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INTERGENERATIONAL TRANSMISSION OF, AND RETURNS TO HUMAN CAPITAL AND CHANGES THEREIN OVER TIME: EMPIRICAL EVIDENCE FROM EGYPT

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Abstract

Over the last fifty years, Egypt has witnessed several reforms and shocks such as the need to absorb a huge influx of new and especially more educated entrants to the labor force. Virtually neglected, however, have been the long run effects of education, including those across generations.

The purposes of this study are: **(1)** to measure and explain changes in the gender-specific short and medium term returns to education in different sectors (private and public, formal and informal, tradable and non-tradable), and **(2)** to examine the long-run effects of education from generation to generation and, in the process, to measure the extent to which, how and why intergenerational mobility has changed over the last twenty years. In estimating both the determinants of schooling (including its intergenerational transmission) and the returns to schooling and changes therein over time, the study applies a number of estimation techniques to data taken from family members of different generations from the 1988, 1998 and 2006 waves of the Egyptian Labor Market Survey (ELMS).

The major substantive findings are: (1) that intergenerational mobility with respect to education has increased across generations, especially for those living in urban areas, (2) that parental education has positive influences on the returns to children's education, implying that the influence of education of family members goes well beyond its direct influence on children's education, (3) that both the level of education and the returns to education are strongly affected by location, with locations in rural areas and especially those in Upper Egypt being much less fortuitous than those in urban areas, (4) that there are some significant differences between the effects of the education of particular parents (father or mother) and grandparents on particular children (sons or daughters), (5) the returns to education based on earnings reported in the 2006 ELMS generally fall with the number of controls included and appear to be considerably lower than both estimates in developing countries and estimates for Egypt from the earlier 1988 and 1998 ELMS (especially for males). Educational reforms seem to have contributed to finding (1) (of increased intergenerational mobility over time) but seem to have been insufficient to offset the low and falling rate of return to schooling.

The most important methodological conclusions are: (1) that in a context where the role of a parent's education on that of his/her child is broader than a simple genetic one, grandparents' education seems to be more suitable as a control variable than as an instrument for parents' education, (2) that potentially at least a certain educational reform could serve as a suitable instrument for parents' education but only if further research would allow us to identify differences in the speed of implementation of these reforms across Egypt's regions.

ملخص

خلال الخمسين سنة الماضية شهدت مصر عدة إصلاحات وصدمات كالحاجة إلى استيعاب قدر كبير من التدفقات من جانب الوافدين الجدد إلى سوق العمل، لاسيما من ذوي المستويات العليا في التعليم. ومع ذلك نجد أن آثار التعليم بعيدة المدى أوشكت أن تهمل، بما في ذلك تلك الآثار عبر الأجيال. وتهدف هذه الدراسة إلى ما يلي:

1- قياس وتفسير التغيرات في العائدات قصيرة ومتوسطة الأجل المتعلقة بنوع (العامل ذكرا كان أم أنثى) في شتى القطاعات (سواء كان خاصة أو ما عامة، رسمية أم غير رسمية، تجارية أم غير تجارية

. 2- دراسة الآثار بعيدة الأجل للتعليم من جيل إلى جيل والقيام في أثناء ذلك بقياس مدى التغير الذي طرأ على الحراك بين الأجيال خلال العشرين سنة الماضية، وكذا كيفية وأسباب هذا التغير.

ونجد الدراسة إذ تحاول تقويم كل من محددات التعليم (بما في ذلك تناقل المعلومات بين الأجيال) وعائدات التعليم والتغيرات التي تعتريه بمرور الزمن، نجد هذه الدراسة تطبق عدداً من تقنيات التقويم، على البيانات المستقاة من أفراد الأسرة من مختلف الأجيال من موجات مسح سوق العمل المصري لأعوام 1988، و1998 و2006. والنتائج الواقعية الرئيسية هي

1:- زاد الحراك بين الأجيال في مجال التعليم، لاسيما بالنسبة لساكني المناطق المدنية.

2- دور الوالدين في تعليم أبنائهما آثار إيجابية على عائدات التعليم لدى الأبناء، بما يوحي بأثر تعليم أفراد الأسرة التي يتجاوز التأثير المباشر على تعليم الأبناء.

3- يتأثر كل من مستوى التعليم والعائدات عليه - تأثراً كبيراً بعامل الوضع، حيث تعتبر المناطق الريفية لاسيما في صعيد مصر، أقل حظاً منها في المناطق المدنية.

4- ثمة بعض الفروق ذات البال بين آثار التعليم الخاصة ببعض أولياء الأمور (سواء كانوا آباء أم أمهات) والأجداد (أو الجدات) على بعض الأبناء (بنيناً كانوا أم بناتا).

5- انخفضت عائدات التعليم القائمة على المكتسبات التي ذكرت في مسح سوق العمل المصري في عام 2006 بصفة عامة نظراً للعديد م القيود التي صاحبتها فبدت أقل كثيراً منها في كثير من التقديرات بالدول النامية وعن مصر في الفترات من 1988 حتى 1998 (لاسيما بالنسبة للذكور)

وكان من شأن الإصلاحات التعليمية، على ما يبدو أن أسهمت في إحداث النتيجة (1) بشأن زيادة الحراك بين الأجيال على مر الزمن، بيد أنها لم تكن كافية، على ما يبدو، لمواجهة المعدل المتدني والهابط لعائدات التعليم. وأهم النتائج المنهجية هي: 1- في السياق الذي يتجاوز فيه دور تعليم أحد الوالدين في تعليم ابنه أو ابنته مجرد الدور الوراثي، نجد تعليم الجد أو الجدة أكثر ملاءمة باعتبار أحد متغيرات التحكم من كونه أداة لتعليم الوالدين. 2- من المحتمل على اقل تقدير أن يصير إصلاح تعليمي معين أداة مناسبة لتعليم الوالدين، ولكن ذلك لا يمكن إلا إذا تمكنا عن طريق المزيد من البحث أن تدرك الفروق في سرعة التطبيق بالنسبة لهذه الإصلاحات في شتى مناطق مصر.

I. Introduction:

A. Background on Egyptian Education and Labor Market

Despite being known as one of the leading centers — if not the leading center — for education in the Arab world, Egypt's educational structure is an extremely distorted one that continues to have important repercussions on labor market outcomes. Despite its relatively large population and its long and often glorious past, modern secular education was very late in coming to Egypt. The first university was established in 1908, at which time less than 10 percent of the population was literate. Even in 1917 and at the primary level only three percent of children of primary school age were attending school. Since the 1950s, however, education at all levels has expanded very rapidly (Richards, 1992).

Subsequently, several important educational "reforms" have been undertaken. Among the most important reforms designed to encourage education were those of the Nasser period, namely making secondary schooling free for all Egyptians in 1950, abolishing fees at public universities in 1963 and then guaranteeing employment for university graduates in the public sector in 1964. As a result, enrollment in primary education increased from 1 million in 1952 to 3.5 million in 1965/66. Accordingly, enrollments in secondary education rose from 22,000 in 1956 to 75,000 in 1961, and university enrollments exploded from 50,000 in 1952 to 160,000 in 1969/70 and to 660,000 in 1984. Especially at the university level, the explosive growth in numbers brought extreme crowding and decline in quality. The demographic transition that Egypt has been going through has complicated the picture even further. A sudden and sustained fall in fertility rates beginning in the late 1980s from the extremely high rates of the preceding several decades, gave rise to extremely rapid increases in the numbers and relative importance of new entrants to the labor force beginning in the late 1980s and continuing until the present time. This "demographic gift" has made it extremely difficult for Egypt to absorb the rapid growth of its labor force, especially its university graduates (Richards, 1992).[1]

Another important educational reform, namely, a law increasing the required number of years of schooling from 6 to 9 took place in 1981. This was accompanied by a program to substantially increase the number of schools (Institute of National Planning 1999). The 1990s were also a period of structural adjustment aimed at dealing with Egypt's rising debt problems, decreasing its reliance on public sector, and liberalizing controls and regulations. At the same time the 1990s were also the peak period for having to absorb the massive numbers of new entrants into the labor force.

Previous studies have revealed the quality shortcomings of Egyptian education that resulted from the excessive crowding of secondary and especially higher education in the 1970s, important changes in the structure of employment, the rising and more recently falling share of the public sector (and within the private sector the rising importance of the informal segment of the market), changing gender composition of the labor force and changes in the distribution of earnings across gender, education, region and sector groupings. By the mid-1980s the structure of the labor force was so distorted that university graduates would often wait on a queue for years for a public sector job that paid higher wages rather than to accept lower paying but available employment in the private sector. Assaad (1997) documented this carefully and showed that for this reason the public sector was especially attractive for educated women who faced discrimination in the private sector.

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[1] As a consequence, Richards (1992) demonstrated that the Egyptian educational officials started to make it harder for secondary and vocational school graduates to gain entrance into universities, mainly by increasing the test score requirements, thereby stabilizing the number of students attending universities in the attempt to mitigate crowding and improve educational quality.

Although the structural adjustment program to which Egypt was committed at the beginning of the 1990s called for privatization and private sector growth, private sector growth was slowed by the painfully slow pace of privatization attributable in part to the lack of profitability of public sector manufacturing and fears for job loss and the lack of incentives to take advantage of foreign markets. A number of studies revealed falling real wage rates during the 1990s and falling returns to education, but not necessarily much improvement in reducing gender gaps and poverty reduction (Said and El-Hamidi 2005, El-Hamidi 2007, Afifi 2007)). Assaad (2007) was perhaps the first to extend these trends to 2006, taking advantage of the 2006 ELMS.

With respect to the returns to education, Psacharopoulos (1994), Psacharopoulos and Patrinos (2004) presented large compendiums of studies computing the rate of return to schooling and experience in different countries and years, only a couple of which pertained to Egypt. Their results revealed the rates of return to education to be considerably higher in developing countries than in developed countries, and perhaps more importantly to decline with the level of education. These results seemed to support the neoclassical concept of diminishing returns to education and have long been used to stress the importance of basic education. Over time, however, the validity of these conclusions have been challenged, at least in individual countries (in part because of lack of sufficient controls, and the presence of specification bias) and on the basis of more recent data (Behrman and Birdsall 1983, 1987, Bennell 1996, Knight et al. 1992). One of the explanations given for the lower rate of return to schooling in recent years has been the alleged decline in school quality, something which as mentioned above could well be applicable to Egypt because of school crowding.

A major study on the returns to schooling in Egypt is that of Wahba (2002) who examined regional differences in the rates of return as well as differences in the returns by level of education making use of the 1988 ELMS data. Since the survey did not contain the relevant information for people not in the labor force, she acknowledged that her estimates of the rates of return could be subject to a selection bias. Due to the extremely high labor force participation rates for males and comparisons across regions, this would not seem to be a serious problem. In contrast to the aforementioned studies Said and El-Hamidi (2005) and El-Hamidi (2007) found the rates of return to rise (instead of fall) with the level of education. Indeed the rate of return to university education was found to range from 8.7 percent in rural areas, to 12.9 percent in urban areas and 15.8percent in greater Cairo. These rates of return contrasted sharply with rates of return of about three percent at the primary level and about six percent at the secondary level. As reflected in the above differences for higher education she also found strong evidence of differences in rates of return across regions.

Other studies showed that informality of the labor force was growing over the 1980s and 1990s. Said and El-Hamidi (2005) and El-Hamidi (2007) introduced additional controls (e.g., openness, the presence of siblings in the household, and the sector of employment (private versus public), tradables, nontradables etc.) in measuring the returns to schooling. Since the 2006 ELMS has become available only very recently, there is as yet a dearth of new studies examining the effects of these trends and labor market distortions on the rates of return to education, and the influence of location, migration, parental education, experience and other factors on these returns.

One study that made use of all three of the ELMS rounds is Amer (2007). To her credit, Amer focused on what had happened over the 1988-2006 period to both males and females in the 15-29 age group who have borne the brunt of the rapid growth in their numbers on the labor market. The share of this group in the total Egyptian labor force increased from 27 percent in 1988 to 29 percent in 1998 and finally to 32 percent in 2006. Within that period several quite different trends were found for narrower age groups and for males and females

separately and for the two sub periods, 1988-98 and 1998-06. For example, while the share of 15-19 year-olds in the labor force did not grow, that of 20-29 year-olds grew faster over the full period. The lack of growth in the share of the 15-19 age group could be attributed to rising school attendance for that age group, especially for males. Likewise, while the male labor force participation for those aged 15-29 rose over the period 1988-2006, the female labor force participation rate (FLFP) fell slightly from 41.4 percent in 1988 to 38.3 percent in 2006. Among females 20-29, the FLFP increased between 1988 and 1998 but decreased between 1998 and 2006. Breaking the FLFP down by educational level, she shows that for each of these years the participation rate fell with secondary level education but rose for educational levels above that. Nevertheless, the reduction in FLFP between both 1988 and 1998 and 2006 was greatest at the higher levels of education. While unemployment rates fell for both males and females between 1988 and 2006, especially for those aged 20-24, they increased among those with university degrees. From the cumulative probabilities of entering the labor force after having left school, Amer shows that females enter later — or more often not at all — by age 29, and especially so in 2006.

Never has much attention been devoted to the intergenerational mobility across different levels of education and income groups. This void is especially conspicuous given the number of studies in highly developed countries showing that, even there and even in democratic contexts, there is considerable evidence of low economic and social mobility, implying that inequality tends reproduce from one generation to the next (e.g., Bowles, Gintis and Groves, 2005). These authors point to a wide variety of channels for such effects, including IQ, schooling (conditioned on IQ), wealth, personality traits, race, and family networks. Of these, in a study of the US, Bowles and Gintis (2001) found schooling and wealth to be quantitatively the most important channels. Morevoer, Maoz and Moav (1999) use an "overlapping generations" framework to show that the degree of intergenerational mobility in developing countries could be even lower. In particular, under the assumption of imperfect markets, poor families in a developing economy are likely to be credit-constrained, and hence children may have to depend on their parents' wealth in financing their education. This, of course, may reduce mobility. Because children spend more of their time at home or at least with their parents in developing countries, the influence of parental education on children could well be stronger and more pervasive. There is also considerable literature in developing countries suggesting that uneducated minorities are generally less well served in both access and school quality than others (Lewis and Lockheed eds, 2007).

B. Objectives of This Study

This paper attempts to contribute to the literature, both general and Egypt-specific, in two ways: (1) by examining the neglected topic of intergenerational mobility with respect to human capital and (2) by measuring and explaining changes in the gender-specific short and medium term returns to education in different sectors (private and public, formal and informal, tradable and non-tradable) and in different locations (rural and urban, migration status and region).

With respect to the first objective, the intergenerational mobility of human capital, it attempts to use the ELMS data for 1988, 1998 and 2006 to measure the extent to which such mobility (based on the effects of parent and grandparent education on a child's education) differs by location, rural-urban or by region. Then, it attempts to identify any differences therein according to the gender of both parent and child. Finally, since the liquidity constraints on the poor and the lack of access to schools by the poor should have declined when development spread in Egypt, we also investigate how this has changed over time, including periods in which both the educational and structural adjustment reforms identified above were undertaken.

With respect to the second objective, the paper uses the 1988, 1998 and 2006 rounds of the ELMS to measure the rate of return to schooling in different years, for both males and females. For males, it does so separately for those in different regions, sectors and migration categories.

For both of these objectives, we deal with certain conceptual and econometric issues that have been identified in the more general literature. Chief among these are the inclusion of suitable control variables and the problem of selection or more generally non-exogeneity of the explanatory variables.

C. Organization of the Presentation

The remainder of our presentation is as follows. In Section II we review the literature on intergenerational mobility, and especially the methodological problems that arise in its study. This section also identifies both the model and the measures taken from the ELMS to operationalize the model. It also presents empirical estimates for both 2006 and 1988, for the full samples and for rural and urban separately. In Section III we do the same for the returns to schooling, presenting the model, our estimation strategy, describing the data and presenting the empirical estimates not only for 2006 but also for 1988 and 1998 to extract comparisons over time. We also compare the results for males and females and for males for rural and urban areas separately, for different sectors and perhaps most importantly distinguishing between those who stay in urban or stay in rural areas and those who move from rural to urban or urban to rural. Our conclusions including suggestions for both policy and further research are presented in Section IV.

II. Effects of Parent's Education on Children's Education: Intergenerational Mobility

A. Relevant Literature

An important issue in the quite substantial literature on intergenerational mobility is how best to disentangle the causal impact of parent's outcome on child's outcome from a mere correlation between parents' and children's education. Intergenerational correlation between outcomes can imply causality or mere selection. The causality premise in the intergenerational transmission of education, for example, may imply that a parent's education makes him/her a different type of parent, indeed one capable of inducing the child to attain higher levels of education (*Nurture hypothesis*). A selection story, on the other hand, could simply imply that the type of parent with more education has the type of child who attains more education but with no causal mechanism in action (*Nature hypothesis*) [Black et al. (2005)]. While the previous studies on mobility in developing countries were mainly concerned with measuring mere correlations (e.g., Behrman et al ,1999; Dahan and Gaviria, 2001), the current paper attempts to identify the causal link between parent's education and child's education in a developing economy.

The literature on intergenerational mobility has constituted an important branch of labor economics over the last three decades, but as noted above, not so for Egypt. Early studies on intergenerational mobility of earnings in the United States (as surveyed in Solon, 1999) found low correlations (or equivalently high mobility) between the earnings of different generations. However, as these studies used the earnings of a single year (or alternatively the average earnings over a few years) as a measure of permanent income, they were subject to criticism. In a recent study, Mazumder (2005) used the average earnings over a longer period (based on social security earnings data) to find that the correlation is about 0.6 which implies a very low degree of social mobility.

Relatively few studies, however, have managed to deal with the more fundamental problem of distinguishing causation from correlation in these relations. Three alternative strategies

have been employed, especially in the context of intergenerational transmission of education. First, many studies on siblings and twins use the fact that monozygotic twins (and siblings to a lesser degree) have the same genes so as to attribute any observed differences in the outcomes of their offspring to differences in nurture (for example differences in time spent with the children or sending them to different schools). Second, some studies compare the outcomes of own children retained by the family and those adopted by another family with different levels or kinds of education. Since adoptees do not share any genes with their foster parents, any observed correlation in educational outcomes between parent and child can be attributed to nurture rather than genetics or nature. Third, some studies suggest using instrumental variables for parent's education to identify the causal impact on child's education (or the nurture part of the correlation).

Since the Egyptian data employed in this study do not permit application of either of the first two strategies, we focus on the literature concerning the third approach. Notably, Oreopoulos et al (2006) use an exogenous variation in compulsory schooling laws as an instrumental variable (IV) for parent's education in the United States to find a significant causal impact of parent's education on child's educational outcomes. Black et al (2005) use the same methodology in a Norwegian dataset to find no causal impact of parent's education on child's education. Since these authors point out that the nurture effects might well differ from one parent-child combination to another, the latter study measures the impact for mother/son pairs. Finally, Chevalier (2004) applies the same idea to British data and finds a significant causal effect. Another approach taken in the literature is to take advantage of purely exogenous changes in education such as a new law requiring schooling attendance for more years than before the change (a tradition initiated by Angrist and Krueger, 1991).

The present paper makes use of the latter approach by seeking to identify the casual impact of parent's education on child's education employing two alternative strategies for treating the parent's family background. It does so by treating grandparents' years of schooling in two different ways: (1) as an instrument for parents' education, and alternatively (2) as an additional control for children's education. In this regard, the paper is also related to a long tradition in the literature reviewed by Card (1999) in estimating the returns to education (in an earnings equation).

B. Empirical Strategy

As indicated above, the exogeneity of parental education to child's education is potentially problematic. If it were exogenous, the causal impact of parent's education on child's education could be estimated by OLS. However, parent's education is likely to be endogenous, in that parent's education may be correlated with other unobservable factors that affect the child's education decision. For instance, an educated parent may happen to have an educated child because of an unobserved factor like genetics (nature) instead of by virtue of better nurturing.

To isolate the causal impact of parent's education on child's education, one needs to find an exogenous variation in parent's education that is uncorrelated to the child's education choice. Following the literature on using family background (such as parent's education) as an instrument for child's education (Card 1999), we use grandparents' education as an instrumental variable for parent's education in the first step of the empirical strategy. While this would seem relevant because grandparents' education is likely correlated with parent's education, to assure orthogonality and hence to serve as a valid instrument, however, grandparents' education would have to affect child's education only through parent's education, after controlling for parent's earnings, an index for household (HH) Wellbeing and other relevant factors. Yet, since Card (1999) showed in a similar context that grandparents' education may well be correlated with unobservables affecting the child's education,

orthogonality cannot be assured. For this reason, our alternative empirical strategy is to use grandparents' education levels as controls rather than instruments.

For control variables, following the previous studies on Egypt we include ages of both parent and child, earnings of the parent, the number of siblings, a household (HH) Wellbeing Index and region dummy variables. The latter are introduced to capture differences in the access to schools at the different levels of education and perhaps also differences in social norms with respect to the value of education across regions. Hence, our two estimation procedures are Two Stages Least Squares (2SLS) estimation of equations (1) and (2) below or alternatively, OLS estimation of equation (2) but with grandparent schooling added as an extra control variable:

$$schooling^{p} = \alpha_0 + \alpha_1 schooling^{gf} + \alpha_2 schooling^{gm} + \alpha_3 age^{c} + \alpha_4 age^{p} + \alpha_5 earnings^{p} + \alpha_6 HHwellbeingindex + \eta \quad (1)$$

$$schooling^{c} = \beta_0 + \beta_1 schooling^{p} + \beta_2 age^{c} + \beta_3 age^{p} + \beta_4 earnings^{p} + \beta_5 HHwellbeingindex + \varepsilon \quad (2)$$

The superscripts *c*, *p*, *gf*, and *gm* refer to child, parent, grandfather, and grandmother respectively. Age (for both child and parent) is controlled for to account for any cohort effects that may exist due to secular trends in education in Egypt.

While the second empirical strategy based on OLS estimates of (2) with grandparents' education added may still not produce consistent estimates of the coefficient of parent's education in general, it can do so if the correlation between parent's education and the unobservables is absorbed entirely in grandparents' education and the other controls. The results should also help in assessing the validity of using grandparents' education levels as instruments.

Following the literature on intergenerational mobility of education, these strategies are applied separately for each of the four parent-child pairs, i.e., father-son, mother-son, father-daughter, and mother-daughter. This is done, on the one hand, to avoid the multicollinearity which would arise if both father's and mother's education were included in the same regression, and on the other hand, to retain the influence of separate influences that would be lost if gender differences were eliminated in the children and/or if schooling of mothers and fathers was averaged.

To assess how much intergenerational mobility may have changed over time, we conduct separate analyses for 1988 and 2006, i.e. years that are roughly a generation apart.

C. Data and Measures

The empirical analysis is based on the Egyptian Labor Market Panel Survey (ELMPS) (conducted in 1988, 1998 and 2006). The sample of households is nationally representative of Egypt. For the 1988 analysis we make use of the data for 1988 alone, but for the 2006 analysis, we use the 1998 and 2006 surveys together. The 2006 analysis is able to take advantage of the fact that all individuals living in the same home are interviewed as part of the household in 1998, and all the individuals in the household are followed up in 2006, whether or not they are still living in the same 1998 HH. Hence, fathers, mothers, sons, and daughters surveyed in 1998 can be linked to information on sons and daughters in 2006 irrespective of whether they still live with their parents. This has the important advantage of reducing the selection bias that arises in surveys where only the children living with their parents at the time of the survey are interviewed. Note that even the well-known study of Chevalier (2004) suffers from this problem.

The sample is restricted to include those individuals who have presumably already taken their education decision. We chose 21 as the age cutoff. The percentage of individuals still in school after this age cutoff is 4.2% in the "Sons" sample and 5.28% in the "Daughters" sample. Later, as a robustness check, we repeated our estimations with the use of a cutoff point of 25 years. This has the advantage of reducing the percentage still in school to 0.97% in the "Sons" sample and 1.08% in the "Daughters" sample but the disadvantage of reducing the sample sizes for as much as 50 percent for some parent-child pairs.

We have also excluded from the samples households with grandparents living in the same home with the other household members (whether in 1998 or in 2006), since in such households it might be the case that there is a direct impact of grandparents' education on the child's education. This exclusion does not exclude the possibility that there may have been some grandparents who used to live with the household members in the same home but stopped doing so by the 1998 survey year. While needed in implementing the instrumenting strategy, this restriction would not have been needed in the alternative strategy in which a grandparent education is introduced only as an extra control variable in equation (2).[2]

The information on educational attainment (measured in 2006) takes the form of 15 categories (9 categories in the case of grandparents' education) which specify in detail the type of education the individual has. Assumptions had to be made when assigning the number of completed years of schooling for each category (which is admittedly somewhat tricky in the case of Egypt in the case of technical education). The details of what we did are elaborately explained in Tables A1 and A2 of Appendix A. Experimentation with some alternative assumptions seemed to make little difference.

Following Vyas and Kumaranayake (2006), our index of household wellbeing is constructed using the first principal from a Principal Components Analysis (PCA) based on 44 household variables (measured in 1998) such as ownership of the house, area of the house, the number of rooms, as well as the ownership of a wide range of durable goods and appliances. These variables are commonly used as proxies for family wealth or socio-economic status. The details of the PCA are explained in Appendix B. As a robustness check, we made use of the second principal component but found little difference. For this reason, such results are not reported here. The PCA is conducted across all 1998 HHs and is standardized with zero mean and unit variance.

For region, we include dummy variables for location in the Alexandria and Suez Canal area, Urban Lower Egypt, Urban Upper Egypt, Rural Lower Egypt and Rural Upper Egypt. The excluded region is Greater Cairo.

Descriptive statistics for all the relevant variables for 2006 are shown in Table 1. The 1998 dataset is used only to identify parents and children and also to compute the HH Wellbeing Index, the latter so that the index would better reflect the children's original household. While the same logic would suggest that our measure of parent earnings should be based on the 1998 ELMS, the large number of missing observations on earnings in the 1998 forced us to use the 2006 data for this control variable. As a robustness check, we also made use of the 1998 reports in parent earnings for the necessarily much smaller sample, but again with little change in results.

Note from Table 1 that sons and daughters have very similar mean years of schooling as reported in the 2006 ELMS, both much higher than the years of schooling of their parents and grandparents. Note that their fathers had on average almost three more years of school than their mothers, indicating the rather high rate of catch-up in education by girls over this single generation. Also note that grandmothers averaged less than one year of education according

[2] It is retained, however, in this case in order to keep the samples comparable in the two approaches.

to the 2006 ELMS reports for the samples used in this analysis. The mean values reported in the table also show that there is a five year gap in age between mothers and fathers and a sizeable gap in their average earnings as well.

D. Empirical Results for 2006

The empirical results for both estimation strategies are presented in Table 2. This table is broken into sections A-D, for the four different parent-child pairs. The results for the father-son pairs are given in section A, the mother-son pairs in Section B, the father- daughter pairs in Section C, and the mother-daughter ones in Section D. The first two columns of each section represent the OLS estimates of equation (2), without and then with controls for grandparents' schooling. Column (3) provides the IV estimates where grandparents' education is used only as an instrument for parent's education based on the two stage approach of equations (1) and (2) together. The parameter of primary interest for intergenerational mobility is of course the coefficient of parent's education. Estimates of the effects of each of the other controls are included (namely child age, parent's age, number of siblings and the HH Wellbeing Index). The five dummy variables for region identified in the previous section were also included in each of these regressions, though to save space the coefficients are not reported (except later on in Table 9). The numbers in parentheses below the estimated parameter values represent standard errors.

Turning first to the father-son sample, the OLS estimation of equation (2) in column (1) shows that a one year increase in father's schooling is associated with a 0.297 year increase in son's schooling on average (holding other control variables constant). The corresponding OLS estimate for mother's schooling from the mother-son sample in Section B is 0.249, and those from the father- daughter and mother- daughter samples in Sections C and D are 0.274 and 0.235, respectively. As discussed in Section B above, these positive (and highly significant) coefficients may reflect "causality" (nurture) or mere "selection" (nature). In our attempt to test for causality in this effect, the two strategies outlined above are implemented. First, grandparents' schooling is used as an extra control variable in the OLS results presented in column (2) of each section. Then in column (3) are the corresponding results when grandparent's schooling is used as an instrument for parent's schooling.

From the column (2) results in the different sections of the table, one can see that in each case the effects of grandparent's education on child education are rather weak. The effect of grandmother's schooling on child schooling is positive and statistically significant at the 5 percent level in the father-son sample but in none of the other samples. Similarly, the effect of grandfather's schooling is positive and significant in the mother-son sample but in none of the other cases. In three of the four cases, the effect of inclusion of grandparent's education on the parameter estimate for parent's education is to reduce it slightly, suggesting that at least a small component of the effect of grandparent's education on child's education may come from its effect on parent's education. If the controls in column (2) have done an adequate job of mitigating the correlation between parent's schooling and the error term, the now smaller coefficients of parent's schooling on child schooling in columns (2) of Sections A, B and D of the table could represent a causal impact.

But before reaching this conclusion we need to examine the corresponding IV estimates of the effects of parent's education in column (3). By comparing these with the estimates in column (1), one can see that the effect is to raise the estimate of parent's education in three of the four parent-child pairs. The exception is in the father-daughter pair sample of Section C of the table. Since this was the smallest of the samples and the effect of grandfather's education was negative in both the OLS version of column (2) and in the first stage of the IV equation, one should probably not pay much attention to this case. The fact that the effect of instrumenting parent's education is to raise the effect of parent's education in the other three

cases may be taken as evidence that grandparents' education may well be correlated with other unobservables, implying that orthogonality of parental income cannot be assured in this case[3].

In general therefore, we feel that the results of column (2) are the more reliable except in Section C where column (1) estimates may be preferred. While the effect of father's education on son's education is slightly larger than that on daughter's education, a greater difference is that between fathers and mothers, which show that the effects of fathers' education on children's education are somewhat larger than those of mother's education. This suggests that, for this period at least, mother's education seems to have contributed less to intergenerational immobility — with respect to education — than father's education.

Of the other results, it is worth noting that: (1) as expected the effects of child age (over the cutoff age of 21) are negative indicating the growth in educational attainment over time, (2) the effects of father's age on child's schooling are positive (and statistically significant in the case of sons) possibly reflecting the life cycle of father's earning power but the effects of mother's age are insignificant and even negative and almost significant in the case of the mother-son sample, (3) while the effects of parent earnings are universally insignificant, the effects of the HH Wellbeing Index are positive and significant in all samples, being slightly larger for the mother-child samples than for the father-child samples, (4) while the effects of number of siblings are always negative they are significantly negative only in the case of daughters, indicating that the quantity-quality tradeoff is more severe in the case of girls than boys.

Finally, it is interesting to compare these results to the results obtained in the previous literature. Qualitatively at least, our finding of positive impacts of parent's education on child's education is consistent with the findings of Oreopoulos et al (2006) and Chevalier (2004). Quantitatively, however, the magnitudes of the coefficients obtained in this study are not comparable with those of the other studies since they used a different measure of education (instead of the number of completed years of schooling that we have used). Our results differ quite substantially from those of Black et al (2005), where parent's education was found to have no causal impact on child's education (except for mother- son pair). Qualitatively, the results are also similar to the estimates reported for the United States and other developed countries by Bowles et al (2005). Based on Black et al, however, our results would seem to be more robust to alternative estimation strategies and samples than those in earlier studies.

Since several of the region dummy variables also tended to have significant effects on child schooling in each of the estimates in Table 2 (not reported), our next step was to investigate the extent to which the preferred approach to identifying causality in the relation between parent's and child's education (by adding grandparents' education as additional controls), would vary between rural and urban areas. Splitting the sample in this way, of course, reduces the number of observations, so that as shown in Table 3 the resulting father–daughter and mother-daughter samples for rural areas are both well below 500 observations. Even with the considerably smaller sample sizes, however, the effects of parent's education on child's education are in all cases still positive and significant. One can compare the results for the Urban and Rural samples for each parent-child pair in Table 3 with each other and with the corresponding estimates for the combined rural and urban sample from column (2) estimates

[3] We conducted a sensitivity analysis to assess the robustness of the coefficient of parent's education to varying degrees of correlation between the instruments (grandparents' education) and the error term — based on Ashley (2007). Overall, the results (not reported in the paper) showed that the coefficient is robust if we allow for correlation up to 20%.

of Table 2. For example, with respect to the father-son sample, one can see that there is virtually no difference in the effect of father's education between rural and urban areas. For the mother-son sample, however, there is a fairly large difference between the parameter estimates for rural and urban, the coefficient being quite a bit larger for rural areas (0.294) than for urban (0.211). The differences are even greater for the father-daughter and mother-daughter samples. Hence, we can conclude that intergenerational mobility is much lower in rural areas than in urban areas, possibly because access to schooling may be easier in urban areas even for disadvantaged children, urban schools are of higher quality and (3) the benefits of education are more readily ascertained in urban areas.

Other results of note in Table 3 are: (1) that the negative coefficients of child age are larger (in absolute terms) in rural areas, indicating faster catch-up over time in educational attainment in rural areas, (2) the effects of parent's age (again largely father's age) are larger in urban areas, (3) while the effects of the HH Wellbeing Index are very similar between rural and urban areas for sons, for daughters they are much higher in urban areas than in rural areas where they are not even statistically significant, (4) the effects of grandparents' education are generally higher in rural than in urban areas, and (5) the sibling effects are again negative and significant primarily in the case of daughters but with no consistent differences between the rural and urban samples.

E. Empirical Estimates for 1988

While the results in Tables 2 and 3 have shown rather considerable evidence of immobility in relative educational attainment from the 2006 ELMS, one would like to know whether or not mobility has at least increased as a result of the various educational reforms and the overall development that has been achieved in Egypt over the last few decades. To that end, our next exercise aims to present comparable estimates of the effects of parent's education based on the 1988 ELMS, taking into consideration the differences between both databases.

There are some differences in the 1998 database which somewhat reduces comparability of the results. First, there is no data on wealth variables from which the HH Wellbeing Index can be created. Second, the educational attainment categories used for computing the years of education are slightly different. Third, the siblings' data is either not available or very incomplete. Fortunately, for most variables comparable measures are available and for each of the four parent-child pairs.

Table 4 provides descriptive statistics on the variables used for the 1988 analysis. For both sons and daughters average schooling attained was at least two years below that in 2006 (from Table 1). Somewhat surprisingly, average schooling for daughters was very similar to, and indeed slightly higher than, that for sons. The same held true for mothers and fathers, but again for grandparents, grandmothers had less education than grandfathers (on average much less than one year of schooling). The age gap between fathers and mothers was almost eight years, (i.e. greater than in 2006).

We use the same two strategies for trying to identify causality in the relation between parent and child education as in the 2006 analysis. In the three columns of Table 5 we present the estimates of parent's education on child's education for 1988 corresponding to those of columns (1), (2) and (3) in Table 2 above. Again, we do not report the other coefficients (those for grandparent's education, child's age, parent's age, parent's earnings, and the region dummies). As before, the use of the IV for parent's education based on grandparent's education seems to bias the estimate of this variable upwards, though the statistical significance is generally weaker than in the case of column (1) and column (2) estimates. The estimates in column (1) are the OLS estimates without controlling for grandparent's education while those in column (2) are those with the control for grandparent's education.

As in Table 2 the effect of controlling for grandparent's education (as we deem desirable) has the effect of lowering the coefficient of parent's education in all parent-child samples except for father-daughter. In each case, the coefficient is positive and significant. By comparing these estimates with the column (2) estimates from the four sections of Table 2, one can see that the magnitudes of these effects are much larger, ranging from 50 percent to 100 percent higher than those of Table 2. Clearly, there has been a sharp increase in intergenerational mobility with respect to education between 1988 and 2006.

III. Determinants of the Returns to Education

In this section we develop our empirical model, identify the measures and data and present empirical estimates for the determinants of the returns to education. Our objective is to present estimates of the returns to education for both males and females for different years, 1988, 1998 and 2006. For 2006 we also present comparable estimates of the returns to education by region (urban and rural), location of birth, current residence groups, public and private employers, and different sectors of economic activity.

Section A presents the empirical model, including data description; Section B presents the empirical estimates for 2006; and Section C the corresponding results for 1988 and 1998.

The Empirical Model and Data

Since a major motive in estimating the returns to education in Egypt is to compare them with other studies, to disaggregate the dataset by regions, sectors, gender and to make comparisons over time, we choose to estimate the standard Mincerian model. This model is

$$\mathbf{Earnings}_i = \beta_0 + \beta_1\ \mathbf{Schooling}_i + \beta_2\ \mathbf{Experience}_i + \beta_3\ \mathbf{Experience}_i^2 + \beta_4\ \mathbf{Controls}_i + \varepsilon_i \qquad (3)$$

where Earnings are the monthly earnings in Egyptian pounds (in logs), Experience is years working, and Controls include mother's and father's education, and region. The error term ε_i is assumed to be randomly distributed with 0 mean. We also experimented with additional controls for migration, sector of employment and other variables but instead chose to estimate the returns separately for each of these categories.

This kind of model that has been used by Psacharopoulos and others to generate the stylized facts that the rates of return to education are typically much higher in developing than in developed countries, and that they tend to decline with the level of education. As mentioned earlier, the first of these findings has been challenged by the findings from several more recent studies on other countries, and the second by several of the studies mentioned above for Egypt. Our focus, however, is on the first issue and the effects of sector and region. In addition we follow up on the intergenerational transmission of education theme presented in Section II.

It is worth mentioning that our measure of experience is an improved version of the one used in most of the literature. While the standard measure of Experience is that of *potential* experience (age-schooling- 6), we were able to construct a measure of *actual* experience which we defined as the survey year less the year of entry into the labor force.

Our first exercise is to estimate (3) with OLS for the year 2006. For this purpose we again make use of the 2006 ELMS. Since many of the same variables have been used before, the exception being the monthly earnings variable and Experience, we proceed to the descriptive statistics presented in Table 6 for males and females separately in 2006. Because the information on monthly earnings and experience is only available for those in the labor force, those who are not in the labor force are excluded. Because of the relatively low labor force participation rate of Egyptian women, this accounts for the large difference in sample sizes between males and females. While the ages of males and females in the respective samples are almost identical, males had more experience and higher earnings. Note also that despite

their lower earnings the females had on average almost three more years of education than males (and also came from more educated parents than their male counterparts). It should also be recalled from earlier studies by El-Hamidi (2007) and others that females had suffered a greater decline in real wages than males between 1998 and 2006, perhaps helping to explain their declining labor force participation rate.

We had expected to be able to instrument for education in this model and indeed attempted to do so, using age, age squared, the 1981 educational reform, reform interacted with age, and reform interacted with age squared in the first stage and imposing various plausible exclusions in IVs. Yet despite various attempts, we were unable to identify suitable instruments and obtain meaningful results. It was for this reason, and again following the suggestion of Card (1999), that parents' education was included as an additional control, just as for grandparent's education in Section II.

Empirical Results for 2006

The results for the log of monthly earnings in the full samples of males and females are given in the first two rows of the table (Section I), in each case with robust standard errors in parentheses immediately below the parameter estimate. Note that the rates of return to schooling estimates are very low, 0.030 for males and 0.037 for females. These estimates are lower than all but three of the estimates from the several hundred studies for both developed and developing countries cited by Psacaropoulos and Patrinos (2004), the exceptions being those for Italy in 1987, South Africa in 1990, and Vietnam in 1992. As expected Experience has a nonlinear effect, the coefficients being larger and more significant for females. Father's and mother's schooling have positive and significant effects on earnings, again indicating that the influence of parent's schooling extends well beyond the effect on children's education itself. Probably as a result of the larger and more significant effects of Schooling and Experience for females, the overall explanatory power of the model is considerably higher for females than for males.

Our next step is to estimate the same model separately for different regional and sector categories. This is motivated by the fact that it is often hypothesized, especially in the Egyptian context, that the returns to education vary by sector and region. Because of the relatively small size of the female sample, these disaggregated analyses are limited to the male sample. In Section II of the table are the corresponding estimates for rural and urban areas. As expected, the returns to schooling are higher in urban than in rural areas as are the returns to Experience. The impact of mother's schooling is also stronger in urban areas. Note that the explanatory power of the model is also considerably stronger for the urban sample.

To capture the influence of migration on returns to schooling, in Section III of Table 7 we present the corresponding results for four different region-of-birth, region-of -residence categories. Notice that the returns to schooling and experience are even lower for the Rural-Rural sample (those who were both born in and currently reside in rural areas), than for the Rural sample as a whole in Section II of the table. On the other hand, the returns to education (but not experience) are higher for the Rural-Urban migrant group. In contrast to the results of the preceding samples, the effect of father's schooling is no longer significant in the Rural-Urban sample. The Urban-Rural sample is quite small, but for this sample the returns to education are higher than those in the male sample as a whole. The returns to schooling are comparable in the Urban-Urban sample and the returns to experience larger than for any of the other male samples, though still below that of females.

Consistent with the frequently acknowledged tendency of public sector salaries to be differentiated according to educational credentials, as shown in Section IV of the table, the returns to schooling are somewhat higher in the public sector than in the private sector. The

returns to experience, however, are higher in the private sector. Section V of Table 6 shows the corresponding estimates for the male samples employed in different sectors, tradable and non-tradable. This distinction is thought to be meaningful in the light of the foreseen need of the Egyptian economy to be transformed in a way in which the tradables sector would increase relative to non-tradables. Following El-Hamidi (2007), the tradables sector is here defined to include manufacturing and tourism and the non-tradables sector encompasses all the remaining sectors. Note that the returns to both schooling and experience are estimated to be higher in the tradables sample than in the non-tradables.

Since several of the studies for Egypt referred to above have noted a trend toward more employment in the informal sector relative to the formal sector, in Sections VI and VII of the table we present the results obtained by two alternative ways of distinguishing between the formal and informal sectors with the 2006 ELMS data. In Section VI the distinction is based on whether or not the earner reports are being covered by Social Security, while in Section VII the distinction is based on the existence of a work contract. Note that by both criteria, the returns to schooling are higher for those in the formal sector. The effects of father's schooling are also higher for those in the formal sector. By contrast, the returns to experience are higher for those in the informal sector.

To summarize, the above results show (from the point estimates at least) that the returns to education for males are considerably lower than those for females. Those for males are somewhat higher for those in urban areas, and especially for those who had migrated from rural areas, for those in the public sector, in the tradables sector and in the formal sector by either definition.

Empirical Results for 1988 and 1998

In view of the various educational as well as economic reforms adopted by Egypt of the last several decades and the tremendous pressure that has been placed on its labor market through the enormous influx of young people into the labor force as a result of its "demographic gift", in Table 8 we present comparable estimates of equation (3) for the male and female samples based on the 1988 and 1998 ELMS. Notice that the returns to schooling for males were marginally higher in 1988 than in 1998 which were in turn marginally higher than those for 2006 reported in Table 7. By contrast, the returns to schooling for females increased marginally between 1988 and 1998, a period in which public sector employment was still expanding. Yet, between 1998 and 2006, the returns to education for females fell by the same amount as for males to a level relatively close to the 1988 level. The returns to experience fell very sharply for both males (from 0.108 to 0.043) and females (from (0.139 to 0.047) between 1988 and 1998, but recovered somewhat between 1998 and 2006. These may be regarded as rather unfortunate outcomes, largely attributable to the large influx of more educated young workers and perhaps to the turnover associated with structural reforms. On the other hand, the fact that the effect of father's schooling has also fallen from 1988 to 1998 and even further in 2006 is evidence of the increasing intergenerational mobility of educational influences that was documented in Section II. This may be regarded as a desirable influence.

Hence, overall, the above results would seem to contribute to our understanding of the changing conditions in the Egyptian labor market. It appears that ongoing reforms to improve the quality of Egyptian education, to better link education with the needs of the market, and to increase openness and thereby stimulate the tradable goods sectors have been overpowered by the enormous influx of more educated young people to the labor force which has had the effect of lowering the returns to education. The social returns to education may have been reduced still further by the fact that females — for whom the returns to education have been higher than for males — have reacted to the weakness of the labor market by withdrawing

from it. Two other economic reforms, one to reduce the relative importance of the public sector and to back away from its earlier commitment to higher university graduates as employer of last resort, and the other to partially deregulate the labor market by allowing more inter labor market flexibility through relaxing regulations on short-term employees or more generally the informal sector may have also contributed to the declining returns to schooling since the returns to schooling are lower in the private and informal sectors than in the public and formal sectors.

Regional Differences

As noted above, in all the regressions in both Sections II and III (except those in the present section where the full sample was broken down into various regional groupings), the models included region dummies. To examine the magnitudes of these coefficients results for both intergenerational mobility and returns to education in Table 9 we report the parameter values for each of these dummy variables based on the 2006 ELMS. Recall that these five regions are all relative to the excluded region of the Greater Cairo area.

Beginning with education regressions for the full father-son sample in Table 2, one can see from the entries of the first row of Section I -Table 9 that location in any of the other regions is associated with a negative coefficient, though only those for Rural Lower Egypt and especially Rural Upper Egypt are statistically significant. For the Mother-Son sample, all the region dummies have significant negative effects, but with the two rural regions having the largest negative influences. The results for the Father-Daughter and Mother-Daughter samples are similar to one another in that neither the coefficient for the Alexandria and Suez Canal nor that of Urban Lower Egypt is statistically significant, but the negative values for daughters are much larger than those in the two samples for sons. Note that for a female in rural Upper Egypt, the parameter value indicates that a daughter expects to receive three years less education than after controlling for all the other influences in the model.

In Section II of the table we report the parameter estimates for the region dummies corresponding to the returns to education equation (3) reported for males and females separately in Section I of Table 7. With one exception, the Alexandria and Suez Canal dummy for males, the coefficients are all negative and significant for both males and females. These coefficients indicate the percent by which earnings are estimated to be lower in these regions than in Greater Cairo after controlling for all the other variables included in the model. In every case except Urban Upper Egypt, the negative influences of these region-specific dummies are larger for females than for males, and the discrepancies being quite large for both Rural Upper Egypt and Rural Lower Egypt.

IV. Conclusions

This paper explores both the intergenerational transmission of human capital and the returns to education in Egypt, a country whose labor market and educational system have been buffeted by various reforms as well as shocks. Using two waves from the Egyptian Labor Market Panel Survey (ELMPS) conducted in 1998 and 2006 enable us to identify parents and children in 1998 and to follow children in 2006 even if they had split from their 1998 households and formed their own families. In both parts of the analysis, we attempt to make use of family background as an instrument (or as a control) in distinguishing causal effects from correlations, and the channels whereby the effects are realized if in fact the effects are causal. In the intergenerational transmission of human capital portion of the study we make use of the information available on grandparents' educational attainment by adding this variable as an instrument for parent's education or alternatively as a control.

Likewise, in the returns to education part of the analysis, we both instrument for parents' education and include it as an additional control. In both cases, we find that adding

the parent or grandparent's schooling as a control variable is more satisfactory and does not give rise to selectivity and other biases as does the instrumenting strategy. In both cases, we also experiment with using educational reforms as instruments for parents' education. The problem is that the reforms introduced by law were undertaken simultaneously throughout the country. In practice it is quite possible that certain regions may have lagged behind others in implementing the reforms. If this is the case then a more satisfactory "treatment analysis" of such policy changes may be possible. For example, should we be able to find data from the Ministry of Education or other sources for this, such a strategy for dealing with endogeneity of education choices may be possible and may also prove superior to the controls for parent and grandparent schooling employed by this study.

In the case of intergenerational mobility, compared to results of previous literature, it seems that the causal effect of parent's schooling in Egypt is much stronger than that found in Norway [Black et al. (2005)]. This seems to be consistent with the reasoning that poor and "uneducated" families in a developing country like Egypt may be more credit-constrained than those in a developed country like Norway, thereby lowering the chances that their children can break the vicious circle of "low education" and "poverty" that causes educational attainment to be so highly correlated across generations within families. Due to the satisfactory GDP per capita growth rate that Egypt has enjoyed over the last two decades, one may have expected that liquidity constraints would have been gradually relaxed allowing intergenerational mobility to rise. Some educational reforms — like making education free for successive levels of schooling — could have also contributed to the same outcome. The fact that our estimates of intergenerational mobility in 1988 and 2006 show an increase may support these hypothesized effects.

The separate analyses of intergenerational transmission of education in various groups show that these transmission effects are stronger in rural than in urban areas, and from fathers to sons and daughters than from mothers to sons and daughters. The effects of grandparents' schooling on child's schooling are also positive and significant in several parent-child pairs. Wealth (as measured by the HH Wellbeing Index) has a consistently positive and significant effects on child education, thus serving as another important source of intergenerational immobility of human capital.

The returns to schooling are much lower than in almost any other study on any other country. Moreover, these returns seem to fall over time for both males and females. While the returns seem to be slightly higher for females than males, this benefit for females has been offset by the fact that their average earnings are much lower and their labor force participation rates fall more than males in the duration of the study. For males, the already low returns to schooling in 2006 are even lower for those in rural areas, in the private sector, in the informal sector and in non-tradables. The returns to experience are also higher for women than for men and for men are higher in urban areas, the private sector, the informal sector and tradables.

Finally, the results for the various region dummy variables representing locations outside of Greater Cairo show sizeable negative effects of these non-central locations on both children's education and returns to that education. For rural areas these effects are strikingly large. This suggests the importance of giving high priority to reducing these disadvantages for rural households.

Based on the results presented in this paper, the following implications for policy may be derived:

- Efforts to increase school quality should be strengthened. This would include further efforts to avoid overcrowding of schools and universities. But, as suggested in World Bank 2008, such efforts should go well beyond these rather traditional approaches. Some

promising approaches may be to incentivize teachers to be in the classroom and to dedicate themselves to helping students perform better on standard international tests in all levels. On the TIMSS administered in Egypt in 2003, despite spending over 5 percent of its GDP on education between 1960 and 2003, Egypt's score was slightly below the Latina American average of 408, further below the Asian developing country average of 467 and the overall international average of 489 despite the fact that in each of these other regions less than 3.5 percent of GDP had been spent on education.

- Efforts to improve the match between the skills of those coming out of the educational system and the needs of firms should also be strengthened. In part, this may be accomplished by reallocating resources for university education away from humanities. In Egypt some 35 percent of university graduates major in humanities, which is well above the Asian average of 19.9 percent and the Latin American average of 17.4 percent (World Bank 2008).
- Economic reforms that would increase incentives for increased employment by the formal sector and in particular in the tradables sector (for example through exports and import substitution, technological improvement and increased competition) should be strengthened. Another possibility that needs to be explored is the World Bank (2008) suggestion of efforts to encourage a MENA market for labor. This could help raise the returns to education in Egypt since it could be expected to export more of its plentiful supply of educated workers, thereby raising the return to education in Egypt.
- Given the need of the private sector to take up the slack of slower growth of the public sector, special attention should be given to measuring the impact of education on productivity in this sector and the relation between such productivity and wage rates in the private sector. Is private sector employment of educated people held down by labor market regulations? If so, it might be desirable to examine further mechanisms for liberalizing private sector labor markets.
- Subsidies for higher education and especially public higher education should be reduced in favor of merit-based scholarships and loan programs. This would help both efficiency and equity.
- Given the extremely low returns to education in rural areas, new methods of encouraging non-agricultural activities and especially small businesses that could provide more job opportunities for middle level educated workers in rural areas should be examined and where feasible implemented.
- Programs of the head-start type that could be accessed by children of less educated parents should be developed. While the results presented in this study suggest that intergenerational mobility has increased, it also demonstrates that the intergenerational transmission of educated is still significant.

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Table (1): Descriptive Statistics in 2006

Variable	N	Mean	St. Deviation	Min.	Max.
Son's Education	2932	10.356	5.224	0	20
Daughter's Education	1704	10.633	5.548	0	20
Father's Education	794	6.293	6.162	0	20
Mother's Education	1303	3.371	5.204	0	20
Father's Father's Education	794	2.237	3.835	0	16
Father's Mother's Education	794	0.696	2.082	0	16
Mother's Father's Education	1301	2.198	3.794	0	20
Mother's Mother's Education	1302	0.704	2.133	0	16
Son's Age	2932	29.453	7.495	21	74
Daughter's Age	1704	26.775	6.188	21	66
Father's Age	794	60.714	9.800	41	90
Mother's Age	1303	55.891	11.207	35	92
Son's Siblings	2932	4.327	2.086	0	16
Daughter's Siblings	1704	4.186	2.088	0	13
Father's Earnings (Egyptian Pounds/ Month)	794	347.765	1030.533	0	13295
Mother's Earnings (Egyptian Pounds/ Month)	1303	81.991	377.768	0	8200
HH Wellbeing Index in 1998 (for HHs included in the sample)[1]	1568	.102	1.083	-1.837	17.037
HH Wellbeing Index (for all HHs in 1998 survey)[2]	4465	0	1	-1.890	24.348

[1] These statistics are calculated for the HHs used in the analysis (i.e. for the HHs where parents and children were identified in 1998).

[2] These statistics are calculated for all HHs included in the 1998 survey, whether they are included in the analysis or not. The index is standardized with zero mean and unit variance.

Table (2): OLS and IV Estimates of Intergenerational Mobility in 2006

	A. Effect of Father's Education on Son's Education			B. Effect of Mother's Education on Son's Education		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	OLS	**OLS**	**IV**	**OLS**	**OLS**	**IV**
Constant	9.675 (.968)	9.523 (.978)	9.079 (1.192)	15.130 (.741)	14.902 (.739)	13.977 (.822)
Parent's Education	.297	.290	.342	.249	.205	.379
	(.022)	(.023)	(.051)	(.023)	(.026)	(.049)
Son's Age	-.075	-.075 (.024)	-.073	-.072	-.071	-.060
	(.024)		(.024)	(.020)	(.020)	(.020)
Parent's Age	.041	.042	.042	-.024	-.025	-.024
	(.016)	(.016)	(.016)	(.016)	(.016)	(.016)
Number of Siblings	-.050	-.039	-.016	-.113	-.103	-.035
	(.063)	(.065)	(.077)	(.053)	(.053)	(.059)
Parent's Earnings	-.009	-.010 (.015)	-.012	.002	.005	-.015
	(.015)		(.015)	(.007)	(.007)	(.013)
HH Wellbeing Index	.401	.387	.353	.485	.452	.398
	(.135)	(.133)	(.141)	(.109)	(.109)	(.104)
Grandfather's	-	-.008 (.040)	-	-	.135	-
Education					(.030)	
Grandmother's	-	.125	-	-	-.055	-
Education		(.053)			(.073)	
Region Dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	1695	1695	1695	2544	2544	2544
R^2	0.170	0.171	0.168	0.147	0.152	0.137

Table (2) (Cont.): OLS and IV Estimates of Intergenerational Mobility in 2006

	C. Effect of Father's Education on Daughter's Education			D. Effect of Mother's Education on Daughter's Education		
	(7) OLS	(8) OLS	(9) IV	(10) OLS	(11) OLS	(12) IV
Constant	12.611	12.674	13.144	15.130 (.741)	15.577 (.989)	14.914
	(1.361)	(1.365)	(1.563)			(1.042)
Parent's Education	.274	.281	.230	.235	.211	.313
	(.029)	(.031)	(.075)	(.027)	(.029)	(.060)
Daughter's Age	-.088	-.087 (.040)	-.091	-.120	-.117	-.113
	(.040)		(.039)	(.034)	(.034)	(.035)
Parent's Age	.024	.023	.024	.004	.001	.003
	(.024)	(.024)	(.024)	(.022)	(.023)	(.022)
Number of Siblings	-.321	-.328 (.092)	-.360	-.293	-.283	-.234
	(.091)		(.109)	(.078)	(.079)	(.087)
Parent's Earnings	-.033	-.032 (.016)	-.027	-.004	-.004	-.014
	(.016)		(.017)	(.012)	(.012)	(.016)
HH Wellbeing Index	.283	.289	.327	.472	.453	.413
	(.112)	(.113)	(.133)	(.094)	(.095)	(.093)
Grandfather's Education	-	-.039 (.050)	-	-	.069 (.039)	-
Grandmother's Education	-	.021 (.083)	-	-	.007 (.060)	-
Region Dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	1046	1046	1046	1457	1457	1457
R^2	0.225	0.226	0.224	0.205	0.206	0.201

Robust Standard Errors are in parentheses. Excluded instruments are: grandfather's education and grandmother's education. Controls for child's age, parent's age, and parent's earnings are included in the first stage for model (3). Controls for child's age, parent's age, parent's earnings, and HH Wellbeing Index are included in the first stage for model (4). Earnings are measured in 100 Egyptian Pounds/month.

Table (3): Intergenerational Mobility in 2006 (Rural vs. Urban Areas)

	A. Father- Son		B. Mother- Son		C. Father- Daughter		D. Mother- Daughter	
	Rural	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**
Constant	9.389	8.365	14.405	12.613	15.639	10.536	14.618	13.897
	(1.646)	(1.062)	(1.172)	(0.828)	(2.382)	(1.424)	(1.552)	(1.166)
Parent's Education	0.304	0.302	0.294	0.211	0.439	0.239	0.575	0.164
	(0.046)	(0.027)	(0.064)	(0.027)	(0.071)	(0.035)	(0.069)	(0.029)
Child's Age	-0.083	-0.064	-0.089	-0.060	-0.252	-0.048	-0.203	-0.094
	(0.043)	(0.028)	(0.034)	(0.024)	(0.078)	(0.048)	(0.057)	(0.043)
Parent's Age	0.026	0.053	-0.044	-0.007	0.006	0.038	-0.013	0.021
	(0.030)	(0.019)	(0.027)	(0.019)	(0.047)	(0.028)	(0.041)	(0.028)
Number of Siblings	-0.018	-0.068	-0.160	-0.081	-0.496	-0.314	-0.242	-0.416
	(0.109)	(0.074)	(0.089)	(0.062)	(0.156)	(0.114)	(0.133)	(0.094)
Parent's Earnings	-0.075	-0.004	-0.007	0.010	-0.112	-0.029	-0.640	0.003
	(0.066)	(0.015)	(0.058)	(0.006)	(0.097)	(0.014)	(0.165)	(0.009)
HH Wellbeing Index	0.264	0.269	0.375	0.395	-0.148	0.443	0.212	0.499
	(0.218)	(0.121)	(0.153)	(0.124)	(0.128)	(0.170)	(0.121)	(0.160)
Grandfather's	0.246	-0.043	0.244	0.132	0.175	-0.041	0.397	0.047
Education	(0.110)	(0.043)	(0.077)	(0.074)	(0.126)	(0.053)	(0.109)	(0.041)
Grandmother's	0.295	0.140	-0.359	-0.008	-0.303	0.050	0.218	0.024
Education	(0.177)	(0.054)	(0.238)	(0.032)	(0.176)	(0.088)	(0.281)	(0.060)
N	628	1067	932	1612	344	702	462	995
R^2	0.101	0.180	0.224	0.133	0.204	0.150	0.176	0.135

Robust standard errors are in parentheses. All the regressions are OLS regressions. HH Wellbeing Index is calculated separately for urban and rural areas.

Table (4): Descriptive Statistics in 1988

Variable	N	Mean	St. Deviation	Min.	Max.
Son's Education	1539	7.306	5.784	0	20
Daughter's Education	728	7.863	5.801	0	20
Father's Education	1125	3.500	4.966	0	20
Mother's Education	187	3.914	6.032	0	20
Father's Father's Education	1125	1.328	2.948	0	20
Father's Mother's Education	1125	0.213	1.168	0	12
Mother's Father's Education	187	2.310	4.274	0	20
Mother's Mother's Education	187	0.754	2.213	0	12
Son's Age	1539	23.791	5.699	18	80
Daughter's Age	728	21.435	3.648	18	40
Father's Age	1125	55.182	8.087	37	84
Mother's Age	187	47.283	7.375	32	70
Father's Earnings (Egyptian Pounds/ Month)	1125	76.665	152.415	0	2916.667
Mother's Earnings (Egyptian Pounds/ Month)	187	66.190	130.738	0	1168.333

Table (5): OLS and IV Estimates of Intergenerational Mobility in 1988

	(1) OLS (Not Controlling for Grandparents' Education)	(2) OLS (Controlling for Grandparents' Education)	(3) IV
Father-Son	.518	.508	.568
	(.028)	(.030)	(.067)
	N = 1410	N = 1410	N = 1410
Mother-Son	.428	.412	.530
	(.067)	(.069)	(.200)
	N = 203	N = 203	N = 203
Father-Daughter	.422	.427	.404
	(.035)	(.040)	(.066)
	N = 670	N = 670	N = 670
Mother-Daughter	.444	.429	1.264
	(.076)	(.071)	(.939)
	N = 121	N = 121	N = 121

Robust standard errors are in parentheses. Excluded instruments are: grandfather's education and grandmother's education. Controls for child's age, parent's age, parent's earnings, and region dummies are included in both stages, and in every OLS regression.

Table (6): Summary Statistics for Returns to Education 2006 Sample by Gender

Variable	N	Mean	St. Deviation	Min.	Max.
I. Males					
Years of Schooling	6012	9.478	5.596	0	20
Monthly Wage (in Egyptian Pounds)	6012	705.676	1795.244	10	66240
Age	6012	35.130	11.728	10	81
Experience	6012	17.813	12.308	0	72
Father's Schooling	6010	3.433	4.800	0	20
Mother's Schooling	5986	1.495	3.490	0	20
Reform	6012	0.582	0.493	0	1
II. Females					
Years of Schooling	1560	12.376	4.603	0	20
Monthly Wage (in Egyptian Pounds)	1560	564.121	1611.444	5.417	53568
Age	1560	35.917	11.034	10	66
Experience	1560	14.301	10.380	0	46
Father's Schooling	1559	5.736	5.639	0	20
Mother's Schooling	1558	2.971	4.693	0	20
Reform	1560	0.498	0.500	0	1

The sample includes individuals with positive weeks worked and positive wages in the reference 3 months.

Table (7): OLS Estimates of Returns to Education

		Constant	Schooling	Experience	Experience^2	Father's Schooling	Mother's Schooling	Region Dummies	N	R^2
I. Gender	*Males*	5.433	.030	.045	-.001	.021	.007	Yes	5985	0.182
		(.039)	(.002)	(.002)	(.000)	(.003)	(.004)			
	Females	4.892	.037	.066	-.001	.008	.014	Yes	1558	0.337
		(.084)	(.005)	(.006)	(.000)	(.004)	(.005)			
II. Region of Residence	*Rural*	5.366	.023	.035	-.001	.023	.001	No	2583	0.087
		(.043)	(.003)	(.003)	(.000)	(.004)	(.008)			
	Urban	5.195	.035	.051	-.001	.021	.009	No	3402	0.186
		(.041)	(.003)	(.003)	(.000)	(.003)	(.004)			
III. Location of Birth and Region of Residence	*Rural-Rural*	5.422	.021	.032	-.0005	.023	.000	No	2415	0.074
		(.042)	(.003)	(.003)	(.0001)	(.004)	(.008)			
	Rural-Urban	5.580	.039	.020	-.0002	.000	.028	No	274	0.127
		(.146)	(.009)	(.010)	(.0002)	(.010)	(.016)			
	Urban-Rural	5.547	.033	.021	-.0002	.015	-.011	No	142	0.052
		(.287)	(.015)	(.022)	(.0004)	(.019)	(.026)			
	Urban-Urban	5.202	.034	.052	-.001	.023	.008	No	3095	0.180
		(.044)	(.003)	(.004)	(.000)	(.003)	(.004)			
IV. Sector Ownership	*Public*	5.359	.041	.035	-.0003	.021	-.002	Yes	2477	0.163
		(.083)	(.004)	(.005)	(.0001)	(.004)	(.006)			
	Private	5.377	.029	.052	-.0008	.022	.015	Yes	3508	0.184
		(.049)	(.002)	(.003)	(.0001)	(.003)	(.005)			
V. Sector Activity	*Tradables*	5.272	.033	.058	-.0008	.021	.0185	Yes	1283	0.238
		(.076)	(.004)	(.006)	(.0001)	(.005)	(.008)			
	Non-Tradables	5.467	.025	.049	-.0007	.019	.006	Yes	3051	0.162
		(.050)	(.002)	(.003)	(.0001)	(.004)	(.005)			

Table (7) (Cont.): OLS Estimates of Returns to Education

		Constant	Schooling	Experience	Experience^2	Father's Schooling	Mother's Schooling	Region Dummies	N	R^2
VI. Social Security Coverage	*Formal*	5.594	.035	.028	-.0003	.021	.003	Yes	3206	0.151
		(.066)	(.003)	(.004)	(.0001)	(.003)	(.004)			
	Informal	5.467	.020	.046	-.0007	.014	.006	Yes	2779	0.104
		(.054)	(.003)	(.004)	(.0001)	(.004)	(.006)			
VII. Existence of Work Contract	*Formal*	5.444	.043	.028	-.0002	.021	.005	Yes	3144	0.170
		(.065)	(.003)	(.004)	(.0001)	(.003)	(.005)			
	Informal	5.473	.019	.049	-.0007	.013	.003	Yes	2841	0.116
		(.055)	(.003)	(.004)	(.0001)	(.004)	(.006)			

Robust standard errors are in parentheses. All regressions in sections II through VII are on the sample of males, with positive wages and positive weeks worked in the reference 3 months.

Table (8): OLS Estimates of Returns to Education in 1988 and 1998

	1988		1998	
	Males	**Females**	**Males**	**Females**
Schooling	.040	.035	.033	.040
	(.002)	(.005)	(.002)	(.005)
Experience	.108	.139	.043	.047
	(.005)	(.015)	(.002)	(.005)
Experience^2	-.001	-.001	-.0006	-.0004
	(.000)	(.000)	(.0001)	(.0002)
Father's Schooling	.010	.014	.009	.003
	(.004)	(.006)	(.003)	(.003)
Mother's	-.005	.014	.018	.012
Schooling	(.007)	(.008)	(.004)	(.004)
Constant	2.141	1.216	4.909	4.482
	(.095)	(.255)	(.035)	(.074)
Region Dummies	Yes	Yes	Yes	Yes
N	3478	881	3759	1031
R^2	0.324	0.361	0.286	0.455

Sample consists of individuals with positive weeks worked and positive wages in the reference 3 months.

Table (9): Regions' Coefficients

	Alexandria and Suez Canal	Urban Lower Egypt	Urban Upper Egypt	Rural Lower Egypt	Rural Upper Egypt
I. Intergenerational Mobility:					
Father-Son	-.255	-.444	-.211	-.993	-1.474
	(.376)	(.414)	(.358)	(.407)	(.437)
Mother- Son	-.758	-1.276	-.786	-2.384	-2.313
	(.334)	(.343)	(.308)	(.349)	(.362)
Father-Daughter	-.582	.097	-1.036	-1.967	-3.179
	(.468)	(.465)	(.500)	(.540)	(.598)
Mother-Daughter	-.586	-.391	-1.489	-2.554	-3.694
	(.386)	(.403)	(.416)	(.446)	(.501)
II. Returns to Education:					
Males	.002	-.188	-.192	-.220	-.281
	(.034)	(.035)	(.032)	(.030)	(.032)
Females	-.170	-.297	-.190	-.407	-.403
	(.055)	(.053)	(.051)	(.062)	(.098)

Robust standard errors are in parentheses. Excluded region is Greater Cairo. Regressions for mobility are OLS regressions of child's education on parents' education including controls for child's age, parent's age, number of siblings, parent's earnings, HH Wellbeing Index, grandfather's education, and grandmother's education. Regressions for returns to education are OLS regressions of log wage on schooling, experience, and experience squared including controls for father's schooling and mother's schooling.

Appendix (A): Assigning Years of Schooling to Education Categories

Years of schooling are assigned based on the education variable categories. For children and parents, the categories and assigned years of schooling are given in table (A1). For grandparents, their education variable comes from a different question in the survey which asks each interviewed individual (in this case the parent) about the education attainment of his/ her parents (i.e. the grandparents). The categories for this question and the assigned years of schooling are given in table (A2).

Table (A1): Years of Schooling for Child's and Parent's Education

Education Variable Categories	Assigned Years of Schooling
Illiterate	0
Read and Write	3
Primary	6
Preparatory	9
General Secondary	12
Vocational Secondary (Agricultural) (3 years)	12
Vocational Secondary (Industrial) (3 years)	12
Vocational Secondary (Commercial and others) (3 years)	12
Vocational Secondary (5 years)	14
Post secondary	14
University (4 years)	16
University (5 years)	17
Postgraduate (Diploma)	18
Postgraduate (Master)	20
Postgraduate (PhD)	24

Table (A2): Years of Schooling for Grandparents' Education

Education Variable Categories	Assigned Years of Schooling
Illiterate	0
Read and Write	3
Primary	6
Preparatory	9
General/ Technical Secondary	12
Above Intermediate	14
Higher Institute	16
University	16
Postgraduate	20

Appendix (B): Principal Components Analysis (PCA) to Construct HH Wellbeing Index in 1998

The HH Wellbeing Index is constructed using 44 household-level variables. These variables reflect various aspects of the family wealth. Definitions of the variables are presented in Table (B1). Table (B2) shows the eigenvalues and proportions explained by the principal components. Table (B3) shows the weights used to construct the index based on the first principal component.

Table (B1): Definitions of Variables included in the HH Wellbeing Index

Variable Name	Definition	Notes
crowding	HH size/ Number of rooms	
fridge	Number of fridges	
freezer	Number of freezers	
dishwasher	Number of dishwashers	
colortv	Number of color TVs	
bwtv	Number of black and white TVs	
video	Number of videos	
ac	Number of air conditioners	
microwave	Number of microwaves	
cooker	Number of cookers	
kcooker	Number of kerosene cookers	
fan	Number of electric fans	
waterheater	Number of water heaters	
heater	Number of heaters	
sewing	Number of sewing machines	
iron	Number of irons	
radio	Number of radios	
washing	Number of washing machines	
camera	Number of cameras	
bicycle	Number of bicycles	
motorcycle	Number of motorcycles	
car	Number of private cars	
taxi	Number of taxis	
truck	Number of trucks	
area	Total area of dwelling in squared meters	
telephone	Ownership of land line	1 = yes, 0 = No
remitabroad	HH non-labor income from overseas remittances from relatives	1 = yes, 0 = No
remitin	HH non-labor income from remittances from relatives inside Egypt	1 = yes, 0 = No
realestrent	HH non-labor income from letting owned property	1 = yes, 0 = No
landrent	HH non-labor income from letting agricultural land	1 = yes, 0 = No
charity	HH non-labor income from financial help from religious organizations	1 = yes, 0 = No

Table (B1): Definitions of Variables Included in the HH Wellbeing Index (Cont.)

Variable Name	Definition	Notes
aid	HH non-labor income from financial help from governmental organizations and NGOs	1 = yes, 0 = No
interest	HH non-labor income from interest or dividends on savings and shares	1 = yes, 0 = No
pension	HH non-labor income of pension	1 = yes, 0 = No
emplfund	HH non-labor income from employees- help fund	1 = yes, 0 = No
othrinc	Other types of non-labor income	1 = yes, 0 = No
own	Ownership of dwelling	1 = own, 0 = other
walls	Material of inside walls	1 = brick, stone, and concrete; 0 = other
floor	Material of floor	1 = tiles or cement or parquet or wood; 0 = other
roof	Material of roof	1 = reinforced concrete; 0 = otherwise
water	Source of water supply	1 = tap water; 0 = other
trash	Method of waste disposal	1 = public waste collector; 0 = other
sanitation	Type of sanitation facilities	1 = toilet connected to public network; 0 = other
illumination	Source of illumination	1 = electricity; 0 = other

Table (B2): Principal Components Analysis, Eigenvalues and Proportions Explained

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	7.16194	4.6514	0.1628	0.1628
Comp2	2.51055	0.494972	0.0571	0.2198
Comp3	2.01557	0.637176	0.0458	0.2656
Comp4	1.3784	0.052463	0.0313	0.297
Comp5	1.32593	0.131683	0.0301	0.3271
Comp6	1.19425	0.02594	0.0271	0.3542
Comp7	1.16831	0.045973	0.0266	0.3808
Comp8	1.12234	0.035896	0.0255	0.4063
Comp9	1.08644	0.026707	0.0247	0.431
Comp10	1.05974	0.026565	0.0241	0.4551
Comp11	1.03317	0.019981	0.0235	0.4786
Comp12	1.01319	0.009814	0.023	0.5016
Comp13	1.00337	0.009031	0.0228	0.5244
Comp14	0.994343	0.023137	0.0226	0.547
Comp15	0.971206	0.020214	0.0221	0.5691
Comp16	0.950992	0.026276	0.0216	0.5907

Table (B2): Principal Components Analysis, Eigenvalues and Proportions Explained (Cont.)

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp17	0.924716	0.026751	0.021	0.6117
Comp18	0.897964	0.018916	0.0204	0.6321
Comp19	0.879049	0.008452	0.02	0.6521
Comp20	0.870597	0.034272	0.0198	0.6719
Comp21	0.836325	0.004017	0.019	0.6909
Comp22	0.832308	0.033678	0.0189	0.7098
Comp23	0.79863	0.013448	0.0182	0.7279
Comp24	0.785183	0.019758	0.0178	0.7458
Comp25	0.765424	0.042778	0.0174	0.7632
Comp26	0.722646	0.015557	0.0164	0.7796
Comp27	0.70709	0.014792	0.0161	0.7957
Comp28	0.692298	0.006975	0.0157	0.8114
Comp29	0.685323	0.018839	0.0156	0.827
Comp30	0.666484	0.017175	0.0151	0.8421
Comp31	0.649309	0.037185	0.0148	0.8569
Comp32	0.612124	0.01439	0.0139	0.8708
Comp33	0.597735	0.023819	0.0136	0.8844
Comp34	0.573916	0.011133	0.013	0.8974
Comp35	0.562783	0.017251	0.0128	0.9102
Comp36	0.545532	0.011086	0.0124	0.9226
Comp37	0.534446	0.03123	0.0121	0.9348
Comp38	0.503216	0.040292	0.0114	0.9462
Comp39	0.462924	0.02548	0.0105	0.9567
Comp40	0.437444	0.019074	0.0099	0.9667
Comp41	0.41837	0.01889	0.0095	0.9762
Comp42	0.399481	0.016176	0.0091	0.9853
Comp43	0.383305	0.117677	0.0087	0.994
Comp44	0.265628	.	0.006	1

Table (B3): Weights Based on First Principal Component

Variable	Weight	Unexplained	Variable	Weight	Unexplained
crowding	-0.1135	0.9077	*taxi*	0.021	0.9969
fridge	0.2653	0.4958	*truck*	0.0224	0.9964
freezer	0.1433	0.8529	*area*	0.0621	0.9724
dishwasher	0.0806	0.9535	*telephone*	0.2471	0.5628
colortv	0.2792	0.4417	*remitabroad*	0.0332	0.9921
bwtv	-0.1229	0.8918	*remitin*	-0.0338	0.9918
video	0.2021	0.7074	*realestrent*	0.0756	0.959
ac	0.1318	0.8756	*landrent*	0.0381	0.9896
microwave	0.0471	0.9841	*charity*	-0.0517	0.9809
cooker	0.2289	0.6249	*aid*	-0.0166	0.998
kcooker	-0.1511	0.8364	*interest*	0.1097	0.9138
fan	0.2263	0.6331	*pension*	-0.0028	0.9999
waterheater	0.2722	0.4694	*emplfund*	0.0041	0.9999
heater	0.1592	0.8184	*othrinc*	0.0058	0.9998
sewing	0.1389	0.8617	*own*	-0.1237	0.8903
iron	0.2573	0.526	*walls*	0.0972	0.9324
radio	0.1872	0.7491	*floor*	0.2083	0.6894
washing	0.2214	0.6488	*roof*	0.2096	0.6853
camera	0.1833	0.7593	*water*	0.1535	0.8312
bicycle	0.0817	0.9522	*trash*	0.0357	0.9909
motorcycle	0.0287	0.9941	*sanitation*	0.192	0.736
car	0.1707	0.7913	*illumination*	0.0802	0.9539