INTRAHOUSEHOLD RESOURCE ALLOCATION IN EGYPT: DOES WOMEN'S EMPOWERMENT LEAD TO GREATER INVESTMENTS IN CHILDREN?

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Abstract

This paper presents new empirical evidence from Egypt on the existence of intrahousehold allocation bias. We examine the effects of the women's status within the household regarding decisions on investment in children's human capital—focusing specifically on children's schooling and nutrition. Special attention is paid to examine how the welfare of children living in an empowered female household is compared to their peers who live in low women's status households, and whether parents have identical preferences towards sons and daughters. The results confirm that empowered women are more able to make positive investments in their children. The influence of women's status may operate differently for boys and girls, and may differently affect children's educational outcome than their nutritional status. Also, we find that parents do not always have identical preferences towards sons and daughters.

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1. Introduction

Women's empowerment and child wellbeing have emerged among the principal goals of the international development efforts in the last decade, most notably as articulated in the Millennium Development Goals and as identified by the World Bank (2001) as a means to promote growth, reduce poverty and promote better governance. The effect of women's status on demographic behavior has been addressed by many researchers; however, very few tried to access the links between women's status and their investment in children (Durrant and Sathar, 2000). This paper helps in filling the gap in the empirical literature by extending the intrahousehold allocation models to investigate the role of women's empowerment on child investment.

The allocation of resources within the household has recently become an important research issue. For years the "unitary" or the "common preferences" models were the basis of most empirical research on intrahousehold resource allocation. A key feature of the unitary model is that resource allocation does not depend on the identity of the person receiving the income within the household, since all family members act as if they maximize a single utility function subject to a single budget constraint. More recently, growing evidence from many developed and developing countries has shown that family resources are not equally allocated within the households; instead there exists an unequal distribution of resources, which usually takes the form of a bias against females or children (Behrman, 1997; Haddad et al., 1997).

The existence of intrahousehold allocation bias has been tested using data from many developed and developing countries. However, to the best of our knowledge, this has not yet been tested in Egypt. This paper contributes to the empirical evidence on intrahousehold allocation using new data from a recent survey project conducted in Egypt, called the Stalled Fertility Transition (SFT) project. The paper provides econometric evidence on the degree to which women's access to cash resources, schooling levels of parents and women's status interact with child characteristics—mainly gender—and affect investment in children's human capital.

This paper is organized into four sections. Following the introductory section, the paper reviews recent theory and empirical evidence that test unitary versus collective models of the household. Section Three discusses the determinants and measurements of child investments and the role of women within the household. This section also presents the data and the econometric modeling. Section Four empirically examines the existence of intrahousehold allocation bias and the effect of the women's status within the household on child investment. Concluding remarks and policy implications are presented in Section Five.

2. Theoretical and Empirical Consideration

The theory of the household was introduced into the economic literature by Gary Becker in the mid-1960s. As a result, for many years, most economists saw the household as a single economic agent, in which individuals share the same preferences and pool their resources. These common preferences models only allow the demand behavior to depend on the total household income and not on the amount of income received or controlled by each individual member. Thus, under these unitary models the household behavior can only change if the prices or the total household income change (Pezzin et al., 1997).

Afterwards, empirical research started to question the assumptions of this unitary model. This has spawned a number of alternative household "collective" models, which focus on the individuality of the household members and allow for the possibility that they have different preferences. The common implication of all the collective models is that changes in individual-specific control of resources translate into changes in household resource

allocation patterns (for a detailed discussion on collective models, see Udry, 1996; Pezzin et al., 1997; Apps and Rees, 1997; Chiappori, 1992, 1997). As a result, the collective models have raised new questions concerning the design and potential effectiveness of government transfer programs, unlike those that existed under the common preference models—which entail that policies are neutral towards who receives a transfer within the household. Haddad et al. (1997) discusses how mistakenly using the unitary model as a guideline for policy prescriptions may lead to different types of policy failure. For instance, according to the unitary model it does not matter to whom the policy initiatives are addressed, since information—like other resources—will be shared within the household. Additionally, if transfers directed to the husband have different impacts than those directed to the wife, then targeting transfers to the household may not always result in the desired consequences (Haddad et al., 1997; Quisumbing and Maluccio, 2000).

The unitary model of the household has been rejected in a variety of country settings in both the developed and developing world. However, according to our knowledge, the existence of intrahousehold allocation bias has not yet been tested in Egypt. Haddad and Hoddinott (1994) use data from Cote d'Ivoire to show that increasing the cash income going to women significantly increases the boy's height-for-age relative to girls. Lundberg, Pollak and Wales (1997) examine the effect of a policy that effectively transferred child allowance from men to women in the United Kingdom in the late 1970s. The authors find that this type of transfer increases the expenditure share on women's and children's clothing relative to that of men. Quisumbing and Maluccio (2000), using household data sets from Bangladesh, Indonesia, Ethiopia and South Africa, rejected the unitary model as a description of household behavior in the four countries' case studies. The authors concluded that assets controlled by women have a positive and significant effect on expenditure allocations towards the next generation—such as the expenditure shares of education, health and children' clothing— while husbands prefer to spend on luxury consumption goods like tobacco. Additionally, the authors examine individual level-educational outcomes and find that parents do not have identical preferences towards daughters and sons within and across the four countries. Duflo (2000) examined whether the impact of a cash transfer on children nutritional status is affected by the gender of its recipient. The author finds that pension received by women (during the 1990s South African social pension program) had a large effect on the anthropometric status of girls, but little effect on that of boys. Similar effects where not observed for pensions received by men.

Alternatively, the role of women's empowerment on demographic outcomes has been demonstrated by many researchers in a number of demographic contexts. A large body of research on South Asian countries supports the view that low status of women significantly affects their reproductive behavior. In these studies low women's status is characterized by limited mobility, weak ability to participate in household decision making, restricted access to financial resources and restricted ability to earn an income (see, for example, Balk, 1994; Dyson and Moore, 1983; Jejeebhoy, 1996; Sathar, 1993). Most of the previous theoretical and empirical research agree that women's status is multidimensional in nature—since it compromises multiple characteristics of the woman and her relation with others—and that the relationship between various aspects of women's status and demographic outcomes differs with the demographic outcome examined (see Mason, 1984, 1993).

Although, previous research has paid special attention to the effect of women's status on demographic behavior and outcomes, few researchers have studied the relationship between women's status and investment in children. In other words, little attention in the literature has been given to the link between women's status and their behaviors after their children are born. A large number of studies focus on the effect of women's education and employment on children's health, survival and schooling (e.g., Agha, 2000 and Glewwe, 1999); however,

few studies focus specifically on different measures of women's status and try to examine their effect on the above individual child outcomes. Jejeebhoy (1998) finds that domestic violence has a positive and significant effect on infant and fetal mortality, but other women's status variables—such as decision making (participation in making decisions regarding purchasing food, jewelry and major household goods), mobility (ability to travel alone to the market, health center, community center, homes of friends and the next village), and control over financial resources (ability to purchase clothes, jewelry and gifts without consulting with or getting resources form others)—have insignificant effects. Hossein et al. (2000) examine the effect of three indices of women's status (autonomy, decision authority and mobility outside the village) on infant and child mortality in rural Bangladesh. The authors find that higher status scores on the decision authority index and the mother's autonomy index are significantly associated with lower risks of post-neonatal mortality. A study in Egypt by Kishor (1995) shows that there exists positive effects of higher women's mobility and participation in household decisions regarding childbearing on child survival (Durrant and Sathar, 2000).

Nevertheless, a common drawback of most of these studies is ignoring the macro-level differences in women's status. For instance, under these studies one cannot identify whether the effect of women's decision making on child wellbeing is driven by the environment or by the individual women's choices (Durrant & Sathar 2000). Stash and Morgan (1999) and Durrant and Sathar (2000) discuss the need to incorporate both the micro and macro measures of women's status. Stash and Morgan (1999) find that unlike the individual-level mobility index, the mean level of women's mobility at the community level significantly reduced the gender differential in a child's completion of the first grade of schooling. Durrant and Sathar (2000) confirm that empowered women in Pakistan, or those with higher status, are more able to positively invest in their children, through reducing their likelihood of dieing during infancy and increasing their chances of ever attending school. The authors examine the effect of multiple dimensions of women's status—on the micro and macro level—on these two outcomes. Their findings show that improvements of women's status at the individual level (especially, in terms of access to financial resources, absence of mobility restrictions and absence of physical abuse by husband) will enhance child survival, while improvements in women's status at the community or macro level (particularly, through higher community mean levels of women's mobility and lower levels of fear to disagree with husband) will increase the children's schooling chances—especially those of girls.

In the following, this paper attempts to expand the empirical literature on intrahousehold allocation and investment in children in two ways:

I. By examining the existence of intrahousehold allocation bias in a developing country, where—according to our knowledge—these types of models have not been tested before.

II. By incorporating different dimensions of women's empowerment which are associated with lower outcomes in child investment. This allows us to investigate potential policy implications of multiple dimension aspects of women's status and children's welfare.

The theoretical modeling underlying the econometrics analysis of this paper builds on the collective and unitary models introduced and compared in Chiappori (1992, 1997) and Quisumbing and Maluccio (2000), and discussed above—after incorporating multiple dimensions of women's empowerment.

3. Data and Econometric Considerations

The main source of data used in this paper is the Stalled Fertility Transition (SFT) project, which is a recent survey project conducted by the International Population Council office in

Egypt. The data from the SFT is supplemented by information on child schooling and anthropometric status from the 2003 Interim Egypt Demographic and Health Survey (I-EDHS).

The SFT data has just been collected in April of this year. This survey re-interviewed a sub-sample of about 3,286 currently married women (age 15-45) from the I-EDHS within about 11 months of the Interim Survey. The I-EDHS survey provides the required basic information on the household members' characteristics (such as education and age), and the anthropometric measures for children under 5 years of age. The SFT provides further empirical information—beyond that included in the I-EDHS—on the economic status of the household, women's attitudes about childbearing and women's autonomy and decision making within the household. However, the SFT provides minimal information on the distribution of income within the household, household expenditures, and assets allocated to each household member.[1]

The paper uses this new dataset to test whether, in Egypt, the husband's and wife's educational status have different effects on the intrahousehold allocation outcomes, which are related to child investment, and whether empowering women within the household would lead to better investment in children. We focus on two individual-level outcomes that are related to child wellbeing within the household—child education attainment and nutritional status. The educational outcome employed in the following analysis is the deviation of the child's completed year of schooling from the cohort mean,[2] while the anthropometric measure height-for-age of children below age 5 is used to analyze children's nutrition and health outcome.

Following Mammen (2002), Quisumbing and Maluccio (2000) and Durrant and Sathar (2000), we estimate individual child outcome *(ICO)* as a function of child characteristics *(C)*, parental characteristics, and individual and community-level women's status.

$$IOC_{ih} = \beta_0 + \beta_1 C_{ih} + \beta_2 M_h + \beta_3 F_h + \beta_4 G_{ih} \times M_h + \beta_5 G_{ih} \times F_h + \beta_6 S_h + \beta_7 IWS_{ih} + \beta_8 G_{ih} \times IWS_{ih} + \beta_9 CWS_{ih} + \beta_{10} G_{ih} \times CWS_{ih} + e_{ih}$$

where ICO_{ih} is a measure of child i in household h educational and health outcome*;* C_{ih} is a vector of child i characteristics; M_h and F_h are vectors of exogenous mother's and father's human resources, respectively; G is a daughter dummy; S_h is a vector of household and community characteristics; IWS_{ih} and CWS_{ih} are vectors of individual and community-level women status, respectively; and e_{ij} is the error term. If the unitary model holds, the differences between the effects of the husband's and wife's human resources and decision-making role within the household would be equal to zero. Thus testing the unitary model would involve testing the inequality of the β_2 and β_3 coefficients and β_4 and β_5 coefficients.

After reviewing the literature and carefully examining the correlations among the predetermined variables, we decided to employ the set of variables discussed in the following (see Appendix A for the descriptive statistics of these selected set of variables). Data availability was also an important constraint in this analysis.

To measure the parents' human capital in education, we use two dummy variables for each of the mother and husband: one for whether each of them has some primary or secondary

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1 For the sample and study design of the SFT and I-EDHS, see Casterline et al. (2004) and El-Zanaty et al. (1994), respectively.

2 See Quisumbing and Maluccio (2000) and Doss (1997) for similar analysis using other measurements of educational attainment. Also, beside individual level outcomes, Doss (1997) and Quisumbing and Maluccio (2000) analyzed household-level outcomes, such as expenditure shares of food, education, health and children's clothing

schooling and the other for whether each of them has completed secondary or higher education. The household and community characteristics vector includes a dummy for the household residing in urban or Upper Egypt governorates, in addition to an indicator of the neighborhood living standards. To measure the neighborhood (or cluster) living standard, an approach similar to that introduced by Montgomery and Paul (2004) is adapted, using the wealth index included in the I-EDHS dataset. The wealth index uses information on household assets to drive a measure of the household living standard. This index has shown high comparability—in many countries' settings—with other measurements of long-term economic status of the household (for details on the calculation of this wealth index, see El-Zanaty, 2004). For each household i in cluster c, a cluster-level measure of the neighborhood living standard for household i is constructed by averaging the wealth index over all the households—excluding i—that reside in this cluster c.

The main challenge in this paper is to identify aspects of women's empowerment that are important in explaining positive investment in children's schooling and health outcomes in Egypt. We mainly focus on elements of women's status which are identified in the literature to be particularly relevant to investment in children (see Durrant and Sathar, 2000 and Balk, 1997 for a detailed discussion on measures of women's status). Four variables of women's status at the individual level and two at the community level are used. The variables of women's status used at the individual level are: mobility, women's opinion towards domestic violence, women's control over the household cash resources allocation and women's role in decision making related to children. Following Stash and Morgan (1999) and the idea of the neighborhood standard of living measurement discussed above, we measure women's status at the community level as an average of all women in the same cluster—excluding the respondent—for the three variables: percent of women working outside their homes, women's opinion towards domestic violence and a set of two indicators of neighborhood-level gender educational norms. Different meanings of women's status are reflected by the community level variables, since once the individual-level variables of women status are aggregated, they reflect the neighborhood gender norms rather than individual actions.

The individual level of women's mobility reflects women's ability to acquire goods and services for her children. This indicator has always been viewed in the literature as particularly crucial in determining women's ability to promote positive outcomes in their children; since restricting a woman's movement would highly affect her ability to keep herself and her children healthy and seek health care whenever a child needs (Basu, 1992). We use a mobility index similar to the one introduced in Stash and Morgan (1999) and Durrant and Sathar (2000). The mobility index sums the woman's responses to whether she can go alone to the market, to the health center and to visit her relatives or friends.

Domestic violence has been identified in many studies as a key indicator of child investment (see Jejeebhoy, 1998). In our dataset, there is no direct question on the frequency of women being beaten by their husbands; instead there is a set of opinion questions on when a husband is justified to beat his wife. As a proxy of domestic violence, this paper employs an index that sums the number of occasions the women answer yes to these set of opinion questions. Obviously, the more often a woman believes that a husband is justified to beat his wife, the less she is able to actively participate in decisions regarding her own and her children's lives, and the more she might be willing to compromise on her children's wellbeing through this violence and her fear of it (Durrant and Sathar, 2000).

The women's control over household cash resources and ability to actively participate in the allocation of these resources are often viewed as an important measure of women's empowerment. One indicator of whether a woman has a final say in making big and small daily household purchases is used to measure women's access to cash resources and her

control over their allocation. To measure the effect of women's roles in decision making related to children we employ a decision-making child's issue index, which sums the number of times a woman reports that she has a final say in decisions related to children's schooling, clothing and health.

A neighborhood measure of women's work outside home is used to reflect the level of women's participation in the public sphere and the gender division of the labor force in the community. This measure is not included among the individual-level women's status variables due to its possible endogeneity with children investment outcomes, since it is also a choice variable (see Quisumbing and Maluccio, 2000). The percent of women in the neighborhood agreeing that a husband is justified in beating his wife reflects compliance with suppressive norms in the community. The third variable is a neighborhood gender illiteracy measure. Two variables fall in this second group: the percent of women with no education and the percent of husband's with no education in the respondent neighborhood. All the individual and community women's status variables are included in the following analysis both independently and as interaction terms with the daughter dummy, to measure parents' gender preference and the neighborhood effect on girls.

In the next section the above equation is estimated in levels and with family-effects, to test whether family-specific unobservable or individual heterogeneity are important. If the omitted family-level variables are correlated with the regressors, this might bias their estimated effects on child educational and nutritional outcomes. In this case, the coefficients can be consistently estimated by introducing family-fixed effect (FE). However, in the FE framework, the coefficients of all the explanatory variables (except child's characteristics and the interactions between child gender and parental and community characteristics) that do not vary across children of the same family cannot be estimated. On the other hand, if child outcomes are affected by individual heterogeneity, a random effect models would be appropriate. Two tests are employed to decide whether a fixed effect (FE) or a random effect (RE) model should be applied. First, the Lagrange Multiplier (LM) test is performed to assess whether the estimates of the ordinary least squares (OLS) model without group effects based on pooling the data are consistent, or if there exists a significant household-specific component that should be incorporated into the estimation by using a suitable procedure, such as FE or RE. Second, the Hausman and Taylor specification test is used to compare the FE and the RE models.

4. Models of Investment in Children

4.1. Individual-level Education Outcome

The data shows that in Egypt about 11 percent of children above age 6 have never attended school. Accordingly, to account for incomplete schooling decisions, the deviation of each child's completed years of schooling from the cohort mean is used as an individual-educational outcome in the schooling equation. This specification allows us to measure how well each child is doing relative to other children of the same age, and is not prone to censoring unlike schooling attainment which could be censored at zero if many children have never been to school. Additionally, in the analysis we restrict the sample to children of ages 6-15 years, to minimize the effect of selection bias that might occur due to early marriages—since children, particularly girls, tend to leave both school and their parents after getting married (Quisumbing and Maluccio, 2000).

Table 1 presents the regression results for schooling outcomes in levels and with household-effects. The level results show that children's completed years of schooling increases with the parents' education level. Mothers with secondary or higher education positively and significantly affect children's schooling attainment in comparison to mothers with no

education. However, mothers with even some primary education positively and significantly affect their daughters' completed years of schooling. The negative coefficient of the interaction term between mothers with secondary or higher education and the daughter dummy does not indicate that mothers having high education level decreases their daughters' complete years of schooling; instead it indicates that mothers with secondary or higher education do not have a gender preference towards daughters. On the other hand, fathers with even some primary education have a stronger and more significant positive effect on children's schooling attainment—especially girls—than mothers' education.

Mothers having a final say in large and small daily household purchases, and thus having some control over the household cash resources, does not have a significant effect on children's schooling. Also, a mother's role in decision making related to children's health, schooling and clothing does not show the anticipated positive effects on children's schooling outcome in general. However, its interaction with the gender dummy reflects its positive and quite significant effect on daughters schooling. This suggests that fathers having more power—in comparison to mothers—over child related decisions does not necessary disadvantage the children in general; however it might lead to disfavoring girls. Surprisingly, the mobility index has a negative and significant effect on children's schooling. One explanation for this unexpected result could be that as a woman's autonomy increases, so does her absence from the household and thus she is giving less attention, guidance and proctoring to her children. This in turn might affect the children's dedication to learning and studying, diminishing their schooling attainment. On the contrary, the interaction term of women's mobility and the daughter dummy have a positive effect on girls' schooling. Finally, both coefficients of the woman's opinion on domestic violence and its interaction with the daughter dummy show the expected negative—but not very significant—effect on children's schooling.

Concerning the community level variables, the table shows that children living in the urban and Lower Egyptian governorates are significantly better off relative to those living in the Upper Egyptian governorates in terms of their school attainment. Also, the schooling attainment of girls living in affluent neighborhoods is significantly higher than those living in poor neighborhoods. Children in communities with a high percentage of women working outside their homes seem to do better in school. However, opposite results are observed for girls. This might be because daughters of working mothers tend to take on more household responsibilities to substitute for the absence of their mothers, such as taking care of their younger siblings, which in turn might affect their schooling completion rate.

The F-tests show no significant difference between parents' education when only the coefficient on schooling is considered; however, the effects of mother and father having secondary or higher education taking into account gender interactions are significantly different from each other. This suggests that the influence of parents' human capital may operate differently for boys and girls. However, the community-level illiteracy ratios do not show a significantly different effect of the percent of women with no education in the community and the same percentage for husbands on children's or daughters' schooling.

Lagrange Multiplier and Hausman and Taylor tests are applied to test the specification of the fitted regression model. Both test are significant at the 0.05 level, thus for the education outcome equation the FE model cannot be rejected in favor of the OLS and RE models. Accordingly, in Table 1, FE estimates are reported along with OLS results. When controlling for family-level unobservables, the significance levels of some of the variables changes. Under the FE specification, women's role on decision making regarding children, their views on domestic violence and the mothers working outside their homes at the community level are all insignificant in their interactions with the daughter dummy.

Child age has a small negative and insignificant effect on child schooling outcome. In another regression, we examined whether girls of older age in comparison to boys of the same age are less favored in the household, by including a daughter-age interaction term (results of this model are not included). When allowing for an age interaction term with the daughter dummy, the daughter dummy is no longer significant, but the interaction term is negative and highly significant. This confirms that older girls seem to do worse than younger girls. Besides that, as the girl gets older—especially in rural Egypt—she is expected to participate in household chores and take care of her younger siblings. This negative effect may also reflect families' desire to marrying girls at early ages. In other words, as girls get older, parents give less weight to their schooling attainment because, after all, they will soon leave school to get married. Moreover, the negative and significant effect of this interaction term shows that older boys seem to do better relative to girls of their age.

Finally, as in the levels regression, under the FE specifications the coefficients of the interaction terms between parents with secondary or higher educational level and the daughter dummy are still significantly different for mothers and fathers.

4.2. Individual-level Nutritional Outcome

Data on the nutritional status of children came from the 2003 I-EDHS. This survey collected information on the height and weight of all children below the age of 5 living in the household. Three standard indices of children's physical growth were constructed from these measurements and included in the I-EDHS data file, which are height-for-age, weight-for-age and weight-for-height. As recommended by the World Health Organization (WHO), each of these indices assesses a different aspect of child nutritional status. The height-for-age index measures linear growth retardation, the weight-for-height index measures body mass in relation to body length, while the weight-for-age is a composite index of the former two indices (for more on measurement of children's nutritional status, see El-Zanaty and Way, 2004) .

The individual-level nutritional outcome analyzed in the following is the height-for-age normalized as the standard deviation from the reference median.[3] Of the three indices, the height-for-age index is considered a measure of health status in the long run (Haddad and Haddinott, 1994). Children whose height-for-age numbers are below minus two standard deviation (-2 SD) from the median of the reference population are considered stunted, or short for their age.[4] El-Zanaty and Way (2004) show that in Egypt 16 percent of children below the age of five are stunted. Stunting levels increase with the child's age and are slightly higher for male children. The educational level of mothers, their work and household wealth is inversely associated with the level of stunting. In rural Egypt 17 percent of the children are stunted, in comparison to 14 percent for urban children.

Table 2 presents a logit regression model for the child nutrition model. The dependent variable employed in this regression is a binary indicator of whether the child is stunted. As predicted, the results show that children living in urban and Lower Egyptian governorates and those living in wealthier neighborhoods are significantly less likely to be stunted. Domestic violence, on both the individual and community level, significantly increases the likelihood of stunting. The coefficients of women's access to cash resources and their role in decision making has the expected signs but are not significant. Children living in communities with high levels of illiterate husbands are more likely to be stunted than others.

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3 Similar results are obtained using the other two indices of child nutrition.

4 One of the widely used reference populations, and the one used in the EDHS, is the international reference population defined by the U.S. National Center for Health Statistics (NCHS) and accepted by WHO and the U.S. Centers for Disease Control.

Tests of the parents' education level coefficients show that the effect of mother's and father's education on child nutrition do not significantly differ from each other. This suggests that parents generally do not differentiate between sons' and daughters' nutrition, but they might have clear gender preferences when it is related to children's schooling.

The FE model of children's nutritional status is not reported due to the very few cases in which the binary dependent outcomes of stunting change values within each family group.

5. Conclusions, Model Limitations and Future Work

The paper presents new empirical evidence from Egypt on the existence of intrahousehold allocation bias—or an unequal distribution of resources—against children, especially girls. The results show that both parents may not always have identical preferences towards sons and daughters, and that the role of women over the allocation of cash resources and decision making regarding children positively affect their children's outcomes—particularly those related to children's schooling.

Policymakers should pay special attention to the results of this paper, especially when designing family policies. Evidence from numerous countries has shown how targeting one individual in the household can lead to unintended consequences. Hence, mistakenly assuming a unitary model as a description of the household behavior in Egypt may disable many policy levers that could have massive effects on development.

Nevertheless, the result of this paper is very limited by the data available on the intrahousehold allocation of resources in Egypt. Due to data limitation, the analysis is based only on individual-level child outcomes. Accordingly, to strengthen the evidence presented on the existence of intrahousehold allocation bias in Egypt, the paper urgently calls for extending the analysis to household level outcome; such as expenditure shares of food, education and childcare. Moreover, the results support the need for a richer dataset that allows for more direct measurements of bargaining power, such as individual level assets and income shares within the household, and thus a thorough testing of the unitary versus the collective model as a description of household behavior in Egypt. This is left for future research.

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Table 1: Regression Results of Children's Educational Outcome [1]

Variable	OLS		FE	
	Coeff.	**S.E.**	**Coeff.**	**S.E.**
Child characteristics				
Daughter dummy	-0.786***	0.265	-1.496***	0.389
Age	-0.019	0.035	-0.11	0.073
Age square	0.002	0.002	0.006	0.004
Parents' education				
Mother's education attainment (Omitted Category= No Education)				
Primary (incomplete/completed) or incomplete secondary	0.072	0.069		
Secondary completed or higher	0.175*	0.096		
Primary (incomplete/completed) or incomplete secondary × Daughter	0.203**	0.103	0.26*	0.140
Secondary completed or higher × Daughter	-0.231*	0.142	-0.324*	0.199
Father's education attainment (Omitted Category= No Education)				
Primary (incomplete/completed) or incomplete secondary	0.159**	0.071		
Secondary completed or higher	0.287***	0.089		
Primary (incomplete/completed) or incomplete secondary × Daughter	0.259***	0.105	0.407***	0.135
Secondary completed or higher × Daughter	0.323***	0.131	0.705***	0.178
Individual-level women's status				
Role in decisions regarding household purchases	0.009	0.037		
Role in decisions regarding household purchases × Daughter	-0.055	0.054	-0.09	0.071
Decision making regarding children	-0.014	0.024		
Decision making regarding children × Daughter	0.065*	0.035	0.062	0.045
Women's Mobility	-0.031**	0.014		
Women's Mobility × Daughter	0.037*	0.021	0.043*	0.027
Domestic Violence	-0.023*	0.015		
Domestic Violence × Daughter	-0.02	0.021	-0.033	0.028
Household & community level variables				
Urban & Lower Egypt governorates dummy (Omitted category=Upper Egypt)	0.167***	0.043		
Neighborhood Wealth Index	0.016	0.033		
Neighborhood Wealth Index × Daughter	0.132***	0.051	0.227***	0.074
Domestic Violence	-0.015	0.026		
Domestic Violence × Daughter	-0.023	0.039	0.068	0.052
Mothers working outside home	0.187*	0.112		
Mothers working outside home × Daughter	-0.342**	0.165	-0.168	0.221
Mothers with no education	-0.077	0.138		
Mothers with no education × Daughter	-0.302	0.208	-0.126	0.288
Fathers with no education	-0.147	0.139		
Fathers with no education × Daughter	0.161	0.209	0.412	0.271
N	3944		3944	
F-tests				
Mother's primary+ education = Father's primary+ education	0.64			
Mother's primary+ edu. × Daughter = Father's primary+ edu. × Daughter	0.48		0.49	
Mother's secondary+ education = Father's secondary+ education	0.13			
Mother's secondary+ edu. × Daughter = Father's secondary+ edu. × Daughter	5.50**		9.77***	
Community-level: Mothers with no education= Fathers with no education	0.09			
Mothers with no edu. × Daughter = Fathers with no edu. × Daughter	1.78		1.36	
Breunch-Pagan LM test			220.04***	
Hausman test			30.91**	

Notes: [1] Dependent variable: Deviation of the child's completed year of schooling from the cohort mean

*** p< 0.01; ** p< 0.051; * p< 0.10

Table 2: Regression Results of Children Nutrition Outcome [1]

Variable	OLS	
	Coeff.	S.E.
Child characteristics		
Daughter dummy	-0.773	0.611
Age	0.038	0.129
Age square	-0.062*	0.033
Parents' education		
Mother's education attainment (Omitted Category= No Education)		
Primary (incomplete/completed) or incomplete secondary	0.044	0.197
Secondary completed or higher	-0.062	0.250
Primary (incomplete/completed) or incomplete secondary × Daughter	-0.292	0.297
Secondary completed or higher × Daughter	0.104	0.361
Father's education attainment (Omitted Category= No Education)		
Primary (incomplete/completed) or incomplete secondary	-0.032	0.206
Secondary completed or higher	-0.213	0.227
Primary (incomplete/completed) or incomplete secondary × Daughter	0.055	0.313
Secondary completed or higher × Daughter	0.245	0.348
Individual-level women's status		
Role in decisions regarding household purchases	-0.011	0.106
Role in decisions regarding household purchases × Daughter	-0.064	0.155
Decision making regarding children	0.064	0.071
Decision making regarding children × Daughter	-0.031	0.104
Women's Mobility	0.019	0.039
Women's Mobility × Daughter	0.033	0.060
Domestic Violence	0.055	0.039
Domestic Violence × Daughter	0.138**	0.057
Household & community level variables		
Urban & Lower Egypt governorates Dummy		
(Omitted category=Upper Egypt)	-0.513***	0.133
Neighborhood Wealth Index	-0.214***	0.076
Neighborhood Wealth Index × Daughter	0.034	0.135
Domestic Violence	0.201***	0.068
Domestic Violence × Daughter	0.061	0.105
Mothers working outside home	-0.539*	0.344
Mothers working outside home × Daughter	0.256	0.485
Mothers with no education	-0.243	0.356
Mothers with no education × Daughter	0.008	0.542
Fathers with no education	0.763**	0.374
Fathers with no education × Daughter	-0.537	0.551
N	2729	
F-tests		
Mother's primary+ education = Father's primary+ education	0.06	
Mother's primary+ edu. × Daughter = Father's primary+ edu. × Daughter	0.13	
Mother's secondary+ education = Father's secondary+ education	0.53	
Mother's secondary+ edu. × Daughter = Father's secondary+ edu. × Daughter	0.05	
Community-level:		
Mothers with no education= Fathers with no education	2.44	
Mothers with no edu. × Daughter = Fathers with no edu. × Daughter	0.35	

Notes: [1] Dependent variable: A binary indicator of whether the child is stunted (below -2 SD from the reference median)
*** $p < 0.01$; ** $p < 0.051$; * $p < 0.10$

Appendix A

The empirical analysis of this paper uses data collected by the Egypt Interim Demographic and Health Survey in 2003 [EIDHS] and by the Stalled Fertility Transition project in 2004 [SFT]. As described in El-Zanaty and Way (2004), in the national Egypt EIDHS survey around 9,159 ever-married women were questioned at length about their recent reproductive experience. The SFT re-interviewed a sub-sample of 3,286 of these women in 2004, on average 11 months after the EIDHS interview. In the follow-up interview, these women were asked about their reproductive experience in the months since the EIDHS-03 interview, their attitudes about childbearing, gender role and related issues and their household economics. The design of this data collection in 2004 is described in detail in Casterline and Roushdy (2004). The analysis in this paper depends on the SFT currently married sample and their children, combining the information gathered in 2003 and 2004. Table A1 shows the distribution of this women's sample by selected background characteristics. Table A2 presents the descriptive statistics of other variables used in the regression analysis of the paper.

Table A1: Sample Distribution, SFT Sample of Currently Married Women

Background characteristics	Unweighted		Weighted	
	Number of women	Percent distribution	Number of women	Percent distribution
Total	3286	100.0	3286	100.0
Urban-rural residence				
Urban	1194	36.3	1392	42.3
Rural	2092	63.7	1894	57.7
Place of residence				
Urban governorates	460	14.0	619	18.8
Lower Egypt	1101	33.5	1456	44.3
Urban	322	9.8	419	12.7
Rural	779	23.7	1037	31.6
Upper Egypt	1725	52.5	1211	36.9
Urban	412	12.5	354	10.8
Rural	1313	40.0	857	26.1
Women's Education				
No education	1,274	38.77	1170.59	35.62
Incomplete primary	415	12.63	410.10	12.48
Complete primary	115	3.5	121.97	3.71
Incomplete secondary	335	10.19	363.12	11.05
Complete secondary	909	27.66	952.35	28.98
Higher	238	7.24	267.87	8.15
Husbands' Education				
No education	712	21.67	658.11	20.03
Incomplete primary	544	16.56	535.43	16.29
Complete primary	205	6.24	242.92	7.39
Incomplete secondary	386	11.75	401.28	12.21
Complete secondary	1,046	31.83	1022.18	31.11
Higher	392	11.93	425.85	12.96
Household Wealth Index				
Lowest quintile	798	24.3	576	17.5
Second quintile	687	20.9	681	20.7
Third quintile	625	19.0	655	19.9
Fourth quintile	659	20.1	757	23.0
Fifth quintile	517	15.7	617	18.9
Age of Women				
15-19	172	9.2	145	4.4
20-24	615	15.8	586	17.8
25-29	721	20.8	756	23.0
30-34	630	22.1	598	18.2
35-39	671	13.9	693	21.1
40-44	466	9.0	496	15.1
45+	11	9.2	12	0.4
Number Living Children				
0	297	9.0	293	8.9
1	514	15.6	508	15.4
2	688	20.9	741	22.6
3	733	22.3	765	23.3
4	459	14.0	471	14.3
5	294	9.0	268	8.2
6+	301	9.2	240	7.3

Notes: [a] All variables are measured at the EIDHS-03, except for number of living children which is measured at the SFT.

Source: Adapted form Casterline and Roushdy (2004).

Table A2: Descriptive Statistics of Variables Used in the Child Education and Nutritional Status Samples

Variable		Child education sample				Child nutrition sample			
		Mean / percent	Standard Deviation	Min	Max	Mean / percent	Standard Deviation	Min	Max
Child characteristics									
Gender	Female	46.72%				48.39%			
	Male	53.28%				51.61%			
Education in single years		2.84	2.44	0.00	11.00				
Height/age below -2SD	Yes					15.62%			
	No					84.38%			
Age		9.75	2.58	6.00	14.00	1.95	1.41	0.00	4.00
Individual-level women's status									
Role in decisions regarding household purchases		1.14	0.81	0	2	1.00	0.83	0	2
Decision making regarding children		1.69	1.30	0	3	1.64	1.28	0	3
Women's Mobility		3.79	1.34	0	6	3.64	1.30	0	6
Domestic Violence		2.72	2.26	0	6	2.66	2.22	0	6
Community level indicators									
Urban-rural residence	Urban	33.70%				31.82%			
	Rural	66.30%				68.18%			
Place of residence									
Urban governorates		11.53%				12.00%			
Lower Egypt		30.02%				29.85%			
Upper Egypt		58.45%				58.15%			
Neighborhood wealth index		2.62	1.13	1	5	2.61	1.13	1	5
Mothers with no education		0.47	0.29	0	1	0.47	0.29	0	1
Fathers with no education		0.27	0.25	0	1	0.27	0.25	0	1
Mothers working outside home		0.28	0.23	0	1	0.28	0.24	0	1
Total number of children		**3947**				**2734**			