining power with different measures (Marginal effects)

	Without weights		Weights MCA		Weights PCA		Random weights 1		Random weights 2		Random weights 3		More DF without weights	
	SE	DW	SE	DW	SE	DW	SE	DW	SE	DW	SE	DW	SE	DW
	(1)	(1')	(2)	(2')	(3)	(3')	(4)	(4')	(5)	(5')	(6)	(6')	(7)	(7')
	Personal decisions													
Pos. ch	-0.009	-0.085	-0.009	-0.085	-0.009	-0.085	-0.009	-0.085	-0.014	-0.079	-0.040	-0.044	-0.025	-0.108
(Low BP)	(0.067)	(0.073)	(0.067)	(0.073)	(0.067)	(0.073)	(0.067)	(0.073)	(0.067)	(0.073)	(0.056)	(0.067)	(0.067)	(0.073)
Pos. ch	0.084	-0.261***	0.084	-0.261***	0.084	-0.261***	0.084	-0.261***	0.090	-0.263***	0.136*	-0.323*** *	0.106	-0.206***
(High BP)	(0.080)	(0.075)	(0.082)	(0.074)	(0.081)	(0.074)	(0.081)	(0.076)	(0.075)	(0.077)	(0.083)	(0.083)	(0.080)	(0.075)
N	675	675	675	675	675	675	675	675	675	675	675	675	675	675
	Economic decisions													
Pos. ch	-0.026	-0.045	-0.026	-0.045	-0.026	-0.045	-0.015	-0.091	-0.041	-0.047	-0.023	-0.129*	-0.025	-0.049
(Low BP)	(0.067)	(0.073)	(0.067)	(0.073)	(0.067)	(0.073)	(0.067)	(0.073)	(0.066)	(0.073)	(0.066)	(0.073)	(0.067)	(0.073)
Pos. ch	0.087	-0.274***	0.087	-0.274***	0.087	-0.274***	0.076	-0.216***	0.112*	-0.275***	0.085	-0.168**	0.087	-0.274***
(High BP)	(0.080)	(0.075)	(0.082)	(0.074)	(0.081)	(0.074)	(0.082)	(0.076)	(0.078)	(0.077)	(0.085)	(0.077)	(0.080)	(0.075)
N	675	675	675	675	675	675	675	675	675	675	675	675	675	675
	Child-related decisions													
Pos. ch	-0.015	-0.094	-0.015	-0.094	-0.015	-0.093	-0.015	-0.094	-0.015	-0.094	-0.014	-0.062	-0.046	-0.030
(Low BP)	(0.067)	(0.073)	(0.067)	(0.073)	(0.067)	(0.073)	(0.067)	(0.073)	(0.066)	(0.073)	(0.057)	(0.067)	(0.067)	(0.073)
Pos. ch	0.076	-0.216***	0.076	-0.216***	0.076	-0.216****	0.075	-0.215***	0.075	-0.216***	0.077	-0.270****	0.139*	-0.324***
(High BP)	(0.080)	(0.075)	(0.082)	(0.074)	(0.081)	(0.074)	(0.081)	(0.076)	(0.078)	(0.077)	(0.084)	(0.083)	(0.080)	(0.075)
N	675	675	675	675	675	675	675	675	675	675	675	675	675	675

Source. Calculations from authors based on the ELMPS-12

Note. Bootstrap standard errors in parentheses (500 replications except for the estimations with personal decisions - random weight 2 (320), 3 (60) and child-related decisions - random weight 3 (60)). Female children between 16 and 20 years old. *SE* stands for school enrollment and *DW* for domestic work. *DF* stands for distribution factors, including the difference in level of education between the fathers of husband and wife, its square and interaction with other distribution factors. Lower bargaining power is defined as having a mother belonging to the 50% least empowered, as defined by their estimated bargaining power from first stage following the method detailed in Section 4.3.

[1] Correlation between the error terms of the schooling and work participation equations. A significant ρ indicates that the Wald test rejected independence between the two equations.

*** p<0.01, ** p<0.05, * p<0.1.

Table A9: Tobit model of hours of girls' domestic work and schooling, by mother's bargaining power (Marginal effects)

	School (Hours/day)	Domestic Work (Hours/week)
	(1)	(2)
Positive change	0.064	-1.462
if Lower bargaining power	(0.523)	(2.407)
Positive change	0.953*	-9.947***
if Higher bargaining power	(0.563)	(2.584)
Equality test		*a*
Observations	515	675

Source. Calculations from authors based on the ELMPS-12

Note. Bootstrap errors in parentheses (500 replications). Female children between 16 and 20 years old. *a* statistically different between high bargaining power and low bargaining power at 5 percent level. Lower bargaining power is defined as having a mother belonging to the 50% least empowered, as defined by their estimated bargaining power following the method detailed in Section 4.3.

*** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A10: Tobit model of hours of girls' domestic work and schooling, by other indicators of mother's bargaining power (Marginal Effects)

	School enrollment		Domestic work	
	Neg change	Pos change	Neg change	Pos change
	(1)	(1)	(1')	(1')
Access to household money				
No access	-0.011	-0.128	0.053	-0.089
	(0.063)	(0.113)	(0.085)	(0.097)
Access	0.033	0.057	-0.036	-0.199***
	(0.046)	(0.060)	(0.056)	(0.060)
First birth below 18 years old				
First birth below 18 years old	0.112	0.051	0.072	-0.139
	(0.083)	(0.116)	(0.129)	(0.147)
Older first birth	-0.003	-0.035	-0.020	-0.168***
	(0.042)	(0.065)	(0.051)	(0.051)
Age difference of more than 10 years				
Age diff. more than 10 years	0.009	-0.020	-0.112	-0.145
	(0.070)	(0.114)	(0.096)	(0.130)
Lower age diff.	0.014	-0.006	0.023	-0.172***
	(0.044)	(0.066)	(0.054)	(0.051)
Observations	675	675	675	675

Source. Calculations from authors based on the ELMPS-12

Note. Standard errors robust to heteroscedasticity in parentheses. Female children between 16 and 20 years old. We restrict the sample to the same number of observations as in Table 7. Results without restriction are identical and available upon request.

*** p<0.01, ** p<0.05, * p<0.1.

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