THE IMPACT OF REMITTANCES ON EDUCATION IN JORDAN, SYRIA AND LEBANON

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Abstract

This paper uses micro data from three households' surveys conducted in three neighboring countries in the Eastern Mediterranean (Jordan, Syria, and Lebanon) to study the impact of migrant remittances on education attendance and attainment. The paper relies on a model that depicts the relationship between migration and remittances from one end and human capital formation represented through education from the other. Empirical results show that migrant remittance receipt has a positive effect on education attendance. This finding is obtained while controlling for other socio-economic determinants of schooling behavior, and is robust to censorship and endogeneity bias. Results also show that the magnitude of the remittance impact on both education outcomes is larger for men compared to that of women in Jordan and Syria, but lower in Lebanon. This shows that in some countries around the region gender dimensions are still important in the household's investment decisions in the sibling's human capital.

ملخص

تستخدم هذه الورقة البيانات الجزئيـــــة من الاستقصاءات الثلاثة الخاصة بالأسر التي أجريت في ثلاث دول مجاورة في شرق البحر المتوسط (الاردن، سوريا، ولبنان) لدراسة تأثير تحويلات المهاجرين على التعليم من ناحية الحضور والتحصيل. تعتمد هذه الورقة على النموذج الذي يصور العلاقة بين الهجرة والتحويلات المالية من ناحية وتكوين رأس المال البشري من خلال التعليم ممثلة من ناحية أخرى. تبين النتائج التجريبية أن استلام المهاجرين للتحويلات المالية له تأثير إيجابي على التعليم من ناحية الحضور. يتم الحصول على هذه النتيجة في حين تثبيت المحددات الاجتماعية والاقتصادية الأخرى من السلوك المدرسي، وقوية للرقابة والتحيز. أظهرت النتائج أيضا أن حجم تأثير التحويلات على كل من نتائج التعليم أكبر بالنسبة للرجال مقارنة بما كان عليه من النساء في الأردن وسوريا، ولكن أقل في لبنان. هذا يدل على ان في بعض البلدان في جميع أنحاء المنطقة لا تزال الناحية النوعية مهمة في القرارات الاستثمارية للأسر في رأس المال البشرى.

1. Introduction

The Middle East and North Africa (MENA) region is witnessing the migration of its most educated labor that is seeking higher returns to compensate their households' initial investment in education. This brain drain phenomenon causes a loss of highly productive labor force that is difficult to replace, especially for the countries with current economic hardship. However, in return, the MENA region attracts a large share of the world's remittance inflows. In effect, 12% of global remittances were directed towards the region in 2006, according to the World Development Indicators data. This percentage amounts to $25 billion, an increase from the $15 billion recorded in 2001. These figures suggest that such inflows could play an essential role in the growth and development process of the region if invested properly, especially in the region's essential asset of human capital. In the spirit of such context, this paper will focus on the different mechanisms that such private transfers follow to impact education choices and consequently affecting the life of young people in the region.

We focus on three countries in the Eastern Mediterranean: Jordan, Syria and Lebanon. These countries are among the highest recipients of remittances in the world in proportion to their GDP. A recent World Bank report[1] estimated that Lebanon and Jordan ranked respectively 8th and 10th in the world as top-remittance receivers proportionally to GDP. Remittances were estimated in 2007 to account for 22.8% of Lebanon's GDP and 20.3% of Jordan's GDP. Figures for Syria remain not depicted due to lack of data, yet remittances in Syria are estimated to be substantial given the large migrant population of the country. It should be noted that the literature usually deals with officially recorded remittances from countries' balance of payments reports. The true size of such transfers, including unrecorded flows from both formal and informal channels, is believed to be larger. This paper will focus on the different mechanisms that such significant private transfers follow to impact human capital formation in Jordan, Lebanon and Syria.

This paper will examine the direct impact of migration and remittances on human capital, especially for young females. The dialectic in this paper will be that the direct impact of migration and remittances on education can have both a negative and a positive effect. The negative impact resides in the fact that migration returns are sometimes higher than the returns from investing in schooling and higher education degrees. Therefore, this entails negative consequences on educational attainment of children and adults. In effect, individuals, especially youth, might opt to migrate directly after schooling in order to send back remittances to their family as soon as possible, and thus will choose to forgo higher education. In addition, migration is becoming a more attractive decision in non-oil MENA countries, by sending youth abroad, especially to Arab gulf countries. On the other hand, the absence of migrants from their families will entail additional work on other members of the household in order to secure the labor shortage or the forgone income that the migrant could have earned. The problem occurs when present household members will have to quit schooling in order to fill in such shortages.

Migrant remittances have also a positive impact on educational attainment through two main mechanisms. First, remittances sent back to migrant households could contribute in alleviating liquidity constraints and thus encourage household heads to invest in their dependant's education. Second, higher educational attainment is usually positively correlated with income. Therefore, obtaining higher education degrees would increase the probability in reaping higher returns from migration by obtaining better-profiled positions in host countries. This will encourage youth to opt for continuing education and obtaining higher degrees. This case applies to countries with higher skilled population. In this paper, the research expects the

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[1] Migration and Remittances Factbook, The World Bank

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above-described impact to be higher for Lebanon whose population is more educated and whose migrants usually hold university degrees. However, this is not necessarily the case of Syria and Jordan that have more blue-collar migrant and relatively lower labor skills as compared to Lebanon.

The remainder of the paper is organized as follows: Section 2 provides a literature review on the impacts of migrant remittances on households. Section 3 details our empirical methodology, where we present the various human capital formation model we rely on for our econometric estimations. Section 4 presents an overview of our micro data sources in the three countries under study. Section 5 details our estimation results for the various models of educational attendance and attainment, and Section 6 concludes.

2. Literature Review: Remittances and Human Capital Formation

Remittances are usually linked to the migrant's ties with his family, as postulated by Elbadawi and Rocha (1992) in "the endogenous migration approach". Cox et al. (1997) specify that altruism and exchange are the main catalysts of remittances. Johnson and Whitelaw (1974) emphasize the role of altruism and Lucas and Stark (1985) talk about mutual caring. Agarwal and Horowitz (2002), in a study on Guyana, find that altruism is the main incentive behind remittances.

Cox (1987), Cox and Rank (1992) and Cox et al. (1997) argue that altruism is not the main motivation behind remittances. Lucas and Stark (1985) introduce the concept of "enlightened self-interest" to refer to the mixture between altruism and self-interest as a motivation for remittances. Haddinott (1994) and Chami et al. (2003) view remittances as a business entity where the relation between its members is considered as a contract. Poirine (1997) talks about the existence of an unofficial loan contract between the migrant and his household, and presents it as a motivation for remittances.

Recent literature focuses on the insurance motivation of remittances. Amuedo-Dorantes and Pozo (2004), and Choi and Yang (2007) focus on the fact that by sending remittances, the migrant is being risk-averse in the face of economic uncertainty, and that remittances will help diversify the risks faced by the household and the migrant.

On the effects of remittances, Chami et al. (2003) find that remittances are spent on consumption, with a smaller fraction going to savings and investments. They see that those investments are not "necessarily productive" as they are usually targeted towards housing and lands. Lipton (1980), Perwais (1980), Sofranko and Idris (1999) and Lopez and Seligson (1991), all agree that remittances are spent on consumption and are not channeled towards productive investments.

However, more recent literature stresses the importance of remittances on economic development, through spending on investments. Adams and Cuecuecha (2010) prove that remittances recipients in Guatemala marginally spend more on one investment good, education. They state that this is consistent with the permanent income theory that finds that a higher marginal propensity to invest is found with transitory income or remittances than with permanent income. Adams and Cuechuescha base this on previous findings by Adams (1998), who sees that remittances allow for more marginal spending on investment goods than on consumption, leading to positive economic development. Osili (2004) observes that, in Nigeria, a significant part of remittances is invested in housing.

Shultz (1960), Becker (1964) and Mincer (1974) see that education is an investment, which will yield returns in the future. In their study on El Salvador, Cox Edwards and Ureta (2003) determine the significant positive impact of international remittances on school retention rates. Yang (2005) concludes that, for the Philippines, positive exchange rate shocks significantly increase remittances spending on education. Hanson and Woodruff (2003) found

that remittances do have a positive impact on 10-15 year old girls in Mexico. Borraz (2005) finds that remittances have a positive effect on schooling for children with less educated mothers. Mansuri (2006) determines the positive impact of remittances on children's education in Pakistan, especially for girls. Calero et al. (2006) find that school enrollment is increased for girls in Ecuador's rural areas, and that child labor is decreased, through remittances.

However, a contradictory set of findings has emerged, indicating a somewhat negative impact of remittances on children's educational attainment. Mckenzie and Rapoport (2006) determine a negative impact of migration on education attainment and attendance for 12 to 18 year-old boys 16 to 18 year-old girls, in Mexico. Nevertheless, they find that it is encouraging for younger girls in rural areas, with uneducated mothers. López-Córdova (2005) also proves that remittances affect negatively school attendance for children aged 15 to 17 years old, but positively that of those aged 6 to 14 years.

Many economists analyzed the links between remittances and labor supply. Fajzybler and Lopez (2006) talk about the "income effect" that increases demand for leisure and decreases labor force participation. However, they find that "substitution effect" will increase wages, thus labor force participation in areas with high migration rates.

Rodriguez and Tiongson (2001) determine that households in Manila, who have migrants abroad, decrease the likelihood of working for both men and women. Acosta (2006) found the same results for El Salvador. Matshe and Young (2004) found that in Zimbabwe, remittances decrease non-farm labor participation.

For the case of Nicaragua, Funkhouser (1992) finds that labor force participation is reduced when remittances increase from 0 to 100$, but self-employment hours are increased. Amuedo-Dorantes and Pozo (2005) estimate that, in the case of Mexico, work hours may increase or decrease depending on the nature of the work, the location and the gender of the recipients.

2.1 Channels of impact of remittances on education

The impact of remittances on education outcomes is not straightforward and can be exerted over several channels especially if it is viewed from a broader perspective of the migration phenomena. The sign of the impact cannot be determined a priori as it varies depending on the channel through which such impact manifests itself.

The first channel of impact is a direct channel where remittances sent back from migrants are believed to alleviate household liquidity constraints and participate in overcoming borrowing limitations. Hence it encourages receiving households to invest in their dependant's education. This claim has been endorsed by recent empirical works such as Adams (1991, 2010)[2] who found that remittances did free other resources for different types of investments. He argued that households receiving remittances spend proportionally less on consumption goods and more on human capital including education if compared to non-receiving peers.

The second channel is a result of the change in the household composition and the linkages to shadow wages. In effect the loss of household members to migration, depicted in the paper through remittances[3], increases shadow wages since labor becomes scarcer and consequently has a higher opportunity cost. According to Becker (1964), an increase in shadow wages coupled with a decrease in prices of goods will result in altering the household spending behavior. In the context of education, the absence of household members and therefore the absence of supplementary labor could indicate a loss of an additional source of income or

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[2] A more thorough discussion on the literature of migration and remittances effects is found in the literature review section.

[3] Migration data is unavailable in the three household surveys.

additional work at home. If the opportunity cost of loosing such labor is higher than the returns from migration a household may decide to stop the schooling of certain members as to fill the labor gap. Such composition change could also alter the spending behavior of the household, which among others could cut on education; leading to potential decreases in the quality of schooling received.

Mora and Taylor identified a third channel (2006) as being information, preferences, and uncertainty and risk. On the information side, migration plays the main role rather than remittances. Migration potentially relaxes information constraints since migrants could introduce households to new products, services and technologies that are non-existent in local communities. Therefore, new traits of consumption and investment are introduced into families' decisions with potential spillover effect over the whole local community. This leads us to talk about preferences. Migrants help bringing local communities into the global economy. The linkages created influence local demand as new services and products are introduced. Such influence over demand patterns intensifies when migrant networks become larger and wealthier. Indeed, migrant networks reduce transaction costs, as they become more integrated into host countries, constituting attraction poles for members in the home communities to migrate to. This is increasingly the case for Jordan, Lebanon and Syria who are countries with large Diasporas across the world. The implication on education outcomes is not determined. On the one hand, these networks do encourage young member of the local community to migrate for the purpose of continuing education and even lower the costs of migration. It is common to observe such type of migration from rural to urban areas when individuals are at a high school level due to potential non-existence or lack in quality of these education institutions in the home economy; and from home to foreign countries for individuals at university levels. On the other hand, those migration networks could have negative implications on education attainment of resident youth. By lowering migration costs, migration returns could become larger than the returns from investing in education. This potentially discourages youth from continuing education, especially at higher levels, and pushes them to migrate in pursuit of higher financial returns. This phenomenon is accentuated when the decision of migrating and remitting is considered as a collective family decision where remittances are viewed as a diversification in household's income sources. In this case youth might opt to drop out of the education system and migrate in order to send back remittances the earliest possible opportunity. As for the uncertainty and risk channels, these are related to the frequency of remittances and the levels of risk that households are willing to take. In the literature, remittances are usually perceived as a counter-cyclical income source but no agreement exists on their frequency. A permanent flow of remittances increasingly encourages households to become more entrepreneurs and hence invest in goods and services that may require additional recurrent future spending. In the case of intermittent remittances, households may refrain from any investments in favor of spending on more basic consumption or increase savings. The magnitude of that will depend on the degree of the household's risk aversion, the extent of its budget constraint, and its perception of the good or service under consideration. From this perspective, the impact of remittances on education becomes linked to the intensity and certainty of the remittances flows along with households' perception of risk and necessity of investing in human capital.

3. Empirical Methodology

3.1 The school attendance model

The research turns in this section to highlight the specifications of the first human capital model used in this study with School Attendance as an outcome measure. This model focuses mainly on looking at the impact of migrant remittances on school attendance. To do so, the research resorts to a probit model inspired by Mckinsey and Rapoport (2006), Fajnzylber and Lopez (2006) and Holmes (2003), which takes the following form:

$$Ed_{ij} = \alpha_0 + \alpha_1 H_j + \alpha_2 X_i + \alpha_3 Pa_i + \alpha_4 C_{ij} + \alpha_5 R_{ij} + \alpha_6 A_j + \mu_{ij} \tag{1}$$

In equation (1) Ed_{ij} captures education attendance. This variable takes the form of a binary variable for whether individual i from household j is currently enrolled in school/university. This is indeed a dichotomous observed variable as opposed to the unobserved decision function. On the other hand, H_j is a vector of household characteristics and demographics, X_i is a vector of individual's characteristics Pa_i is a vector of the parent education, C_{ij} is a vector of regional controls, A_j is a vector of variables reflecting assets owned by households and dwelling size used to control for wealth and R_{ij} the variable of focus is a binary covariate capturing individual being a member of a household receiving remittances. Having proposed equation (1) earlier, the probit model under scrutiny is more formally written in the following way:

$$\Pr(Ed_{ij} = 1/H_j, X_i, Pa_i, C_{ij}, R_{ij}, A_j) = \phi(\alpha_0 + \alpha_1 H_j + \alpha_2 X_i + \alpha_3 Pa_i + \alpha_4 C_{ij} + \alpha_5 R_{ij} + \alpha_6 A_j + \mu_{ij}) \tag{2}$$

Where: $Ed_{ij} = 1$ if $Ed_{ij}* > 0$, and $Ed_{ij} = 0$ otherwise.

As mentioned earlier, it is expected that the impact of those foreign private transfers is potentially stronger for higher education especially that the countries in perspective are middle-income countries that apply strict compulsory primary education laws. Hence the probit model described in equations (1) and (2) allows depicting the influence exerted by remittances on school/university attendance for youth defined here by the selected sample of individuals aged 15 to 24. In effect, youth is a very active group in society that is usually prone to abandon education, especially at university level, to access the labor market or migrate when economic, social or political circumstances are unfavorable.

2.2 Control variables

As indicated in equation (2), the human capital model for school attendance used in this research is augmented by diverse sets of vectors of independent variables. The broadness in the nature of these covariates will enable the study to better isolate the impact of remittances on schooling attendance and thus control for other factors. First on household and individual levels, the model includes covariates related to family composition including number of siblings, number of adults and family size along with controlling for marital status. Since education choices are believed to be decided collectively in the family, household demographics and characteristics have a direct impact on school attendance and thus are controlled for. Second, on regional controls, the model through constructing binary variables that capture the geographical area of residency for each individual captures any variation on a regional dimension. For that the study divides each of the three countries in 4 or 5 broad regions. Third, parents' education is also captured in the proposed model. In effect, it is expected that parents with higher education influence positively their children's schooling regardless of remittances. From this perspective, the paper has constructed covariates reflecting education attainment for both the father and the mother in each household. Holmes (2003) argues that parent's education background also serves as a predictor of the parent's market earnings potential that could be invested in the sibling's schooling. Thomas (1990, 1994) indicates that educated mothers have increased bargaining power in the household and thus will influence the allocation of resources towards children and their human capital more than their husbands usually do. In addition, mother education status could proxy wealth especially if female education is perceived as a luxury commodity. As for father's educational background, it was emphasized in human capital and earnings model such as Al Samarrai and Reilly (2008) who argued that highly educated fathers could exploit informal

networks to secure better paid jobs for their siblings. The data available does not allow controlling for the ability of individuals. This constitutes a shortcoming of the datasets since a failure to control for innate ability might bias estimates upward. Indeed, ability is positively correlated with the level of education. According to Al Samarrai and Reilly (2008) the literature has a consensus about the direction of the bias but to a lesser extent on its magnitude. Card (1999) argues that the magnitude of this bias is modest. This being said, the only information available for the study to proxy innate ability is parents schooling background estimated by mother and fathers' acquired years of education or highest schooling level attained. Such proxy has previously been used in the literature such as the mentioned Al Samarrai and Reilly (2008) paper. Fourth, education behavior is largely affected by the wealth status of households. Rich families have usually sufficient means to send their children to school unlike their poor counterparts. Therefore, it is imperative to control for the positive correlation between wealth status and education outcome. The study has opted to use asset ownership and dwelling size as a measure of wealth that controls for the impact of household economic status on schooling decisions. The study argues that household ownership status of different assets[4] is less likely to be affected by current remittances since assets are much less cyclical and volatile than expenditure or income that do not reflect necessarily past savings especially when a cross-sectional data is used. Additionally income data is often unreliable in household surveys since individuals usually tend to under-report their income from different sources for several reasons mainly related to taxation fears and preferences for not indicating wealth status[5]. While expenditure levels are affected by remittance inflows and thus using such variable will not be helpful in looking at selection into remittance recipients as argued by Acosta (2006). Therefore, assets are better able to reflect past savings and wealth status in general. The study follows Lubotsky and Wittenberg (2005) in listing a set of variables reflecting household ownership of certain assets to measure wealth. Depending on the availability of data and country context the study has selected the following wealth controls: ownership of computer, ownership of land, ownership of car, ownership of mobile phone, dwelling size and number of rooms, and access to private education. For further justification for the usage of such wealth proxies, the study captures the distribution of ownership of such assets and the dwelling size by expenditure quintiles[6]. The study found an ascending trend with the rate of ownership (or average size of dwelling) increasing with upper quintiles. This signals that these covariates are a good proxy for the wealth of individuals' family.

2.3 The school attainment model

Looking at education attainment determinants would ideally involve examining the final level of schooling that any individual of the sample have attained or completed. It is desirable to observe household and community characteristics that surrounded each individual when schooling decisions related to their education completion were being undertaken. However cross sectional surveys are usually limited in providing such information for the first generation, which refers to adult members that are other than siblings. Essential information is hence missing such as whether they have lived in households with migrant members or whether their respective families received any remittances from abroad. Indeed, factors

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[4] One of the data limitations is that the surveys do not indicate whether these assets were purchased prior of after receiving remittances. This could raise concerns over the correlation between assets and remittances. However as the paper argues these assets are more reliable wealth indicators than income or expenditure as they are less cyclical, have a lower probability of being correlated with remittance receipt, and better reflect past savings (asset information are better reported in the surveys also). Additionally the paper has tested for their relevance by looking at ownership status of these assets by expenditure quintiles (refer to the following text for further explanation).

[5] Preliminary statistics have been constructed for income data and showed inconsistencies in the figures due to misreporting and non-reporting. This problem was much less acute for expenditure data.

[6] Results are not presented in this study but are available upon request.

determining the schooling decisions of these adults are unknown and therefore controls for different characteristics such as wealth, migration status, parents' education and others becomes impossible. Such data limitation implies restricting the sample to children and individuals of school/university age or more precisely those who are residing with their families. This is an additional reason for setting an upper age limit of 24 years on the sample used in the empirical model. Utilizing such sample in the research has its clear advantages. In effect, reverting to the above individuals as a unit of observation allows for the use of information about the present parental, household and community characteristics and thus the background in which schooling decisions have been made. Holmes (2003) argues that another advantage for using such sample resides in the idea that many developing countries, especially middle income ones, are experiencing rapid expansion and structural changes in their education systems and therefore birth cohort differences are evident. Hence, the study of current child schooling becomes most relevant to policy.

The second feature resides in the fact that the education attainment model under scrutiny only allows for specific estimations techniques to be undertaken. In effect, least squares estimations techniques will result in biased and inefficient estimations. This is due to the fact that the sample distribution under scrutiny is not normal; the dependant variable education attainment is discrete in nature rather than continuous; and left censoring is imposed on the sample since education outcome cannot be negative[7]. Earlier work in the education literature has used least squares in various papers that examined education attainment determinants. Examples can be given from Birdsall (1980, 1985) for respectively urban Columbia and Brazil; Behrman and Wolfe (1984, 1987) in correspondingly one comprehensive study on several developing countries and a second one on Nicaragua; Chernichovsky (1985) for rural Botswana; Jamison and Lockheed (1987) for Nepal; Parish and Willis (1993) for Taiwan; Barros and Lam (1993) for Brazil; Knight and Shi (1996) for China; Case and Deaton (1996) for South Africa; and Handa (1996) for Jamaica. None of these papers looked at remittances as a determinant of school attainment.

Having rejected lest squares estimates, this brings the study to the third feature of this education attainment model. Glick and Sahn (2000) specify that schooling attainment is the outcome of a series of ordered discrete choices. This implies that the choice of investing in education for an additional year or level could be different in nature for different levels of the schooling cycle. Therefore, the ordered nature of the above education outcome and the research's interest in looking at the probabilities of such choice to occur drives the research to adopt a different estimation technique such as the ordered probit model. However, using the current generation of youth as a sample (individuals aged [15-24]) to analyze schooling determinants entails accounting for individuals who are currently still enrolled at school along with those who have actually finished. This is a problem of the sample being right censored. Hence, treating the completed attainment levels for students who remain at school similarly to individuals who finished or dropped out will lead to selection problems and thus biased estimators. By doing so, the ordered probit model will not differentiate between the likelihood function of the censored observations (individuals still at school) versus the uncensored ones (those who left school). This means that the model will only capture the current attainment for people remaining at school and will not take into account the fact that these students will most probably complete additional years of education. Hence, the estimated coefficients for the determinants of school completion will be biased and their impact will be inaccurate under a common ordered probit model. Any estimation technique needs to account for this right-censoring issue. In effect, the work of King and Lillard (1983, 1987) undertaken in the literature on economics of education, has made it possible to

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[7] Individuals with no education will be attributed with a 0 to reflect their attainment level or 0 years of schooling accumulated and therefore cannot take a negative value.

establish such a technique that accounts for right censoring. This estimation methodology is called the censored ordered probit. The literature on education and human capital has mainly concentrated on topics associated with returns from education or issues related to examining school attendance determinants. However, efforts and research led by King and Lillard (1983, 1987) and Greene (1993) resulted in the improvement of various econometric techniques especially those linked to ordered outcome models. Although these models were not necessarily related to the literature on human capital, nevertheless such improvements encouraged recent papers in the field of education to increasingly start exploring various topics related to educational attainment. Among these recent and focused empirical works are McKenzie and Rapoport (2006) and Hanson and Woodruff (2003) who explored schooling attainment determinants in Mexico; Maitra (2003) and Holmes (2003) who adopted censored ordered probit frameworks to examine the impact of household characteristics on schooling for respectively Bangladesh and Pakistan; while Ranasinghe and Hartog (2002) conducted an empirical study related to Sri Lankan education. It should be noted that the literature has not emphasized such work in the Middle East and North Africa region. To the best of the author's knowledge, no empirical work has yet been conducted on determinants of education attainment and school completions and relevant impact of remittances for countries in that region. Hence, the value added of this study that comes as one of the first empirical research tackling such topic in MENA countries.

2.4 The censored ordered probit for estimating education attainment

The idea behind undertaking the censored ordered probit is to estimate the final year of schooling or education level that current students, representing the censored sample, will most likely attain. This is made possible when referring to the same set of characteristics as individuals who finished schooling since comparisons could then be drawn. Once this theoretical estimate is determined, the model will be able to combine the probability functions of both sub-samples and provide an estimate for the impact of each school determinant on education attainment. A censored ordered probit model therefore constructs two likelihood functions. The first function will reflect the schooling behavior of individuals in the uncensored sample (individuals who completed schooling). As for the second function, it will reflect the likelihood for education attainment of censored observations (students still currently enrolled). Both functions will include the same school determinants. Indeed, these covariates will be similar to the ones used in the school attendance model of equations 1 and 2. To summarize the idea mathematically, the study draws its model on schooling attainment from the general "treatment effect" model proposed in Acosta (2006). The reduced linear form of the human capital model reflecting education attainment as outcome can be written in the following form:

$$S_i = \beta_0 + \beta_1 R_{ij} + \beta V_{ij} + \varepsilon_i$$

(3)

Where S_i indicates the highest schooling level completed by individual i and R_{ij} is a dummy variable taking the value of 1 if the individual is a member of a household j that receives remittances. Additionally, V_{ij} summarizes a set of vectors related to covariates describing individual, household, community, regional, and wealth characteristics. Applying the censored ordered probit framework to equation (7) gives us the following latent education attainment function:

$$S^*_i = \beta X_{ij} + \varepsilon_i$$

(4)

Where the desired level of schooling S* is not observed. For simplicity, the study adopts X_{ij} as the vector representing all the control variables mentioned previously for individual i of household j. Additionally, it is assumed that the error term ε_i is normally distributed.

For unconstrained observations, a discrete level of completed schooling denoted as S is perceived and where:

$S = 0$ if $S^* \leq \mu_0$ (5)

$S = 1$ if $\mu_0 < S = \mu_1$

$S = 2$ if $\mu_1 < S^* = \mu_2$

$S = U$ if $\mu_{u-1} = S^*$

Where S is the last completed schooling grade attained by the individual currently enrolled and μ_J are the threshold parameter denoting the transition from one school grade to another with U denoting the upper school grade[8]. Following equation (5), the probability that the latent schooling function S* falls within a certain threshold bracket can be written as:

Prob. (S = 0) = $\Phi(\mu_0 - \beta X)$ (6)

Prob. (S = 1) = $\Phi(\mu_1 - \beta X) - \Phi(\mu_0 - \beta X)$

Prob. (S = 2) = $\Phi(\mu_2 - \beta X) - \Phi(\mu_1 - \beta X)$

Prob. (S = U) = $1 - \Phi(\mu_{U-1} - \beta X)$

Having determined the probability function for school attainment, the likelihood function for the uncensored sub-sample L_u could therefore be written as:

$L_u = \Phi(\mu_s - \beta X_{ij})$ for $S = 0$ (7)

$L_u = \Phi(\mu_s - \beta X_{ij}) - \Phi(\mu_{s-1} - \beta X_{ij})$ for $S = 1$ to (U-1)

$L_u = 1 - \Phi(\mu_{s-1} - \beta X_{ij})$ for $S = U$

As for the constrained observations, the completed years of schooling are unknown but the desired level of schooling S* is higher than the one observed and denoted S. This means:

$S^* > \mu_{s-1}$ which is then translated into $\varepsilon_i > \mu_{s-1} - \beta X_{ij}$ for S= 0 to U   (8)

Equation (8) indicates that the probability of the censored observations is equivalent to the probability that the error term exceeds $\mu_{s-1} - \beta X$. Thus the likelihood function of the constrained sub-sample L_c that maximizes the probability of an individual currently enrolled to exceed a threshold μ can be written as:

$L_c = 1 - \Phi(\mu_{s-1} - \beta X_{ij})$ (9)

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[8] For the sample aged 15-17, the number of education attainment levels (or U) is equal to 5, 6 and 7 for respectively Syria, Lebanon and Jordan. For the sample aged 18-25, U is equal to 6.6 and 8 for respectively Syria, Lebanon and Jordan. Note that cutoff or threshold points are therefore U-1.

Multiplying the likelihood expressions (11) and (13), for both censored and uncensored observations, gives the total sample likelihood expression. The final likelihood function will therefore have the following form:

$$L = \prod L_u \prod L_c \qquad\qquad\qquad (10)$$

The combined likelihood function L is the one that is maximized in order to estimate the magnitude of the coefficients for all school determinants. In effect, this functional form known as the censored ordered probit is to be run in this study on the two age categories [15-17] and [18-24] independently. As before, the model will also be run for gender separately[9]. This proposed censored ordered model has been previously used in the literature to estimate different types of human capital models. One of the early users of this estimated technique and who also contributed to its present form are Glewwe and Jacoby (1992) who looked at the case of Ghana. Other authors who used this methodology are Alderman et al. (1995) and Holmes (2003) for Pakistan, and Behrman et al. (1997) for Nicaragua. To the best of the author's knowledge, this type of augmented human capital model never included information on migration nor remittances to estimate their respective impact on education attainment except in one paper conducted by McKenzie and Rapoport (2006) for Mexico. Therefore, this is an additional empirical contribution made by this paper to the literature on the economics of education.

4. Data and Variables Description

The data used in this paper comes from three household surveys conducted in the three countries under scrutiny: Jordan, Syria and Lebanon. All three surveys provide several modules that will be used to construct the various socio-economic controls that are employed in the empirical model explained in the upcoming sections. The focus is made on sections of these surveys related to income and transfers where various sources of remittances are depicted. This allows for the construction of the remittance receipt variable whose impact on education attendance and attainment will be determined. The large similarity in questions observed for the three surveys allow for the construction of a somewhat uniform human capital model for attendance and attainment across the three countries[10]. This section describes briefly the content of the three surveys each at a time.

For Jordan, the data draws from a 2006 cross-sectional household survey entitled the "Jordan Household Expenditure and Income Survey" (JHEIS). The Jordanian Department of Statistics (DOS) conducted the survey in the third and fourth quarter of 2006 covering the period from July to December. The questionnaire is composed of eight sections which are: identification information, dwelling characteristics, availability of appliances and cars, subsidies, household members' individual characteristics (including education and employment status), households' properties, household productive activities and income data. In addition, the survey used the expenditure diary methodology to capture the different spending component of Jordanian households. The survey was conducted on a nationally representative sample of 12,768 households from all 12 governorates in Jordan. This sample gave information on 73,949 individuals. The 2006 JHEIS constitutes an update of a household expenditure survey conducted in 2002 by DOS itself.

For Syria, the data used comes from the 2003 - 2004 Syria Household and Expenditure Survey (SHIES), which was led by the Syrian Central Bureau of Statistics with the participation of the United Nations Development Program (UNDP). The information was

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[9] The gender separation is upheld by the results of a chow test undertaken for the censored ordered probit for education attainment.

[10] Differences in constructing some variables will be mentioned as we proceed in the paper and can be depicted from the results tables.

collected in four rounds between June 2003 and July 2004. The questionnaire provides information on household demographics, regional and community features, dwelling characteristics, economic activity, education status and ownership of various assets and equipments. The survey also offers questions related to income, transfers received from various government and non-government entities and on household expenditures over different commodities and services. The survey was conducted on a nationally representative sample of 29,790 households from all 14 governorates in Syria. The 2003-2004 SHIES was originally planned to provide data for conducting the 2004 poverty assessment.

For Lebanon, the data proposed comes from a cross sectional National Survey of Household Living Conditions (HLC). The Lebanese Central Administration of Statistics (CAS) with support from the Ministry of Social Affairs (MoSA) and the United Nations Development Program (UNDP) conducted the survey. The data was collected from February 2004 to April 2005. The questionnaire is composed of 12 modules: Household member's individual characteristics; education status; economic activity; health insurance and coverage; health status and disability; dwelling features; regional and community characteristics; transport facilities; travel and recreational activities; family production; and income and transfers[11]. The survey also uses the expenditure diary methodology to capture the expenditure on goods and services of the Lebanese households. The survey was conducted on a nationally representative sample of 13,003 households[12] from all 6 governorates of Lebanon. The sample gives information on 56,513 individuals.

5. Estimation Results

The probit model presented above was estimated for males and females in order to assess the impact of remittance inflows receipt on school attendance. This probit model was conducted on two sets of age categories: [15-17] where married individuals were dropped, and [18-24]. Such divide was conducted, as it is believed that the impact differs for each age grouping. These differences are due to factors related to the various schooling levels corresponding for each age, and to the accessibility of the labor force. The results of the school attendance model over the various sub-samples and countries are depicted in tables 1-3.

The positive impact of remittances receipt on education attendance does not seem to be statistically significant for individuals aged [15–17], except for Syria. The results also show that remittances receipt has a significant impact for males aged [18-24] but not on females of the same age bracket, except for Lebanon where the reverse is found. Indeed for a Jordanian or Syrian male in this latter age category, receiving remittances increases the probability of attending school on average and controlling for all other factors. For females in Jordan or Syria, two factors play a key role in preventing education attendance: age and marriage. Being married decreases the probability for women aged [18-24] of staying at school by 38.4 percentage points on average and ceteris paribus. Although remittances might alleviate budget constraints and increase the household's human capital production function, the family's decision seems to be primarily investing the generated income surplus in the education of sons rather than daughters. This household behavior is fueled by the fact that only males are expected to financially support the family after finishing higher education and acquiring better-profiled jobs due to such education.

Looking at other determinants of school attendance, individual and household demographics along with regional and dwelling characteristics, all play a role in the human capital model described above. Tables 1-3 indicate that the estimated coefficients for both parents'

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[11] Data on income and transfers is not available for researchers as per CAS's decision and was never published. Therefore the study was not able to access data to construct this variable and therefore has resorted to a proxy as explained later on in the paper.

[12] Expenditure data collected using the expenditure diary methodology was only collected for 7,431 households.

education level are positive and statistically significant. On the father's side, the biggest impact is perceived for individuals aged [18-24]. Interesting findings suggest that mother's education status has a similar if not larger impact on schooling attendance compared to the father's. Such observation suggests that educated mothers are gaining additional bargaining power in household decisions. Indeed they are prone to participate in sibling's schooling decisions as actively as their husbands despite the fact that father's, in their traditional function of head of households in our countries of focus, have a higher weight in family decisions.

The empirical results above are somewhat echoed in the censored ordered probit model examining education attainment. Tables 4-6 indicate that again remittance receipt does not exert a statically significant impact on education attainment of both females and males aged [15-17], except for Syria. However, these positive coefficients in the attainment model become statistically significant when looking at both type of receivers in the age category [18-24]. Indeed, migrant remittances are encouraging both females and males aged [18-24] to reach further levels in their education. The effect appears to be larger in magnitude for males though, except for Lebanon where the reverse trend is observed.

Other dependent variables' coefficients in the censored ordered probit model have similar signs as in the previous school attendance model and seem to play a significant role in determining education attainment. Estimated coefficients in table 4-6 indicate that having parents with higher education qualifications have an impact in increasing the sibling's schooling levels with the magnitude of the impact being larger for educated mothers compared to fathers when looking at females schooling attainment. Other factors such as household size and marital status reduce significantly siblings' schooling for both male and female youth. When comparing these results across gender, it is evident that those factors play a larger negative role for females. This is aligned with the idea that investment in women's education is less of a priority in households especially for female youth beyond compulsory education. Societal pressure is exerted on women to get married and start their own families.

In addition to the above robustness checks, we examine the validity of the sample separation between males and females by using a Chow F-test. Results of the Chow test indicate that the null hypothesis for supporting a pooled model is rejected, suggesting that the male and female regression estimates are different. This gives additional evidence for examining the impact of remittances on schooling behavior using gender specific models.

6. Discussion and Conclusion

A comparison of the impact of remittances on education across the three countries above should incorporate the differences in the education and labor markets among them. First, Lebanon has a predominantly private sector-lead education system, whereas Syria and Jordan have a predominantly public (low cost) educational system. Household spending on education is the highest therefore in Lebanon, and this might be the underlying factor linked to the specificity of the findings on remittances for Lebanon. Second, migrants from Lebanon tend to go primarily to European and North American countries, while Jordanian migrants would go to Gulf States and Syrians to Lebanon and Gulf States (Chaaban, 2009). This differentiation in destinations among migrants is expected to generate a differentiated pattern of remittances (size and frequency). Although no studies to date have tackled this issue, we expect that different migration pattern would result in differing remittance sending behaviors, which in turn would have varied impacts on human capital formation in origin countries.

Moreover, the models estimated above could suffer from endogeneity between remittance receipt and education attendance or attainment if for example migrants are remitting with the intention of supporting other household members' education (McKenzie and Sasin, 2007).

Endogeneity leads to bias in the estimated coefficients and thus implies misinterpretation of the results. Endogeneity arises because remittances may not constitute an exogenous shock. Indeed, households make the decision on migration, remittances and school attendance simultaneously. In this case, it will be difficult to establish a causality relationship. This implies that the vector of household characteristics explaining migrant remittances may also determine education patterns. The issue of estimation bias resulting from the correlation of remittances with observable or unobservable household/individual characteristics could be overcome by using instrumental variables (IV). This methodology has been previously applied in the literature on migration, remittances and education. We therefore introduce IVs to the probit model described above and use a model commonly called "IV Probit". The IV Probit model is Amemya's Generalized Least Square Estimates (GLS). We also introduce these IVs to the ordered model and use a model known as the IV censored ordered probit model. Seven instruments are used for remittances in the above-described model for Jordan. These IVs are: the rate of individuals who are outside Jordan on a district level; the percentage of households owning a bank deposit by region; the percentage of households owning livestock by region; age of the household head; age of the father; number of household members aged above 50 and the number of females in the household. For the Syria model, instruments used include the share of empty houses due to migration of household by district, the number of females in the household, and average length in months of dwelling vacancy by region. As for Lebanon, the instrument used in share of spending on fixed phone calls, (directly correlated with having a migrant member of the family).

The above instruments are not used simultaneously across all the models estimated for age and gender sub-samples. However, a vector of these instruments is selected separately for each model specification conditional on passing relevance and validity tests.

Although the selected IVs fulfilled relevance and validity criterion, empirical testing using the Wald test of exogeneity showed no endogeneity when it comes to remittances. The later result comes in disaccord to other findings in the literature and implies that the estimates obtained from the education attendance ordinary probit model are consistent and unbiased. Similar findings were obtained for the censored ordered probit model. IV estimation results and the various exogeneity tests are available from the authors upon request.

To summarize, in this paper we have relied on an augmented human capital model with two outcomes, education attendance and education attainment, which is estimated using large nationally representative household survey data from the three countries: Jordan, Syria and Lebanon. Empirical results show that migrant remittance receipt has a positive effect on education attendance. This finding is obtained while controlling for other socio-economic determinants of schooling behavior, and is robust to censorship and endogeneity bias. Results also show that the magnitude of the remittance impact on both education outcomes is larger for men compared to that of women in Jordan and Syria, but lower in Lebanon. This shows that in some countries around the region gender dimensions are still important in the household's investment decisions in the sibling's human capital.

The empirical findings also reveal interesting patterns related to parents' education background and regional residency status. Parents' education qualification impacts school attendance and attainment. This positive result is in line with the recent literature that controlled for parents' education as a determinant of the one for their siblings. Our results for the Eastern Mediterranean countries show that the mother's qualifications seem to have a higher effect on both males and females education. This stems from the different bargaining power that each member of the household traditionally holds, especially in conservative societies such as the ones in Jordan or Syria. Educated mothers usually have higher bargaining power in the household and could influence the allocation of resources towards

children and their human capital more than their husbands usually would. As for regional determinants, we find that schooling decisions could be linked to labor market opportunities. Indeed, results of the human capital model indicated that individuals residing in urban areas are less prone to acquire education than rural residents.

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Table 1: Determinants of Education Attendance in Jordan

Age	[15-17]						[18-24]					
Education Attendance	Pooled		Male		Female		Pooled		Male		Female	
Remittance Receipt	0.100		0.068		0.137		0.168	***	0.286	***	0.005	
Demographics												
Household Size	-0.049	**	-0.059	**	-0.050	*	0.021	**	-0.019		0.060	***
Number of Child	-0.003		0.063		-0.068		-0.052	*	0.021		-0.132	***
Number of Adults	0.057	**	0.063	**	0.066	*	-0.080	***	-0.047	***	-0.123	***
Marital Status	na		na		na		-1.903	***	-2.195	***	-1.955	***
Parents' education												
Mother Education	0.030	***	0.023	**	0.040	***	0.031	***	0.039	***	0.021	***
Father Education	0.025	***	0.022	***	0.031	***	0.019	***	0.021	***	0.018	***
Household wealth												
Dwelling Area	0.002	**	0.001		0.003	***	0.001	**	0.001	***	0.000	
Ownership of Car	0.104	*	0.093		0.124		0.106	***	0.079	*	0.143	***
Ownership of Computer	0.529	***	0.553	***	0.496	***	0.472	***	0.503	***	0.432	***
Ownership of Land	0.071		0.135		-0.028		0.082	**	0.052		0.100	**
Regional effects												
Amman	-0.262	***	-0.401	***	-0.084		-0.118	**	-0.071		-0.161	**
North	-0.014		-0.111		0.110		0.079		0.063		0.150	**
South	0.205	*	0.121		0.344	**	-0.009		0.033		-0.028	
Constant	0.674	***	0.812	***	0.492	**	-0.659	***	-0.820	***	-0.363	***
Number of Observations	4701		2376		2325		9867		5342		4525	
Pseudo R2	0.105		0.094		0.137		0.152		0.130		0.205	
Wald Chi-Square	240		137		135		1317		718		739	
Significance Level (Prob Value)	0.000		0.000		0.000		0.000		0.000		0.000	
Log Pseudo-Likelihood	-1422		-830		-568		-5520		-3010		-2412	
Chow Test F-statistic	47						194					
Significance Level (Prob Value)	0.000						0.000					

Notes: Significance Level ***0.01, **0.05, *0.1; Note: A double causality relationship exists between education outcomes and marital status. The study has estimated the models taking out marital status and found no significant changes especially for the Remittances receipt coefficients.

Table 2: Determinants of Education Attendance in Syria

Age	[15-17]						[18-24]					
Education Attendance	Pooled		Male		Female		Pooled		Male		Female	
Remittance Receipt	0.434	***	0.720	***	0.189	**	0.430	***	0.544	***	0.241	***
Demographics												
Household Size	0.003		0.016		-0.012		0.005		0.018	**	-0.016	
Number of Child	-0.129	***	-0.098	***	-0.154	***	-0.095	***	-0.075	***	-0.120	***
Number of Adults	0.001		-0.004		0.010		-0.031	***	-0.058	***	-0.003	
Marital Status	na		na		na		-1.733	***	-1.326	***	-1.912	***
Parents' education												
Mother Education	0.170	***	0.134	**	0.212	***	0.189	***	0.166	***	0.212	***
Father Education	0.202	***	0.246	***	0.162	***	0.156	***	0.179	***	0.128	***
Household wealth												
Nb. of Rooms in Dwelling	0.066	***	0.054	***	0.074	***	0.095	***	0.069	***	0.120	***
Ownership of Cellphone	-0.068	**	-0.102	**	-0.017		0.046		-0.023		0.121	**
Private School	0.537	***	0.298	***	0.868	***	0.451	***	0.465	***	0.435	***
Regional effects												
South	-0.458	***	-0.447	***	-0.465	***	-0.354	***	-0.425	***	-0.258	***
Northeast	-0.559	***	-0.345	***	-0.782	***	-0.388	***	-0.254	***	-0.560	***
Middle	-0.412	***	-0.351	***	-0.466	***	-0.346	***	-0.321	***	-0.358	***
Constant	-0.616	***	-0.804	***	-0.441	***	-1.464	***	-1.457	***	-1.388	***
Number of Observations	14034		7177		6857		25593		13273		12320	
Pseudo R2	0.123		0.108		0.159		0.189		0.128		0.276	
Wald Chi-Square	1818		908		1117		2901		1291		1810	
Significance Level (Prob Value)	0.000		0.000		0.000		0.000		0.000		0.000	
Log Pseudo-Likelihood	-8510		-4411		-3997		-10879		-6117		-4629	
Chow Test F-statistic	204						267					
Significance Level (Prob Value)	0.000						0.000					

Notes: Significance Level ***0.01, **0.05, *0.1

Table 3: Determinants of Education Attendance in Lebanon

Age	[15-17]						[18-24]					
Education Attendance	Pooled		Male		Female		Pooled		Male		Female	
Remittance Receipt	0.321		0.308		0.366		0.177	**	0.092		0.256	**
Demographics												
Household Size	-0.124	**	-0.121	*	-0.154	**	0.058	**	0.043		0.081	**
Number of Child	0.047	**	0.194		-0.081		-0.204	**	0.001		-0.405	*
Number of Adults	0.159	**	0.173	*	0.170	*	-0.068	*	-0.062		-0.133	**
Number of Adult Males	-0.100		-0.090		-0.140		-0.083	**	-0.023		-0.055	
Marital Status	na		na		na		-1.764	***	-1.947	***	-1.661	***
Parents education												
Mother Education	0.218	***	0.274	***	0.160	**	0.186	***	0.273	***	0.112	***
Father Education	0.166	***	0.207	***	0.151	**	0.092	***	0.090	***	0.085	***
Household wealth												
Dwelling Area	0.004	***	0.004	***	0.005	*	0.000		0.001		-0.001	
Ownership of Cellphone	-0.340	**	-0.516	***	-0.106		-0.116	*	-0.072		-0.156	*
Ownership of Computer	0.348	***	0.502	***	0.160		0.216	***	0.275	***	0.150	*
Ownership of Car	0.246		0.178		0.260		0.229	**	0.240	*	0.184	
Regional effects (omitted)												
Constant	-0.258		-0.534		-0.052		-0.960	***	-1.427	***	-0.477	*
Number of Observations	1164.000		612.000		552.000		2743.000		1425.000		1318.000	
Pseudo R2	0.176		0.225		0.166		0.139		0.138		0.171	
Wald Chi-Square	145.160		100.070		66.650		359.530		211.360		232.840	
Significance Level (Prob Value)	0.000		0.000		0.000		0.000		0.000		0.000	
Log Pseudo-Likelihood	-347.656		-191.17		-143.78		-1635.25		-850.506		-756.033	
Chow Test F-statistic	25.397						57.429					
Significance Level (Prob Value)	0.000						0.000					

Notes: Significance Level ***0.01, **0.05, *0.1

Table 4: Determinants of Education Attainment in Jordan

Age	[15-17]						[18-24]					
Education Attendance	Pooled		Male		Female		Pooled		Male		Female	
Remittance Receipt	0.085		0.066		0.098		0.266	***	0.331	***	0.140	*
Demographics												
Household Size	-0.060	***	-0.063	**	-0.072	**	-0.055	***	-0.062	***	-0.058	***
Number of Child	-0.035		0.026		-0.088		-0.075	***	-0.038		-0.104	***
Number of Adults	0.067	***	0.071	**	0.077	**	0.037	***	0.024		0.061	***
Marital Status	na		na		na		-0.696	***	-0.807	***	-0.925	***
Parents education												
Mother Education	0.033	***	0.025	**	0.045	***	0.049	***	0.034	***	0.068	***
Father Education	0.030	***	0.027	***	0.037	***	0.028	***	0.032	***	0.024	***
Household wealth												
Dwelling Area	0.002	***	0.002		0.004	***	0.003	***	0.003	***	0.003	***
Ownership of Car	0.063		0.037		0.122		0.125	***	0.126	***	0.151	***
Ownership of Computer	0.631	***	0.673	***	0.577	***	0.587	***	0.658	***	0.503	***
Ownership of Land	0.132	*	0.233	**	-0.004		0.198	***	0.212	***	0.176	***
Regional effects												
Amman	-0.244	***	-0.352	***	-0.090		-0.119	***	-0.140	**	-0.092	
North	-0.015		-0.058		0.048		0.088	**	0.079		0.144	**
South	0.084		0.045		0.157		-0.085		-0.014		-0.128	
Threshold												
μ1	-1.956	***	-2.075	***	-1.814	***	-1.769	***	-2.002	***	-1.649	***
μ2	-1.504	***	-1.623	***	-1.348	***	-1.152	***	-1.268	***	-1.129	***
μ3	-1.079	***	-1.158	***	-0.970	***	-0.814	***	-0.891	***	-0.833	***
μ4	-0.808	***	-0.886	***	-0.692	***	-0.069		-0.065		-0.173	*
μ5	-0.409	***	-0.481	**	-0.285		0.683	***	0.749	***	0.549	***
μ6	0.873	***	0.710	***	1.178	***	1.101	***	1.159	***	1.018	***
μ7	na		na		na		1.503	***	1.438	***	1.570	***
Number of Observations	4701		2376		2325		9867		5342		4525	
Wald Chi-Square	276		155		170		2111		1133		1330	
Significance Level (Prob Value)	0.000		0.000		0.000		0.000		0.000		0.000	
Log Pseudo-Likelihood	-1877		-1119		-733		-12664		-6994		-5415	
Chow Test F-statistic	49						509					
Significance Level (Prob Value)	0.000						0.000					

Notes: Significance Level ***0.01, **0.05, *0.1

Table 5: Determinants of Education Attainment in Syria

Age	[15-17]						[18-24]					
Education Attendance	Pooled		Male		Female		Pooled		Male		Female	
Remittance Receipt	0.354	***	0.481	***	0.255	***	0.330	***	0.500	***	0.149	**
Demographics												
Household Size	-0.026	***	-0.010		-0.042	***	-0.061	***	-0.045	***	-0.089	***
Number of Child	-0.100	***	-0.100	***	-0.093	***	-0.060	***	-0.043	**	-0.055	***
Number of Adults	0.029	***	0.020	*	0.042	***	0.076	***	0.037	***	0.133	***
Marital Status	na		na		na		-0.662	***	-0.523	***	-0.777	***
Parents education												
Mother Education	0.167	***	0.147	***	0.188	***	0.228	***	0.125	***	0.358	***
Father Education	0.161	***	0.179	***	0.146	***	0.186	***	0.226	***	0.142	***
Household wealth												
Nb. of Rooms in Dwelling	0.064	***	0.048	***	0.076	***	0.081	***	0.069	***	0.089	***
Ownership of Cellphone	-0.044		0.005	*	-0.092	*	0.060	**	0.028		0.078	**
Attending Private School	0.097	*	0.043	***	0.164	**	0.272	***	0.336	***	0.208	***
Regional effects												
South	-0.277	***	-0.259	***	-0.299	***	-0.243	***	-0.236	***	-0.263	***
North East	-0.533	***	-0.308	***	-0.761	***	-0.662	***	-0.464	***	-0.885	***
Middle	-0.281	***	-0.199	***	-0.366	***	-0.342	***	-0.278	***	-0.410	***
Threshold												
$\mu 1$	-1.521	***	-1.526	***	-1.586	***	-1.328	***	-1.543	***	-1.212	***
$\mu 2$	-1.213	***	-1.143	***	-1.314	***	-1.030	***	-1.183	***	-0.936	***
$\mu 3$	0.892	***	1.086	***	0.711	***	0.916	***	0.883	***	0.956	***
$\mu 4$	3.007	***	3.150	***	2.897	***	1.523	***	1.480	***	1.603	***
$\mu 5$	na		na	**	na		3.580	***	3.341	***	3.962	***
Number of Observations	14035		7178		2325		25594		13273		12321	
Wald Chi-Square	2030		1020		170		5944		2426		4000	
Significance Level (Prob Value)	0.000		0.000		0.000		0.000		0.000		0.000	
Log Pseudo-Likelihood	-1877		-1119		-733		-12664		-6994		-5415	
Chow Test F-statistic	49						509					
Significance Level (Prob Value)	0.000						0.000					

Notes: Significance Level ***0.01, **0.05, *0.1

Table 6: Determinants of Education Attainment in Lebanon

Age	[15-17]						[18-24]					
Education Attendance	Pooled		Male		Female		Pooled		Male		Female	
Remittance Receipt	0.269		0.290		0.299		0.202	**	0.059		0.453	***
Demographics												
Household Size	-0.136	***	-0.100		-0.197	***	-0.052	**	-0.033		-0.087	**
Number of Child	0.077		0.216	*	-0.071		-0.109		0.015		-0.190	*
Number of Adults	0.174	**	0.171		0.212	**	0.107	**	0.020		0.062	***
Number of Adult Males	-0.119		-0.105		-0.199		-0.207		-0.052		-0.107	
Marital Status	na		na		na		-0.864	***	-0.940	***	-1.009	***
Parents education												
Mother Education	0.264	***	0.324	***	0.222	***	0.281	***	0.302	***	0.275	***
Father Education	0.159	***	0.193	***	0.143	***	0.133	***	0.125	***	0.123	***
Household wealth												
Dwelling Area	0.004	***	0.005	***	0.004	***	0.002	***	0.002	***	0.002	**
Ownership of Cellphone	-0.353	***	-0.494	***	-0.096		-0.024		0.025		-0.080	
Ownership of Computer	0.283	***	0.371	**	0.118		0.244	***	0.300	***	0.171	*
Ownership of Car	0.246		0.104		0.343		0.197	**	0.210	**	0.130	
Threshold												
μ1	-1.308	***	-1.318	***	-1.531	***	-1.514	***	-1.150	***	-2.188	***
μ2	-1.138	***	-0.969	**	-0.602		-1.241	***	-0.930	***	-1.811	***
μ3	-0.152		0.130		-0.219		-0.008		0.348		-0.604	**
μ4	0.202		0.497		0.499		0.647	***	1.005	***	0.079	
μ5	0.901	**	1.276	**			1.249	***	1.611	***	0.701	**
Number of Observations	1161.000		611.000		550.000		2650.000		1420.000		1230.000	
Wald Chi-Square	163.060		166.230		78.440		530.150		329.450		328.160	
Significance Level (Prob Value)	0.000		0.000		0.000		0.000		0.000		0.000	
Log Pseudo-Likelihood	-453.452		-260.58		-172.91		-2563.71		-1481.88		-1049.33	
Chow Test F-statistic	39.921						64.995					
Significance Level (Prob Value)	0.000						0.000					

Notes: Significance Level ***0.01, **0.05, *0.1

Appendix 1
Table A1: Jordan sample: Some Descriptive Statistics

	All Sample	Remittances	
		Recipients	Non Recipients
Sample Size	**14623**	**1041**	**13582**
Education Characteristics			
Years of Schooling	11	12	11
Father Years of Schooling	8	7.5	8
Mother Years of Schooling	7	9	7
Enrollment Rate	54%	64%	53%
High School Degree Rate	34%	44%	33%
University Degree Rate	7%	10%	6%
Individual and Household Characteristics			
Age	19.3	19.3	19.3
Household Size	7.6	7.0	7.7
Number of Children <5	0.5	0.3	0.5
Number of Adults	4.7	4.4	4.7
Number of Male Adults	2.5	2.1	2.5
Number of Siblings	5.4	4.9	5.5
Marital Status	7.5%	4.1%	7.7%
Dependency	8.2%	7.5%	8.2%
Regional Characteristics			
Urban	75.7%	90.7%	74.5%
Dwelling Characteristics and Asset Ownership Status			
Dwelling Owned	79%	77%	79%
Dwelling Area (sqm)	130.6	148.9	129.2
Number of Rooms	4.1	4.7	4.1
Ownership of Car	44%	43%	44%
Ownership of Computer	41%	61%	40%
Ownership of Land	29%	23%	30%

Table A2: Jordan Mean Education Characteristics by Gender

| Age Category | [15-17] | | | [18-24] | | |
Gender	Females	Males		Females	Males	
Sample Size	**2376**	**2380**		**4525**	**5342**	
Years of Schooling	9.85	9.80		12.04	11.59	***
Father Years of Schooling	8.69	8.55		8.30	7.78	***
Mother Years of Schooling	8.09	7.83	*	7.50	6.75	***
Enrollment Rate	90%	87%	***	39%	35%	***
High School Degree Rate	1.4%	1.4%		57%	43%	***
University Degree Rate	0%	0%		12%	8%	***

Note: Stars correspond to joint statistical significance using t-test with H0= mean (1)-mean (2)=0 / Significance Level: ***0.01, **0.05 and *0.1

Table A3: Syria Sample: Some Descriptive Statistics

		Remittances	
	All Sample	Recipients	Non Recipients
Sample Size	**39,629**	**1,350**	**38,279**
Education Characteristics			
Enrollment Rate	32.76%	37.63%	32.59%
High School Degree Rate	16.98%	21.93%	16.81%
University Degree Rate	0.66%	1.04%	0.65%
Individual and Household Characteristics			
Age	19.04224	19.16815	19.0378
Household Size	7.617502	7.12	7.635048
Number of Children <5	0.5750334	0.6933333	0.5708613
Number of Adults	4.415706	3.952593	4.432038
Number of Male Adults	2.33526	1.685926	2.35816
Number of Siblings	0.1135027	0.1592593	0.111889
Marital Status	11%	11.26%	10.93%
Dwelling Characteristics and Asset Ownership Status			
House Area (sqm)	N/A	N/A	N/A
Number of Rooms	3.556865	4.134074	3.536508
Ownership of Car	N/A	N/A	N/A
Ownership of Computer	N/A	N/A	N/A
Ownership of Cellphone	13.65%	18.52%	13.48%

Table A4: Syria Mean Education Characteristics by Gender

| Age Category | [15-17] | | [18-24] | |
Gender	Females	Males	Females	Males
Sample Size	**6,857**	**7,178**	**12,321**	**13,273**
Enrollment Rate	51.04%	54.51%	21.35%	22.14%
High School Degree Rate	1.49%	1.46%	27.48%	23.63%
University Degree Rate	0%	0%	5.43%	4.12%

Note: Stars correspond to joint statistical significance using t-test with H0= mean(1)-mean(2)=0 / Significance Level:***0.01, **0.05 and *0.1

	%	%	%	%
Education Attainment	100	100	100	100
Illiterate	4.81	2.01	7.26	2.80
Literate	2.86	2.47	3.42	2.82
Primary	54.09	58.39	45.26	52.90
Preparatory	36.75	35.68	16.57	17.85
Secondary/ Interim Institute	1.49	1.46	26.49	22.58
University +	N/A	N/A	0.99	1.05
Mother Education Attainment	100	100	100	100
Illiterate	48.23	47.13	44.33	53.53
Literate	7.05	7.14	6.64	7.98
Primary	29.34	30.51	31.52	25.97
Preparatory	7.10	7.18	8.68	5.94
Secondary/ Interim Institute	6.58	6.32	7.27	5.20
University +	1.71	1.73	1.56	1.40
Father Education Attainment	100	100	100	100
Illiterate	22.53	21.15	22.06	25.04
Literate	10.57	10.35	9.95	11.35
Primary	39.16	39.26	39.62	37.72
Preparatory	10.12	10.27	10.19	8.90
Secondary/ Interim Institute	11.91	12.22	11.34	10.19
University +	5.70	6.76	6.85	6.81

Table A5: Lebanon sample: Some descriptive statistics

		Remittances	
	All Sample	**Recipients**	**Non Recipients**
Sample Size	**3911**	**621**	**3290**
Education Characteristics			
Enrollment Rate	62.95%	73.11%	61.03%
High School Degree Rate	69.52%	78.42%	67.84%
University Degree Rate	30.12%	37.04%	28.81%
Individual and Household Characteristics			
Age	19.50729	19.45089	19.51793
Household Size	5.690872	5.692432	5.690578
Number of Children <5	0.1861417	0.1658615	0.1899696
Number of Adults	4.021989	4.114332	4.004559
Number of Male Adults	2.032728	1.94847	2.048632
Marital Status (% of people married)	5.34%	2.74%	5.84%
Dwelling Characteristics and Asset Ownership Status			
House Area (sqm)	67.37664	71.85561	66.53122
Number of Rooms	4.538427	4.818854	4.485495
Ownership of Car	85.40%	88.24%	84.86%
Ownership of Computer	56.10%	65.54%	54.32%
Ownership of Cellphone	51.62%	56.36%	50.73%

Table A6: Lebanon sample: Some descriptive statistics

		Remittances	
	All Sample	**Recipients**	**Non Recipients**
Sample Size	**3911**	**621**	**3290**
Education Characteristics			
Enrollment Rate	62.95%	73.11%	61.03%
High School Degree Rate	69.52%	78.42%	67.84%
University Degree Rate	30.12%	37.04%	28.81%
Individual and Household Characteristics			
Age	19.50729	19.45089	19.51793
Household Size	5.690872	5.692432	5.690578
Number of Children <5	0.1861417	0.1658615	0.1899696
Number of Adults	4.021989	4.114332	4.004559
Number of Male Adults	2.032728	1.94847	2.048632
Marital Status (% of people married)	5.34%	2.74%	5.84%
Dwelling Characteristics and Asset Ownership Status			
House Area (sqm)	67.37664	71.85561	66.53122
Number of Rooms	4.538427	4.818854	4.485495
Ownership of Car	85.40%	88.24%	84.86%
Ownership of Computer	56.10%	65.54%	54.32%
Ownership of Cellphone	51.62%	56.36%	50.73%

Table A7: Lebanon Mean Education Characteristics by Gender

Age Category	[15-17]		[18-24]	
Gender	Females	Males	Females	Males
Sample Size	**1595**	**1701**	**3795**	**4052**
Enrollment Rate	79.94%	76.31%	43.14%	40.55%
High School Degree Rate	55.67%	53.62%	63.35%	54.29%
University Degree Rate	2.82%	2.00%	32.75%	26.41%

Note: Stars correspond to joint statistical significance using t-test with H0= mean(1)-mean(2)=0 / Significance Level:***0.01, **0.05 and *0.1

	%	%	%	%
Education Attainment	100	100	100	100
Illiterate	0.76	0.83	1.44	1.68
Literate/ Kindergarten	0.57	1.30	1.19	2.03
Primary	10.82	14.48	17.17	23.41
Intermediate	31.69	30.02	18.61	18.75
Secondary/ Vocational	53.32	51.36	27.28	27.62
University	2.85	2.01	34.32	26.50
Mother Education Attainment	100	100	100	100
Illiterate	17.43	15.29	19.55	26.48
Literate/ Kindergarten	6.14	6.70	6.17	7.33
Primary	32.60	30.92	28.51	29.15
Intermediate	22.82	24.93	22.77	20.93
Secondary/ Vocational	15.17	16.64	14.70	11.11
University	5.83	5.53	8.30	5.01
Father Education Attainment	100	100	100	100
Illiterate	17.18	15.17	20.92	20.80
Literate/ Kindergarten	9.40	8.88	8.64	10.37
Primary	34.67	32.63	29.80	31.91
Intermediate	19.75	22.57	18.71	18.16
Secondary/ Vocational	10.72	12.46	11.96	10.54
University	8.28	8.29	9.96	8.22

Appendix 2

Endogeneity leads to biased and inefficient coefficients. To deal with this issue the research proposes to instrument the endogenous regressors in the proposed human capital model. By introducing instrumental variables (IVs) to the proposed probit and censored ordered models, the study resorts to an estimation technique commonly known in statistical packages as "IV Probit" or "IV censored ordered Probit". These are typically estimated using the methodology of a two stage least squares (2SLS). However, Newey (1987) argues that the usage of a 2SLS in the context of a binary dependant variable outcome (education attendance in this study's case) and a binary endogenous covariate (one of the physical damage variables) can produce inconsistent estimators. Although Angrist (1991) provide some conditions where the 2SLS estimations perform greatly under the mentioned conditions, Acosta (2006) specifies that such conditions are difficult to hold in practice. Therefore, the IV Probit (IV censored ordered Probit) estimation technique for the education attendance (attainment) model under scrutiny will be conducted using Amemya's Generalized Least Square Estimates (GLS). In effect, the selected Amemya GLS specification maximizes a likelihood function that fits a probit model where the regressor capturing the physical damage incurred during the 2006 war is endogenously determined. Moreover, instrumental variables could vary substantially in nature and are usually left to the researchers' judgment to argue for the rationality behind the instruments selected. The instruments' relevance and validity criterion are also tested empirically in this study. The general methodology though consists of choosing instrumental variables that do not have a direct impact on education attendance or attainment except through their impact on remittance receipt. Identifying instrumental variables for the human capital model considered in this study is another axis for augmenting it. Indeed, identifying IVs in an empirical study on a MENA country is not common in the literature, to the best of the authors' knowledge, especially when it comes to armed conflicts and human capital models.

To justify empirically the usage of the selected instruments, the study opts to conduct three tests: validity, relevance and Wald test for exogeneity of the direct damages. These three tests will be conducted respectively for the five categories of direct damages identified previously; and for both age sub-samples [15-7] and [18-24] separately.

To investigate validity, a simple probit model is conducted where the respective direct damage is regressed on the instruments and on the covariates identified in the human capital model of equation (2). Instrumental variables are said to be valid if their respective coefficients are statistically significant. Additionally, the following hypothesis is tested: $H_0 : IV_1 = IV_2 = ... = IV_n = 0$ with n being the number of instruments used. This test has a chi2 distribution with n degrees of freedom. For the validity criterion to hold empirically, H_0 should be rejected. All instruments have a statistically significant impact on remittance receipt, and that the proposed H_0 is rejected for both age sub-samples. The IVs identified in this study are therefore valid (refer to table X).

The second criterion examined is relevance. An instrument is said to be relevant if it does not impact directly the outcome variable in this case school attendance. To examine that, the study estimates the education attendance probit model (subsequently an education attainment one) and introduces the selected IVs to the vector of covariates. To fulfill the validity criterion, the coefficients estimated for the IVs should be statistically insignificant. This indicates the lack of any impact of those instruments on the schooling outcome. Empirical findings signal that all selected instruments have no statistical significant impact on education attendance and hence the relevance of those IVs (refer to table X).

Prior for adopting an instrumented education attendance model, the study tests for the endogeneity of the remittance receipt. To do so the study has opted to undertake a Wald test of exogeneity. The test aims at examining the null hypothesis of whether the error terms in the structural equation (the education attendance probit model) and the error term of the reduced form equation for the endogenous variable (direct damage sustained probit model) are correlated. The rejection of the null hypothesis indicates the rejection of exogeneity and therefore the need to instrument the direct damage variables. The results of the Wald test of exogeneity undertaken for the various sub-samples models suggest occurrence of endogeneity between remittance receipt and education attendance or attainment for Syria data but not for Jordan. Table X summarizes the outcome of the above tests and lists the different instruments used for different sub-samples.

Table X: Instrumental Variables Selection and Endogeneity Test

Education Attendance and Atteainment Models			IVs used	Relevance	Validity	Wald Test of Exogeneity
Jordan	[15-17]	Males	Rate of Bank Deposit Ownership, Rate of Livestock Ownership by governorate, Age of the Father in Household, Number of Household Individuals above 50	yes	yes	Failed to Reject
		Female	Rate of Livestock Ownership by governorate, Age of the Father, Number of Household Individuals above 50	yes	yes	Failed to Reject
	[18-24]	Males	Rate of Jordanians Outside the Country, Rate of Bank Deposit Ownership, Rate of Livestock Ownership by governorate, Number of Females in the Household	yes	yes	Failed to Reject
		Female	Rate of Jordanians Outside the Country, Rate of Bank Deposit Ownership by governorate, Age of the Household Head	yes	yes	Failed to Reject
Syria	[15-17]	Males	Share of empty houses due to migration of household by mohafaza, Number of Females in the Household	yes	yes	Reject
		Female	Average length in months of dwelling vacancy by mohafaza	yes	yes	Reject
	[18-24]	Males	Share of empty houses due to migration of household by mohafaza, Number of Females in the Household	yes	yes	Reject
		Female	Average length in months of dwelling vacancy by mohafaza	yes	yes	Reject