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**Essays on Human Capital Formation of Youth in
the Middle East: The Role of Migrant Remittances
in Jordan and Armed Conflict in Lebanon.**

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Thesis Submitted for the Degree of Doctor of Philosophy

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January 2012

I hereby declare that this thesis has not been and will not be submitted in whole or in part to another University for the award of any other degree.

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Degree of Doctor of Philosophy

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Summary

Human capital formation is a fundamental requirement for countries' long term economic development and societal prosperity. This process can be enhanced or disrupted by internal factors such as migration and remittances, or external ones like wars. This thesis is interested in investigating both phenomena. The following questions are addressed: what is the impact of migrant remittances on human capital formation, do these private inflows induce any changes in the behavior of remittance-receivers towards education expenditure, and finally what is the short term micro-economic effect of armed conflicts on education in post war countries. In investigating these issues, focus is made on two perspectives: first youth, an active group in the society whose age matches up higher education levels and labor force entry simultaneously; second gender differentials both in terms of impact and behavior. The research explores new surveys from the Middle East, datasets that have not been analyzed previously from an education angle and that are not generally available to researchers. These datasets come from Jordan and Lebanon, two middle income non-oil producer countries.

The thesis is composed of three independent essays. The first examines the impact of migrant remittances on human capital accumulation among youth in Jordan and highlights the various ways in which remittances influence education outcomes. The analysis takes a gender dimension and examines whether the effects and magnitude of such impact is different between males and females. The second essay considers remittances receipt, from both domestic and international sources, and examines their impact on Jordanian households' education spending patterns. Following the literature on intra-household bargaining and gender expenditure preferences, the analysis examines whether such impact is potentially different between male and female headed households. The third essay tackles the impact of the 2006 war on education attendance of youth in Lebanon. The chapter captures households' schooling responses in the aftermath of the war. By looking at the implications of a diversified array of damages sustained; reflecting physical, human, income and employment losses; the chapter examines possible linkages between the nature of the damage incurred and the manner and magnitude in which such damage affects education.

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Introduction

Human capital is a fundamental input to countries' economic development. Its accumulation is a cornerstone for long term sustainable growth and an enhancement of societies' prosperity and welfare. Maximizing economic and social returns from human capital has always been a primary objective for policymakers all around the world. For this purpose governments have attempted to engage in reform activities and adopt policies that tackle issues related to coverage, quality and efficiency of such capital. The economic literature on education has examined for a long time diverse issues related to human capital formation. From a macroeconomic perspective it examined thoroughly the correlation between human capital accumulation and productivity starting with the work of Shultz (1960), and consequently human capital accumulation and economic growth. Becker's (1964) pioneering work on human capital was the first to introduce the concept of investment in individuals' education and comparing it to business investments in equipment. This inspired the literature to tackle questions related to returns from investment in human capital, and looking closely at education outcomes from both supply and demand perspectives. This was translated in the seminal work of Becker and Chiswick (1966) and later on Mincer (1974) who laid the ground for the estimation of human capital earning functions. The improvement in data collection techniques and the availability of household surveys on the one hand coupled with the development of econometric and statistical tools on the other, has enabled the literature to further focus on microeconomic aspects of human capital formation. As a consequence, more recent empirical works were further improved and started examining the determinants of education outcomes through observing wider sets of socio-economic characteristics and through investigating inter and intra household behavior in regards to education choices. These improvements pushed the literature to widen the research scope and address existing research gaps, especially in terms of analyzing impact effects on education outcomes coming from a multitude of endogenous or external factors and shocks. Examples can be given from Barros and Lam (1993) who looked at income inequality impact, Cox-Edward and Ureta (2003) examined the impact of migration, and Blattman (2006) depicted the impact of child soldering. Consequently, this PhD research is motivated by the growing interest in this stream of

empirical literature that examines impact effects on human capital formation. For this purpose, the thesis has selected to observe the implications on education outcomes of two important phenomena: migrant remittances from one hand and armed conflicts from the other. These two phenomena are very different in nature, but they both exert an impact on human capital. The decision to migrate and remit is often viewed as a conscious decision taken by households under a specific set of socio-economic conditions and that potentially influences education outcomes. On the other hand, an armed conflict is considered as a shock that is imposed externally on households and the extent to which they are affected, along with the nature of the losses incurred, consequently changes education choices. The research observes the impact of migrant remittances and armed conflicts on education outcomes and depicts any household behavioral changes towards human capital that emerge as a result. The research also highlights the various mechanisms through which these phenomena impact human capital formation. In investigating the above issue, the thesis has two focuses. First it examines the impact effect of remittances and armed conflicts on the education outcomes of a particular group that is the youth. The study is interested in shedding light on youth as they represent an active and sizeable group in developing countries' societies. A group whose age match up higher education levels and labor force entry simultaneously, making them more sensitive to changes and shocks. Second it tackles potential gender differentials. The study explores whether remittances affect education outcomes of males and females differently, and subsequently whether gender plays a role in a household's decision to invest in human capital. Issues related to the human capital formation of youth and to gender inequality are high on policy maker's agenda. Issues that are increasingly relevant in the Middle East, the region of interest to this thesis, especially in the context of the Arab spring.

The research explores new surveys from the Middle East region, datasets that have not been analyzed previously from an education perspective. These datasets come from Jordan and Lebanon, two middle income non-oil producer countries. The choice of the two countries stems from the fact that migration and remittances are important issues in Lebanon and Jordan. With 22.8 percent of GDP for Lebanon and 20.3 percent of GDP for Jordan, the two countries are among the highest recipients of remittances in the world relative to the size of their economies. They rank respectively 8th and 10th worldwide

(World Bank 2008). Moreover the two countries are located in one of the most troubled regions in the world. The Middle East has witnessed throughout its modern history many armed conflicts, civil wars and violent events. In particular Lebanon a country that witnessed repetitive civil wars and wars with Israel throughout its short history since independence in 1943¹. Looking at the structure of their economies, the two countries exhibit many similarities. Lebanon and Jordan are two upper middle income countries with very open economies, labor abundant relative to their size², do not produce oil, and are very limited in other natural resources. Human capital is esteemed as the two countries' comparative advantage in the region and is therefore deemed fundamental for growth. With respectively 51 and 42 percent tertiary enrollment rate, Lebanon and Jordan have outperformed MENA³'s average of 28 percent⁴. Characterized by a young and dynamic population, youth in those two countries have very large aspirations towards acquiring education as it is one of the key endowments to acquire employment with higher returns. Although such education is very much accessible on a basic and intermediate level, however it might not necessarily be the case at higher levels especially universities⁵. This is due to different socio-economic factors including wealth, lower returns on higher education and community pressures. Additionally the two economies are failing to produce enough jobs especially for the highly skilled and are therefore not fulfilling the aspiration of their youth. Despite economic growth rates averaging respectively 5.1 and 6.3 percent in the past decade⁶, youth unemployment has reached 22.1 in Lebanon and 28.3 in Jordan by 2007⁷, while unemployment among those with college degrees exceeded 15 percent in the case of Jordan (Abdih 2011). This has exacerbated the brain drain phenomena especially

¹ Since independence from the French, Lebanon saw 2 civil wars and 6 wars with Israel; all different in magnitude and length.

² Population size is estimated at 4 and 6 million for respectively Lebanon and Jordan.

³ Middle East and North Africa.

⁴ World Development Indicators (2010). The same dataset reveals that Lebanon and Jordan had a secondary education enrolment rate of respectively 83.6 and 91.1 percent compared to a MENA average of 74.5 percent.

⁵ World Development Indicators (2010) indicate that while primary school enrolment reached 97 and 101 percent in 2008 for respectively Jordan and Lebanon, tertiary enrollment rate drops to respectively 41 and 52 percent.

⁶ Official National Accounts of the respective countries and represent average growth in real GDP over the period [2001-2010]. For Jordan figures can be found on the website of the Jordanian Department of Statistics www.dos.gov.jo; in Lebanon figures are public on the Prime Minister's office website www.pcm.gov.lb.

⁷ World Development Indicators (2010). WDI defines youth as individuals aged [15-24] years old. Figures for Jordan are more recent and they estimate youth unemployment at 27 percent in 2009.

with the strengthening of pull factors like growth in Gulf countries' economies and consequently growth in demand for labor which benefited from the constant increase in oil prices throughout the last decade. From this perspective, understanding the way in which incidents like migration, remittances and conflicts impacts young people's ability to acquire further education and consequently affect the human capital formation process of a whole country becomes more relevant.

Gender issues in countries of the Middle East have considerable importance as discrimination against women often exists. This is especially the case when looking at issues related to education access and quality, labor market access and earnings. To endorse this claim, the World Development Indicators estimate the average female labor force participation rate in the Middle East countries at 19.9 percent, the lowest in the world⁸ in 2009. Tzannatos (2008) goes further and shows that MENA is one of two regions⁹ that have seen a decline in female to male relative wages across three decades since the 1980s. Gender differentials are depicted as a result of societal and community pressures exerted on women. This is mostly the case in Middle Eastern countries like Jordan that has a conservative society. Societal impediments for women access to education or entrepreneurship activities have been well documented in the USAID (2007) gender report. The World Bank gender assessment report (2005) goes even further and states that despite considerable education progress, Jordanian women's economic role does not fit the pattern seen in similar middle-income countries. Hence the impact of a phenomenon like remittances might be different for female education, an issue that is explored with interest in this study. Finally observing the cases of Jordan and Lebanon could help understanding the linkages between remittances or armed conflicts and human capital in other middle income countries around the world, another value added brought forward by the thesis.

This thesis is divided into three separate essays, labeled as chapters in the document.

The first essay examines the impact of migrant remittances on human capital accumulation among youth. An augmented human capital model with two outcomes, education

⁸ Middle East countries include Lebanon, Jordan, Syria, Iraq, West Bank and Gaza. When observing MENA as a whole, female participation rate increases to 26.8.

⁹ The second region being Africa.

attendance and education attainment, is estimated using the 2006 household income and expenditure survey from Jordan. The chapter highlights the various channels through which remittances influence education outcomes and provides empirical evidence that migrant remittance receipt exerts 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, the two traditional empirical challenges faced in the literature. The analysis takes the gender dimension into account and examines whether the effects and magnitude of the remittance impact on both education outcomes is larger for men compared to that of women.

The second chapter examines the impact of migrant remittances on household education expenditure patterns. To do so, an Engel's curve based expenditure model (the Working-Lesser model) is estimated using also the 2006 household income and expenditure survey from Jordan. The model examines education spending behavior of households with different remittance receipt status compared to their non-receiving counterparts. Through calculating marginal budget shares and elasticities, empirical estimates identify whether migrant remittances do increase budget allocations on education and whether it does so at a lower or higher rate than non-receivers. In contrast to chapter 1, chapter 2 explores the impact of different remittances sources, international inflows (coming from other countries) and also domestic ones (coming from inside the Kingdom). The key empirical findings are obtained while controlling for socio-economic determinants of education spending, and are robust to censorship and selection bias. Following the literature on intra-household bargaining and gender spending preferences, the essay expands the analysis to determine empirically differences in spending behavior between female and male headed households when investigating the impact of remittances on human capital investment.

The third chapter examines the impact of the 2006 war on education attendance of youth in Lebanon. The objective is to depict the short term implications of armed conflicts on education and therefore capture the early behavior patterns of households towards human capital in the aftermath of a war. To this extent an augmented human capital model with education attendance as the outcome of interest is estimated using the 2007 Living Conditions Survey, a dataset collected one year following the Israeli war with Lebanon. The chapter examines the implications of a diversified array of possible damages

sustained: direct damages reflecting physical losses, human casualties and displacement along with indirect ones capturing losses in income, wages and employment for different members of the household. By highlighting the various transmission channels, the chapter examines the possible correlation between the nature of the damage sustained and the manner and magnitude in which such damage affects education. The chapter tackles the issue of potential endogeneity of the damage variables, and resorts to a wide vector of socio-economic and household characteristics as controls.

Chapter 1: The Impact of Migrant Remittances on Education Attendance and Attainment of Youth - The Case of Jordan¹⁰

1.1 Introduction

A growing interest in the field of migration and remittances is currently detected in both academia and policy making, pushing economic literature to initiate the development of frameworks for future research focus and policy implications. With remittance flows to developing countries reaching \$265 billion in 2007 (Ratha et al 2008), the development agenda in the world today is increasingly acknowledging the economic impact of migration and remittances. The development function of migration in developing countries includes not only benefits through transfers sent by remitters, but also from other equally important channels of transmission such as the transfer of knowledge and enhanced investments in human capital. Focusing on remittances, recent literature has started arguing for the positive contributions put forward by those foreign private transfers especially in enhancing various investments in the home country. Works of economists like Adams (1992, 2005) have managed to establish a link between remittances and investments generating future returns to households and consequently the overall economy. Moving away from the common perception of considering remittances as an additional source of consumption towards a view where remittances free up financial resources for investment, has pushed the literature to examine further this phenomenon. One of the main investments that a household could engage in is in effect the human capital of its members. Therefore, with large amounts of foreign private transfers pouring into developing countries and potentially going towards investments, the current research investigates the impact of remittances on education as a prelude to examining human capital formation.

From this perspective, the research's objectives focus on determining the impact of migrant remittances on human capital formation in one of the most vibrant regions the

¹⁰ A revised version of this chapter has been recently published as a peer-reviewed paper in the International Migration Review journal with Julie Litchfield (University of Sussex) and Jad Chaaban (American University of Beirut). Please find below the reference to the paper:

Mansour W.; Chaaban J.; and Litchfield J. "*The Impact of Migrant Remittances on School Attendance and Education Attainment: Evidence from Jordan*"; Volume 45; Number 4; December 2011.

I was responsible for all of the empirical analysis and a large portion of the conceptual planning and write-up in the paper.

Middle East. In particular, the study focuses on examining the case of Jordan a middle income country with no oil resources. Jordan is one of the highest remittances receiving countries with a very vibrant labor mobility and migration rates. Indeed, World Bank statistics in 2007 indicate that the share of remittances is around 20.3%¹¹ of GDP, which ranks Jordan as the world's 10th top remittance receiver proportionally to GDP¹². Additionally, 11.2%¹³ of Jordan's population is considered to be migrants. With such large magnitude of remittances, the study investigates whether foreign private inflows are encouraging education in Jordan. Since compulsory primary and basic education laws are strictly applied in Jordan, the attention turns to investigate youth, a group that is a cross age where choices have to be made between proceeding with higher education levels of accessing the labor market. The research is also interested in depicting the gender dimension of this impact and highlighting potential disparities between male and female education. It is believed that such difference is partly explained by the perception of female education in a conservative society like Jordan, a question that is addressed in this study.

To examine the above objectives, the research utilizes a Jordanian Household Income and Expenditure Survey conducted in 2006 to construct two human capital models each capturing a specific education outcome. The first model investigates education attendance and looks at the impact of migrant remittances on the current enrollment status of young Jordanians. Since school attendance is a binary outcome depicting whether an individual is still at school, the model is not evaluated using linear estimation techniques. A probit model and consequently marginal effects are estimated instead allowing the research to observe the pattern and magnitude of the impact of remittances among other determinants on the probability of individuals attending school. The second model looks at education attainment. Estimating such human capital model allows the study to examine the determinants affecting the progression of young Jordanians in the schooling system. Therefore, the model determines the impact of remittances at different schooling levels especially higher ones. Education attainment is measured through constructing a dependant variable capturing various schooling grades and taking into account the specificities of the

¹¹ World Development Indicators 2007.

¹² Migration and Remittances Factbook, the World Bank.

¹³ Development and Prospects Group of the World Bank.

Jordanian education system. The ordered nature of this education outcome implies the usage of a censored ordered probit model.

The human capital models in this essay are estimated for two age groups [15-17] and [18-24]. The relevance for examining these particular individuals is that their age matches high school and university education levels on one hand and the labor force entry at the other. Therefore, this allows the study to examine whether remittances are encouraging young Jordanians to pursue higher levels of schooling or whether they push them to access the labor market at early ages or even migrate in the quest of reaping higher returns. The human capital models are also estimated for different genders separately as the chapter is interested in examining the gender dimension when it comes to household education investments decisions. The study carefully tests whether remittances and other determinants have similar impact across gender or whether female education is perceived as secondary to male individuals.

The identification strategy selected faces two main empirical challenges: endogeneity and censorship. Often neglected in the literature, the chapter attempts to tackle these issues.

Endogeneity may arise when remittances receipt is not an exogenous shock. Three potential circumstances could present themselves. Firstly, it could occur as the decision to migrate, remit and acquire further education are decisions taken simultaneously by households. Secondly, endogeneity may arise because of a reverse causality between remittances and education outcomes (attendance or attainment). An alternative third possibility could occur as the result of correlation between remittances and omitted variables such as income shocks. In all cases, the treatment of remittances receipt as exogenous could potentially bias the estimated coefficients. These propositions are empirically tested in the chapter through resorting to instrumental variables that fulfill the orthogonality and relevance criteria¹⁴. Interestingly, these instruments fail the exogeneity test suggesting that, in the case of Jordan, remittances receipt is not an endogenous process. This result goes against much of the literature findings, but supports the consistency and non-biasness of the suggested non-instrumented human capital model.

¹⁴ The chapter will refer later on to validity of instruments. This occurs when both orthogonality and relevance criteria are satisfied.

As for censorship, this occurs due to the nature of the outcome of schooling attainment. Right-sided censorship is perceived since the sample accounts for both individuals who have completed schooling and those who are still enrolled and who will eventually finish more years of education than reported in the questionnaire. Right censoring also leads to bias estimates. To deal with this issue, the research reverts to the usage of a censored ordered probit model. Initially developed by King and Lillard (1983, 1987), this technique is still not widely used in the literature especially that which relates to remittances and education. It should be noted that the human capital models utilized in the essay are augmented in many ways. Various household, community, regional and individual characteristics are controlled for. Among these controls are the parents' education backgrounds, which are one of the main determinants in children's education.

The remainder of the paper is composed of ten sections. Section 2 is a literature review highlighting various works related to the economics on remittances and on education. Section 3 is a data description related to the household surveys utilized in this paper. Section 4 talks about the different channels for the impact of remittances on education behavior. Section 5 describes the features of Jordanian youth and compares the characteristics of individuals and households receiving remittances to their non-receivers counterparts. It also argues for gender specific analysis and modeling. Section 6 illustrates the theoretical background governing the relationship between the impact of remittance inflows and education behavior. Section 7 looks at the first augmented human capital model and highlights the impact of remittances on school attendance. Section 8 tackles the issues of endogeneity and the usage of instrumental variables. It also presents the empirical results of the instrumented human capital model. Section 9 explores the second human capital model which deals with the impact of remittances on education attainment. Section 10 examines marginal effects of the censored ordered probit model used and quantifies the magnitude of the remittance impact on education attainment. Section 11 concludes.

1.2 - Literature Review

The section dwells mainly on the economic literature related to migrant remittances and its relevant impact on some selected outcomes. Looking at the various hypotheses and empirical studies, this section presents a summary of the literature on human capital

models in an attempt to shed lights on education and schooling behavior outcomes. The section starts with the literature on the causes of migrant remittances and presents some of the early literature on remittances effects, before looking further at some of the more recent impact studies undertaken, mostly those related to the impact on the labor force¹⁵. The section then brings education into the picture and describes the literature behind human capital models. This lays down the floor to discuss the literature's most recent interest that looks at the links between migration, remittances and human capital formation, the main interest in this research.

The literature on the causes of remittances is more decisive on its conclusions than the literature on its effects. Causes are captured by two main streams of that literature. The first is what Elbadawi and Rocha (1992) call "the endogenous migration approach". This approach is based on the economics of the family, where motives to send back remittances are centered on the family ties with the migrant. Two motives are set: altruism and exchange (Cox et al 1997). Altruism is modeled in early work such as Becker (1974) or Lucas and Stark (1985), where mutual caring is acknowledged to be the prime motivation for remitting. Therefore, a utility interdependence model was specified where the migrant utility function includes components of parents or relatives' consumption. However, such approach was limited due to the difficulty of formalizing such motive into a rigorous mathematical model. On the other hand, more recent theories have focused on the "self-interested" (Chami et al, 2003) reasons for remitting. The family is viewed as a business entity where the relation between its members is considered as a contract. The cause of remitting is thus captured through several Principle-Agent models. De la Biere et al (2002) modeled the decision to remit and the amount of remittances by maximizing the utility function of those remaining in the original community subject to the migrant's participation constraint. Such decision is represented as an insurance model where remittance is the cost or premium of the insurance. Therefore, this modeling approach introduces a whole array of discussion concerning risk and asymmetric information creating moral hazard problems. In the above case, remittances are hence viewed as a repayment to an initial investment made by those receiving migrants' transfers. The second theory is called "the portfolio approach" which was developed by ElBadawi and Rocha

¹⁵ An application of the literature that was extensively examined.

(1992). This strand of the literature isolates the decision to remit from the decision to migrate, avoiding therefore the issues of family ties and family contracts. The basic idea behind the later approach is that remittances have similar behavior to other capital flows. Hence, the migrant's savings are allocated between host and home countries' assets. Remittances are considered as a direct result of investing in the home country. The advantage of adopting the portfolio approach resides in the usage of data related to rates of return of different assets, interest rates in both home and host countries, and estimates of political and other market risks.

The literature on the economic effect of remittances is not as widely developed as that on the causes leading to remittances. The general inclination of economists can be summarized in three major points. Chami et al (2003) describes these features in his review of the literature. First, the majority of remittances are spent on consumption. Second, a smaller part of those private transfers tend to be oriented towards savings or investment in both physical and human capital. Third, investments made possible via remittances are productive to individual households and not necessarily to the overall economy. The general productivity effect appears when new capital such as equipments is introduced; only then economic growth comes into the picture. Many empirical papers support such claim: Lipton (1980) considered that 90% of migrant remittances are absorbed into consumption and thus is incapable of generating future wealth neither on the household nor on the whole economy levels. Perwais (1980) in Pakistan wrote that "such earnings are frittered away in personal consumption". Sofranko and Idris (1999) found that very little Pakistani private transfers from the Middle East were channeled to create new businesses. Lopez and Seligson (1991) in El-Salvador reported that 40% of small businesses owners who receive remittances do not invest any of such funds in the business and Glytsos (1993) in Greece emphasized that migrants' private transfers were first spent on consumption and then on housing. However, recent empirical works have challenged the existing theory and went to conclude firmly that remittances were actually being used into investment and ultimately had an impact on the overall economy development. The corner stone of this hypothesis is that the analysis should not stress on the expenditure behavior between consumption and investment for remittance receiving families or individuals; but on the behavior of such group in comparison with non-remittance receivers. Adams (2005) argues

that if remittances were not being spent on investment they could probably have freed other resources to do so. Many empirical papers endorsed such claim: Adams (1991 (b), 2005) calculated marginal budget shares and found that households receiving remittances spent proportionately less on consumer goods (relative to non receivers), and increased expenditure on “education and housing” and on “land and agricultural equipments” respectively in Guatemala and rural Egypt. Alderman’s (1996) revisited the Pakistani migrants’ inflows and showed that remittances are oriented towards land and building development. Gilani et al (1981) found that although consumption formed 62% of the total remittances expenditure; the difference in the expenditure propensities with the non-remittances recipients was largely significant and hence households’ receiving those private transfers from abroad were more keen to spend on investment in housing, businesses and the financial sector.

Taking the remittances effect theories a step further, the literature has also focused on the relation between remittances and labor supply. It has suggested that remittances tend to reduce labor force participation. In effect, Fajzybler and Lopez (2006) argue that the additional income derived from such private transfers has an “income effect” that increases the demand for leisure and reservation wages, thus reducing labor force participation. However, a “substitution effect” away from leisure does occur as migration tends to directly reduce labor force size and put upward pressure on local wages, hence the increase in labor participation in regions with high migration rate. Several empirical papers endorsed the above claim: Hanson (2005) found that remittances reduced both the likelihood of working outside home and the number of hours worked in rural Mexico. Acosta (2006) in El Salvador concluded that remittances had a disincentive effect on labor supply and thus reduced labor participation for both genders. Nonetheless, other empirical works such as Funkhouser (1992) in Nicaragua do not agree with the literature and have found no significant effect of remittances on labor participation.

On the other hand, the literature on education is very diverse and comprises different elements and the determinants of education decision are numerous. Indeed, the literature looks at different issues among them education choices, household behavior, earnings and impact of education on labor. Human capital though came into the picture due to works done by Shultz (1960), Becker (1964) and Mincer (1974). Those economists

argued that education should not be viewed as consumption good but rather as an investment that entails future returns and earnings. Shultz (1960) considered that an individual's education should be treated as an investment and the consequences of such choice should be viewed as a form of capital. Similar to any physical capital, choices to invest in additional units depend on input prices, non-market prices and expected future returns. Therefore, human capital models were constructed through inserting education behavior into Becker's (1981) household production function. Doing so entails that education decisions can be perceived through a utility maximization exercise that is subject to three constraints: money, time and the household's own production function. This will be illustrated more thoroughly in a later section when the empirical models of this research are described. On the other hand, recent literature started augmenting the human capital model by including different determinants of education. Empirical studies, including education earnings models, started examining various community and society characteristics that affect schooling decisions. Holmes (2003) for example included religious environment for an education attainment model in Pakistan, and Al Samarrai and Reilly (2008) looked at family member's education and labor background. Many empirical studies exist in the education field with various outcomes estimated. This chapter comes as one of these studies that takes the human capital model further by looking at two different education outcomes and augmenting the model in different manners¹⁶.

Recent literature started examining the direct impact of migration and remittances on household behavior especially education attendance and education attainment. Despite some of the literature suggestions that remittances can overcome borrowing constraints that previously limited investment in human capital, these inflows have a potential negative impact on education attainment especially for children. The basis for this later claim is that returns from investing in education can be lower for workers considering migration. This will negatively impact schooling of children whose families prefer to let them access the labor market and migrate as soon as possible without completing school. This is accentuated when markets in host countries do require low skilled workers. Empirically though, studies are not in complete accordance with such theory. Economists have advocated for both the positive as well as the negative impact. Hanson and Woodruff

¹⁶ The additions in the model are referred to gradually in the upcoming sections of the chapter.

(2007) found that remittances do have a positive impact on 10-15 year old girls in Mexico. Cox-Edwards and Ureta (2003) in El Salvador showed that children in remittance recipient households are less probable to drop out from school. Such effect is due to lessening budget constraints. On the other hand, more recent work has started to depict mixed evidence. Indeed, Lopez Cordova (2005) found a positive effect for children aged five and a negative one for those between 16 and 17 years old in Mexico. Recent works have also started to lean towards investigating the set of characteristics that do influence the impact of migration on education. These range between wealth, education and labor status of household members and others. This is evident in Acosta (2006) who linked migration and remittances to child labor, female participation in the work force and educational attainment. In addition, McKenzie and Rappoport (2006) emphasized the role of gender, mother education and participation in different economic activities in determining the impact of migration on education and consequently human capital formation. The recent literature hence admits that migration and remittances have a direct impact on education, but are not decisive on the nature of this impact (positive vs. negative). Therefore, the literature recognizes the importance of identifying the relevant factors behind such impact. From this perspective, this study tries to identify those relevant determinants of education attendance and attainment in Jordan. It concludes on the nature of the impact of remittances on human capital formation, and is hence an empirical addition to the current literature debate. The paper turns now to describe the data used in this study.

1.3 - Data Description

1.3.1 - The Jordan Household Expenditure and Income Survey

The data used in this paper comes from a 2006 cross-sectional household survey entitled the “Jordan Household Income and Expenditure Survey” (HIES). The survey was conducted by the Jordanian Department of Statistics (DOS) 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 12768 households from all 12 governorates in Jordan. This sample gave information on 73949 individuals. The 2006 HEIS constitutes an update of a household expenditure survey conducted in 2002 by DOS itself. Both surveys incorporate similar modules and uses identical questionnaire. The 2006 HEIS does not identify the same households that were surveyed in 2002, however it uses the same primary sampling unit and geographical identification¹⁷ as the 2002 HIES. Such homogeneity could be useful in subsequent studies for potential temporal analysis. On the other hand, the 2002 HIES includes two additional modules where it explores in great details additional information related to respectively Education and Health. These modules will be utilized to construct some of the control and instrumental variables of the empirical models as shown in later sections.

1.3.2 - Remittances and Schooling Variables

The key variables of interest in this study are Remittances and Schooling. These are the main variables whose interaction will be examined across this paper. The study will first describe information available on remittances before dwelling on schooling characteristics. The 2006 HIES offers several questions related to Remittances under the household income module in general and the section on transfers in specific. This later section offers data on all sources of private and government transfers coming from inside the country and abroad. In addition, details on in-kind and cash amount of such transfers are specified. In specific, remittances in this paper are defined as private transfers coming from individuals or relatives residing outside the country. The data offers additional questions on the amount of those remittances and on the method followed to conduct such transfers via banks, post, individuals, by hand or other means. The research utilizes a binary variable reflecting whether an individual is a member of a household receiving remittances rather than a continuous covariate depicting cash amounts received. As pointed out by Cox-Edwards and Ureta (2003), remittances cash amounts are not reliable information especially that households tend to pool different income resources when asked to recall the value of the transfers. This is very common in income and expenditure surveys similar to this one. In addition, Freund and Spatafora (2005) and Acosta (2006) indicate

¹⁷ These are districts and small sub-districts called “nahia”.

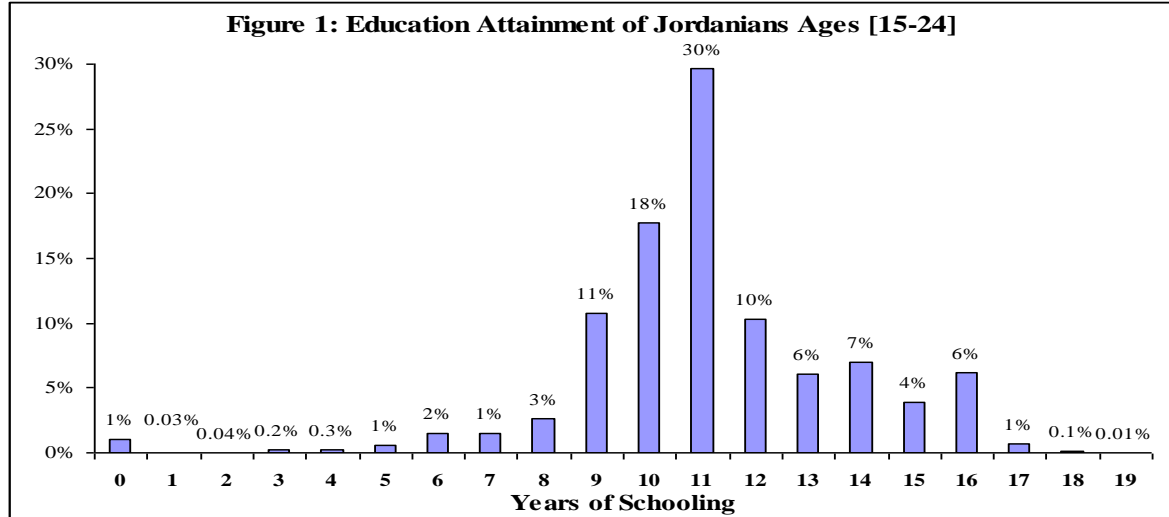
that remittances tend to be underreported in household survey data. This is true when these figures are compared to macroeconomic figures of remittances presented in national Balance of Payments. Therefore, using amounts of remittances in a model might introduce measurement errors and a downward bias of the estimated coefficients on the impact of those private transfers on education attendance and attainment.

The main measures of education outcomes in this research are current schooling attendance and education attainment. It should be indicated at this stage that the 2006 questionnaire only offers education information for individuals aged 15 and above. This does not affect the study since the strict application of compulsory education in Jordan implies that very few children less than 15 are part of the labor force. The impact of remittances on education is believed to be negligible at a younger age. Additionally, the targeted population in the study is youth defined by individuals aged between 15 and 24 years old. The choice of investigating this particular age grouping stems from two main assumptions. The first assumption builds on the idea that this age bracket corresponds with both higher education levels mainly high school and university, and accessing the labor market. Individuals at this age group have the option between the access to formal labor market (contrary to younger children who will have to go to the informal sector due to child labor protection laws) or to higher education. Hence, while controlling for various characteristics, this enables the study to examine the influence of remittances in swaying one of the choices. The second assumption considers that individuals aged [15-24] benefit presently from remittances for acquiring additional education. This is the case since the study uses a cross sectional data. Older individuals would have benefited from those private inflows to actually finish schooling at a time prior to carrying out the 2006 HIES. Capturing this temporal effect is not possible in this study in the absence of time series or panel data. The distinction in the enrollment status at all level of schooling (i.e. school, vocational training and university) is however possible to have. Indeed, the 2006 HIES asks the household members whether they are currently in an academic institution, whether they have previously attended one or whether they have never attended at all. The survey goes further to ask individuals currently or previously enrolled for the highest academic degree obtained and the number of years of schooling successfully completed. The later questions lead the study to highlight the second measure of education used: school

attainment. The paper follows Holmes (2003) and McKenzie and Rappoport (2006) in using years of schooling successfully completed as a measure for schooling attainment. For this purpose, figure 1 was constructed to highlight the education attainment of the whole sample of Jordanian youth aged [15-24]. The sample distribution is not normal and peaks appear at certain years of schooling. The peaks are explained by the different behavior of individuals at different periods and levels of schooling especially that the choice of continuing school at the end of a schooling level is different than when during it. From this perspective, the research has constructed schooling categories using thresholds that accounts for the behavioral changes as represented by the non-linearity of the schooling trends and for the Jordanian education system specificities. The categories of schooling attainment constructed are the following: 0 years of schooling. This category captures illiterates who have never accessed school, Elementary education with [1-6] years of schooling, Preparatory education with [7-8] years and Basic education for [9-10] of successfully completed years of schooling. The later three levels of schooling are compulsory in Jordan and the law is strictly enforced with public schools offering such education for much reduced tuition fees. To endorse this claim, figure 1 indicates that only 6.7 percent of youth have only a preparatory degree or less. In addition a mere 1 percent have reported not to have completed any year of schooling. As for higher levels, secondary education corresponds usually [11–12] years of schooling. However this category is divided for 11 and 12 years separately. The rationale behind such divide is the fact that Jordanians who finished basic education will entail no further costs to go into the secondary level and access the 11th year. This is why a peak is perceived in figure 1 with 30 percent of youth having successfully completed 11 years of schooling. However, by the end of year 12, students need to undertake a national exam. The results of such exam determine whether they can obtain a place at the public universities¹⁸ and which majors they are entitled to choose. A lot of students fail this exam or do not accumulate grades that enable them to access a university. Therefore, it is a common practice in Jordan for the students who fail to access vocational training or the labor market. The opportunity costs of repeating this year is thus higher than choosing a vocational school or the labor path

¹⁸ Most of the Jordanians who are pursuing a university degree are registered in public universities. The national exam is the major entry requirement. Private Jordanian universities and foreign ones are a costly alternative that could not be afforded by all Jordanians.

especially for students who cannot afford a private school with an international curriculum¹⁹ or a private university²⁰. As for University degrees, an undergraduate education level was constructed for [13–15] years of schooling and the postgraduate rank was specified as equivalent to 16 years of education and above. Again, at 16 years of schooling, figure 1 depicts a peak in the distribution with 6 percent of total sample.



Having examined the schooling distribution of the whole sample, the study will focus its analysis on two sub-sets of youth: individuals aged [15-17] whose education should correspond to high school in normal circumstances, and individuals aged [18-24] who should be at a university age. Categories of school attainment will be constructed separately for each of the sub-samples. This entails setting different thresholds as to account for the specificity of the respective education attainment distributions especially at higher schooling levels. Indeed those aged [15-17] could not have acquired more than 15 years of schooling for example. The various thresholds for each age category will be identified when the education attainment model is discussed later on in the chapter.

¹⁹ Private schools with international curriculum are those who offer International, British or French Baccalaureates. Graduates of such schools usually enter private universities.

²⁰ Students who can afford a private university can access higher education as freshman without having to pass the national exam.

1.3.3 - Shortcomings of the Data

The data present two shortcomings that need to be addressed early on in the analysis reported here. The first is the absence of any information on whether the household has any migrant abroad and the characteristics of this migrant. The 2006 HIES only considers households with individuals living within the same dwelling. In the absence of such data, the research assumes that the impact of migration on educational outcomes is only through remittances. However, other channels are embedded in the household composition and dynamics itself. An example could be set when the migrant is a parent and schooling choices are influenced through a lack of direct parental control. Therefore, failing to control for such effects, which are well described in McKenzie (2005), could lead to potential bias in the relevant regression model's estimated coefficients due to omitted variables. However, this might not constitute a problem if we consider the following. First, the above assumption has been adopted by most remittances impact studies due to the difficulty in obtaining specific data on migrants. Second, the empirical models used in this paper have shown great consistency and very encouraging results especially in passing several statistical significance and model specifications tests as highlighted in later sections. Additionally, the potential use of instrumental variables in this study²¹, which predict whether a migrant sends more private transfers than another by estimating the probability of remitting, does separate the impact of remittances from other migration effects: an argument endorsed by the McKenzie and Rappoport (2006) and the Yang (2004) papers. The second shortcoming of the data resides in the fact that the survey is only cross-sectional and does not follow the same group of households across time. Such panel structure would have been ideal to incorporate fixed effects that capture variation for within households across time and thus deals with unobservable characteristics and selection issues. The lack of time series data prevents the analysis from looking at individuals and households who benefited from remittances prior to 2006 the time of the survey. Such shortcoming might be overcome by conducting temporal analysis using the 2002 and 2006 HIES. This is potentially possible since both surveys use similar primary sampling units, and households selected for both panels (2002 vs. 2006) can be very close in terms of community and personal characteristics. A pseudo panel could hence be

²¹ Issues related to endogeneity of the remittances variable and usage of instrumental variables will be discussed extensively in a later section.

adopted with analysis undertaken using aggregates on those primary sampling units' level. This goes beyond this paper especially that access to the full 2002 dataset was not possible. Additionally endogeneity, selectivity biasness and censorship are all issues that are dealt with using various econometric techniques. A thorough discussion on these topics is made at later sections.

1.4 - Remittances and Channels of Impact on Education

To understand the causality relationship between the two variables, the channels of direct impact of migration and remittances on education choices are described below. This impact could be translated into either a negative or a positive effect.

The negative impact is depicted when remittances are considered as returns to migration and those returns are higher than the returns from investing in schooling and higher education degrees. Consequently this entails a possible decrease in educational attainment of children and adults. Individuals, especially youth, might opt to stop schooling or migrate directly after high school in order to send back remittances the earliest possible, and thus will choose to forgo higher education. Dropping education is thus 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. This channel of impact stems from ElBadawi and Rocha's (1992) "endogenous migration approach", which is based on the economics of the family where motives to send back remittances are centered on the family ties with the migrant. On the other hand, another channel for the negative effect is perceived through the attempts to cover for household's shortage in manpower. The absence of migrants from their families could entail additional work for other members of the household in order to secure the labor shortage or the forgone income that the migrant could have potentially earned. The problem occurs when present household members are forced to quit schooling in order to provide for such shortages. Having said that, the current established migration networks along with cheaper transportation have reduced the cost of migration and have potentially encouraged Jordanian youth to quit schooling and migrate. Additionally, the economic prosperity in the Gulf region and the consequent employment creation, which arose as a result of oil prices increase, has been another major pull factor for young Jordanians to

pursue higher financial returns in those countries, and therefore reducing incentives to acquire higher levels of education.

Contrary to the above, migration and remittances could also exert a positive impact on educational attainment. Two main mechanisms govern such positive effect. First, remittances sent back to migrant households could participate in alleviating liquidity constraints and overcome borrowing limitations. Thus it encourages household heads to invest in their dependant's education. This claim has been endorsed by recent empirical works such as Adams (1991, 2005)²² 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 households who do not receive such private transfers. 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 acquiring higher degrees especially in university. The empirical findings of this chapter reveal later on that these positive channels of impact are more dominant and explain better the Jordanian case.

1.5 - Features of Jordanian Youth

1.5.1 - Summary of the Main Characteristics by Remittance Receipt Status

The study turns to look at summary statistics for some characteristics related to Jordanian youth categorized by remittances recipient status. These statistics come from the analysis of the 2006 HIES data. Table 1 summarizes a set of socio-economic, regional, wealth and education characteristics for individuals and households receiving remittances and compares them to those with no access to such private transfers. The differences perceived through this table between remittance receivers and non-receivers are attributed to either the decision to migrate and send remittances or to the consequences and uses of such transfers. At this stage, it is not possible to distinguish between causes and consequences of receiving remittances. These are validated when the chapter models the impact of remittances on education behavior. This section looks at the composition of the

²² A more thorough discussion on the literature of migration and remittances effects is found in the literature review section.

household first, and then discusses the regional aspect, the wealth status and the different levels of education for the two sub-samples.

Table 1: Jordan Descriptive Statistics

	All Sample	Remittances	
		Recipients	Non Recipients
Sample Size	14623	1041	13582
<i><u>A) Education Characteristics</u></i>			
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%
<i><u>B) Individual and Household Characteristics</u></i>			
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%
<i><u>C) Regional Characteristics</u></i>			
UR	75.7%	90.7%	74.5%
Amman	49.5%	53.2%	49.2%
Balqa	4.5%	1.4%	4.7%
Zarqa	6.2%	5.3%	6.2%
Madaba	3.5%	0.5%	3.7%
Irbid	16.2%	30.5%	15.0%
Mafrq	5.6%	6.2%	5.6%
Jarash	1.2%	1.0%	1.2%
Ajloun	4.3%	0.2%	4.6%
Karak	1.5%	0.0%	1.7%
Tafilah	4.0%	0.9%	4.2%
Maan	1.5%	0.0%	1.6%
Aqaba	2.1%	0.8%	2.2%
<i><u>Dwelling Characteristics and Asset Ownership Status</u></i>			
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%

* Note: All figures are statistically significant at 1% level

As depicted in table 1, the household composition of individuals receiving remittances differs from that of non-receivers. A family receiving remittances is on average smaller in size (7.0 members compared to 7.7), with fewer children (4.9 vs. 5.5). This could be driven

by the absence of the migrant which was not accounted for in the survey. Additionally, remittance receiver families have on average fewer dependants²³ than their non-receivers counterparts. Table 1 depicts a dependency ratio of 0.075 compared to 0.082. This indicates that unlike common belief, remittance inflows are not necessarily channeled towards families with more dependants that require higher financial means to cater for their needs.

On the other hand, when comparing dwellings, it appears that on average recipient households reside in larger houses. This is reflected by both the numbers of rooms (4.7 for receivers compared to 4.1 for non-receivers) and the mean dwelling area (148.9 m² to receivers compared to 129.2m²). However, these findings do not necessarily suggest that remittance receivers are wealthier especially that non-receiver households tend to owe their dwelling more frequently than the receivers' counterparts. In addition, when looking at ownership of certain assets, table 1 points out that although it is more probable for household remittance receivers to owe a car and a computer, non-receivers appear to have higher probability for owning land. The above figures hence do not provide evidence as to which category of household is usually wealthier. Accounting for wealth status is very essential especially if evidence supports the idea that one category (i.e. receivers or non-receivers) come from a specific income segment of the population. Failing to account for such a characteristic leads to sample selection problems that could bias the estimates for the impact of remittances in any econometric model. Therefore, there is a clear need to control human capital models for wealth²⁴.

As for regional residency status, table 1 suggests that individuals receiving remittances are more prone to be living in urban areas as compared to their non-receivers counterparts. This is expected especially that the economic means of urban families are usually higher than rural households and could potentially support the initial costs in sending migrants abroad and receive remittances. In addition, sending remittances to urban regions tend to be easier especially with more banking services and money transfer offices. The above is confirmed by the differences that appear in the residency status across

²³ Dependants are defined as members of the household that are less than five years old and older than 65.

²⁴ A more detailed discussion on selection issues and on the choice of assets, expenditure or income as indicators for wealth status is discussed when the features of the econometric model are presented in later section.

governorates. Remittance receivers tend to be more residents of the capital city Amman rather than other districts in the Kingdom that are more rural and hence do not contain many cities.

The education profile of individuals receiving remittances appears to be better than the than those with no access to such transfers. Table 1 indicates that remittance receivers tend to have successfully completed on average 12 years of schooling compared to 11 for the non-receivers. Two additional indicators need to be taken into account when looking into the education profiles of both groupings. First, the schooling enrollment rate among remittances receivers has reached 44%, a rate which is significantly larger than the 33% registered by non-receivers²⁵. Second, the share of individuals holding a university degree among remittance receiver reached 10% compared to 6% for non-receivers. The education profiles presented above indicate that remittances seem to play a role in encouraging individuals to continue education especially at higher levels. Table 1 also highlights parents' education profiles. Looking at average years of schooling successfully completed, mothers of individuals in households receiving remittances seem to be more educated than the non-receivers counterparts (respectively 9 and 7 completed years of schooling). However, the opposite result appears when looking at the mean years of schooling for fathers in both groupings. Parents' education status is one of the important determinants of education behavior as it is believed to impact household education investment decisions. This discrepancy suggests a potential adverse impact between paternal and maternal educational background²⁶.

1.5.2 - The Education Profile of Male and Female Youth

Results in the previous section suggested that education behavior between remittance receivers and non-receivers is different. Figures 2 to 5 also reveal that such difference in behavior could exist between genders as well. To test this claim, the study looks at the education profile of male and female youth separately. Table 2 summarizes education mean characteristics for separate genders by the age categories previously selected [15-17] and [18-24]. Results indicate that females in both age categories tend to

²⁵ The enrollment rate identifies the percentage of individuals in the full sample aged [15-24] that are currently registered in a school, a vocational training center or university.

²⁶ The estimates of the empirical model in this chapter will validate all of the above claims.

have a higher enrollment rate and accumulate more schooling years than males of the same age group. A t-test for joint statistical significance of the means was also conducted and outcome was reported in table 2.

Table 2: Jordan Mean Education Characteristics by Gender

Age Category Gender	[15-17]		[18-24]	
	Females	Males	Females	Males
Sample Size	2376	2380	4525	5342
<i>A) Education Characteristics</i>				
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
 $H_0 = \text{mean}(1) - \text{mean}(2) = 0$ / Significance Level: *1%, **5% and ***10%

For ages [15-17] only enrollment rate seems to be statistically different between the gender sub-samples while for age bracket [18-24] both education indicators - enrollment and completed years of schooling - statistically differ at the mean for young men and women. This difference is explained by male access to labor at this age. Indeed, male youth are more prone to dropping school to go into labor at this age especially that the formal labor age is 16 in Jordan. This becomes more the case as men grow older, which explains the larger magnitude in difference in education outcome between genders for the age group [18-24].

As for females, accessing the labor force especially at younger age is not a desirable option especially that it might not be a socially acceptable choice. Therefore, they tend to continue their education. The statistical significance of the difference in the mentioned means is a first indicator for examining the impact of remittances on education of males and females separately. The study opts for this option and evaluates the below proposed human capital models by gender. In addition, the validity of this separation is further tested empirically using a likelihood ratio test version of Chow's F-test. The log-likelihoods of pooled and gender specific human capital models for education attendance and attainment are specified in table 3. It should be noted that these figures are extracted from the Probit of the education attendance model and the Censored Ordered Probit of the education

attainment model. Both will be investigated in the upcoming sections. Results of the Chow test in table 3 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.

Table 3: Results of the Chow Statistics

Log Pseudo-likelihood	Age [15 - 17]	Age [18 - 24]
<i>The Probit Model (Education Attendance Model)</i>		
Pooled	-1397	-5439
Male	-818	-2963
Female	-553	-2404
Chow Test F-statistic (prob. Values)	0.000	0.000
<i>The Censored Ordered Probit Model (Education Attainment Model)</i>		
Pooled	-1848	-12568
Male	-1104	-6976
Female	-718	-5401
Chow Test F-statistic (prob. Values)	0.000	0.000
<i>Degrees of freedom</i>	<i>(16, 4669)</i>	<i>(17, 9833)</i>

Prior to describing the empirical models, the study briefly examines the marital status and enrollment rates of both genders. Looking at the statistics in table 1, results indicate that a very small portion of individuals aged [15-17] are married; 0.2% of the male sample (4 observations) and 2% of the female one (51 observations). Out of this very small number of observations, all men are enrolled at school while 98% of the females are not. The strong collinearity between marital status and enrollment rate in addition to the very small number of individuals who are married pushes the study to eliminate these observation from the sample that is utilized in the below human capital models. However, this will not be the case for the sample of age [18-24]. Although strong collinearity appears to exist (refer to figures of table 1), the number of married individuals is large (reaches 19% of the sample for females). Hence dropping them entails losing a significant amount of information. An additional rationale for keeping these observations is the fact that marital status is a key social factor that hinders education attendance and attainment as the

study argues when it examines the results of the augmented human capital model in the upcoming sections. In the rest of the analysis, the age category [15-17] will not include marital status as married individuals will be dropped from the sample while they will be kept for the age grouping [18-24].

1.5.3 - The Education Profile of Remittance Receivers vs. Non-Receivers

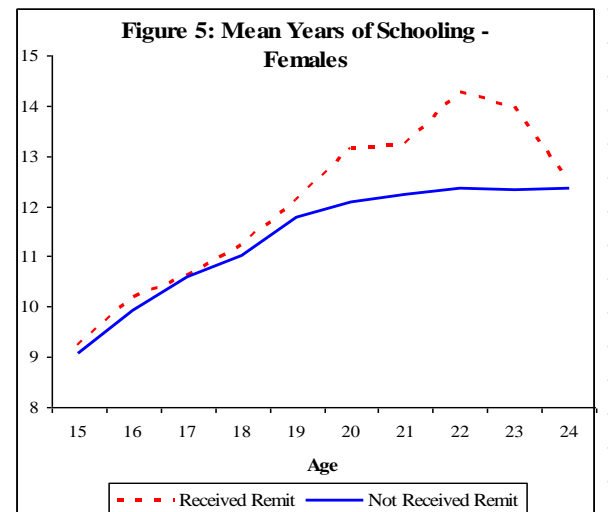
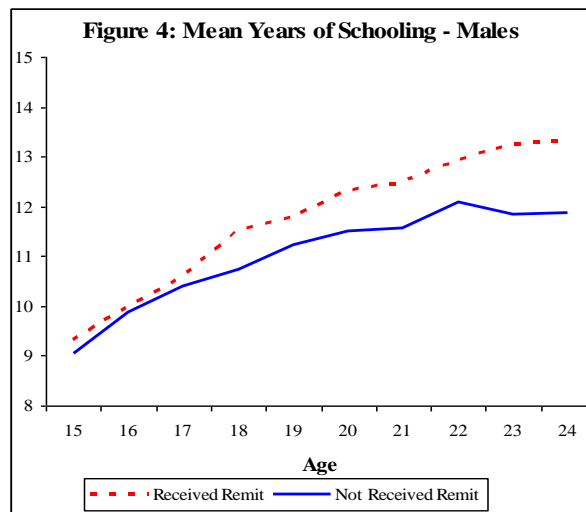
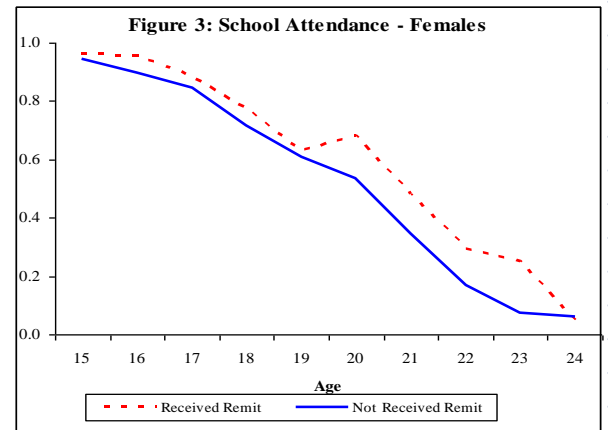
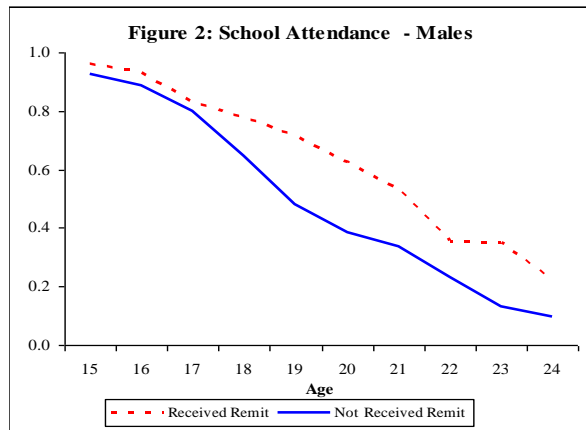
Summary statistics have revealed differences in individuals' education profile by remittances receipt and by gender. To investigate this difference more closely, the chapter turns to highlight the distribution of education attendance and attainment by age, gender and remittance receipt cohorts. These are illustrated in the annex tables A1 and A2. As expected, the tables reveal that the average rate of education attendance drop with older age cohorts. However the average attainment, measured by “years of schooling successfully completed”, increases as older individuals are considered. A result replicated for each gender²⁷. The sub-section dwells further on these issues below.

Examining differences in education attendance first; figures 2 and 3 plots the proportion of respectively males and females attending school/university by age and remittance status of their respective households. The figures indicate that individuals from both genders living in households receiving remittances are more prone to attend school/university when compared to their non-receivers counterparts. The difference in behavior is accentuated for males as the gap between both distribution has a larger magnitude than the females' one. This could be explained by a combination of factors such as community pressure, discrimination and lower earnings, which could disincentive women above the age of 15 from pursuing more education. In addition, the age profile seems to tell an interesting story. Looking first at males' behavior, the difference is most perceived at the age category [18-24]. This category represents youth who are usually more prone to migrate. However, the graphs indicate that such youth group receiving remittances is opting for higher education degrees²⁸ rather than accessing the labor market or migrating. This goes along with what was said earlier that remittances in Jordan are

²⁷ Tables A.1 and A.2 in the Annex illustrates the summary statistics of education attendance and attainment, measured by years of schooling successfully completed, by age and remittances cohort. The tables show the mean of education outcomes and the magnitude of the cell size for each cohort. These tables are used to construct the figures 2 to 5 subsequently.

²⁸ Most probably university level degrees.

encouraging youth to obtain higher degrees in order to find better profiled positions abroad. A similar story could be told for female youth, mainly women aged 18 and above. Such findings imply that remittance inflow could have a positive gender impact where it encourages females to obtain a better education profile in a patriarchal society where female education comes as a lower priority than males' schooling.



On the other hand, highlighting education attainment also reflects the difference in profiles between receivers and non-receivers. To capture this difference, figures 4 and 5 indicate that individuals coming from remittance receiving households are achieving additional years of schooling compared to their non-receivers counterparts. These figures plot the mean of years of schooling attained by age and by remittance receipt status. Results are shown for both genders. Again results indicate that the behavior mostly differs for individuals aged 18 and above. By looking at the male distribution first, the study

notices that men from remittance receiving households are opting on average for more than 11 years of schooling as compared to slightly higher than 10 for their non-receiver counterparts. Such result strengthens the claim that remittance receivers are choosing to continue their education and opt for higher education degrees and universities rather than accessing the labor market. Examining the gender perspective, remittances receiving women aged 18 and above have also higher education levels on average if compared to the non-receivers. The difference in behavior appears significant especially for youth as the gap between the two samples (i.e. recipients vs. non-recipients) widens starting at the age of 18. Additionally, results from figure 4 also suggest that remittances might play an additional role in attenuating community controls over the education of women in a rather conservative society such as the Jordanian one.

Remittances seem to have an impact on education choices of youth in Jordan. The above preliminary findings suggest that remittances might be participating in the human capital formation process in Jordan. In addition, such difference is perceived differently across various age categories. Indeed, the divergence appears to be larger for the age grouping [18–24]. Those foreign private transfers seem to be pushing Jordanian youth towards continuing their education or obtaining university degrees. However such impact still needs to be tested empirically and such linkage between remittances and education could not be established by looking solely at different distributions. This causal relationship cannot be affirmed since such difference in education behavior between receivers and non-receivers could be a consequence of receiving those foreign private transfers. The difference could also be due to different selection issues related to the sample distribution itself or even some hidden characteristics that are not reflected in these plots. From this perspective, the human capital models that this study constructs will take into account such issues and will be able to determine the impact relationship between remittances and the selected education outcomes. Having clarified the above, the chapter now moves to the theoretical discussion on the impact of migrant remittances on household behavior. This sets the ground for an expanded description of the econometric models used.

1.6 - Impact of Remittances on Education Behavior – Theoretical Background

The theoretical approach that guides most of the empirical studies on education behavior especially school attainment is based on the human capital model developed in the works of Shultz (1960, 1963), Becker (1964) and Mincer (1974). These economists have considered education as an investment good rather than a consumption activity. Hence, individual and household behavior towards such investment good is measured by the rate of return it generates. Indeed, individuals consider direct and indirect costs related to education and compare them to the expected return after schooling completion. Thus choices related to school attendance and school attainment will be made accordingly. Holmes (2003) specifies that investment in education ceases when marginal costs and marginal benefits from education are equal. To evaluate the derived demand determinants of investments in education, Holmes (2003) also suggests inserting human capital in Becker's (1981) household production model. This model is based on the assumption that parents maximize household utility where quantity and quality of children, leisure and different market goods are arguments. However, three constraints exist: money, time and the household's own production function. Such perception implies that education improves child quality. Therefore, time spent at school and direct education costs enters the production function for child quality. The reduced form demand determinants equation for schooling attainment, as reported in Holmes (2003), takes the following form:

$$S^* = F(W, P_m, P_n, V, X, Z) \quad (1)$$

where S^* is completed years of schooling for a member of the household; W is a vector of household wages and expected future earnings conditional on schooling; P_m is a vector of market input prices which includes cost of borrowing for investments in education; P_n is a vector of non-market prices such as distance to school; V is forgone household income; X indicates a set of individual and household characteristics; and C captures community characteristics other than P_m or P_n .

Having reviewed the human capital model and the interpretation of education as an investment good, the research brings remittances into the picture. Acosta (2006) proposes what he calls a “treatment effect” model of remittances on different outcomes. This general model enables to capture the impact of remittance inflows on several outcomes among which are schooling and education. The linear reduced form equation is the following:

$$Y_{ij}^* = \alpha X_{ij} + \beta R_j + \varepsilon_{ij} \quad (2)$$

where Y_{ij}^* captures the acquisition of an identified good for individual i in household j . In this particular chapter, Y_{ij}^* captures education attendance and education attainment. As for X_{ij} , it is a vector of individual and household characteristics; R_j captures remittance receipt (the variable of interest); and ε_{ij} is the error term linked to unobserved heterogeneity for different individuals.

By bringing the above two concepts into the research, this study proposes to estimate an augmented human capital model that addresses, among other things, the impact of remittances on education. The model used in the research goes beyond a simple human capital one as it integrates several additions that adds to its novelty and increases the level of complexity. First, it adds a remittances variable whose impact is monitored. Although the usage of an additional variable only shifts the education behavior curve upwards or downward²⁹, examining the impact of remittances is not common in the education literature. Second, the model examines two education behavior outcomes: school attendance and school attainment. Each specification entails a different set of econometric techniques and modeling that takes into account the binary or ordered nature of the dependant variables. Therefore probit and ordered probit models will be investigated accordingly. Third, the human capital model is instrumented so as to account for potential endogeneity between migration, remittances and education choices leading to selectivity biases. Empirical testing will be conducted as to the existence of such endogeneity using selected instruments. Adding instrumental variables (IV) to the model increases its complexity especially with data access limitations for the country under scrutiny. Fourth,

²⁹ No change is made to the slope since the remittance covariate used is binary.

the model is adapted to overcome censoring issues and non-normality of the distribution by resorting to maximum likelihood functions for censored and uncensored observations. Fifth, it is augmented by adding diverse vectors of household, community and regional characteristics. The specifications of this augmented human capital model and all the above econometric issues are discussed gradually in the upcoming sections.

1.7 - Remittances and School Attendance

1.7.1 - Description of the Empirical Model and Covariates Used

Building on equation (2), the research turns in this section to highlight the specifications of the first augmented human capital model used in this study with School Attendance as an outcome measure. This model concentrates mainly on looking at the impact of migrant remittances on school attendance. To do so, the research resorts to a probit model inspired by McKenzie and Rappoport (2006), Fajnzylber and Lopez (2006) and Holmes (2003) which takes the following form:

$$Ed^*_{ij} = \alpha_0 + \alpha_1 H_j + \alpha_2 X_i + \alpha_3 Pa_i + \alpha_4 C_{ij} + \alpha_5 R_{ij} + \alpha_6 A_j + u_{ij} \quad (3)$$

In equation (3) Ed^*_{ij} captures the propensity for education attendance by the i^{th} individual in the j^{th} household and is a latent dependant variable. The dichotomous variable that provides the observable counterpart to this latent dependant variable is Ed_{ij} and 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 expressed in equation (3) above. On the right-hand side of the equation, 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 characteristics and education, C_{ij} is a vector describing the community of the individual, A_j is a set of assets owned by households used to control for wealth (a thorough discussion on the usage of assets as proxy of wealth will be conducted later in the section), and R_{ij} is a dummy capturing individual being a member of a household receiving remittances. The term u_{ij} represents

the error term that is standard normally distributed. Having proposed equation (3) earlier, the probit model under scrutiny is more formally written in the following way:

$$\Pr(Ed_{ij} = 1 | H_j, X_i, Pa_i, C_{ij}, R_{ij}, A_j) = \Phi(\alpha_0 + \alpha_1 H_j + \alpha_2 X_i + \alpha_3 Pa_i + \alpha_4 C_{ij} + \alpha_5 R_{ij} + \alpha_6 A_j) \quad (4)$$

where: $Ed_{ij} = 1$ if $Ed_{ij}^* > 0$, and $Ed_{ij} = 0$ otherwise, and $\Phi(.)$ is the cumulative distribution function operator for the standard normal distribution. As mentioned earlier, it is expected that the impact of those foreign private transfers is potentially stronger for higher education given that the country in question is a middle income country that applies and enforces strict compulsory primary education laws. Hence the probit model described in equations (3) and (4) allows the influence exerted by remittances on school/university attendance for youth to be determined here for the selected sample of individuals aged between 15 and 24. 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 domestic circumstances are unfavorable. Before going further, it should be acknowledged that the identification strategy presented above faces the potential challenge of endogeneity between remittances and education attendance. This could occur as a result of reverse causality or due to potentially omitted variables. Endogeneity issues are thoroughly tackled and tested later in the chapter³⁰.

As specified in equation (4), the human capital model for school attendance used in this research is also augmented by diverse sets of vectors of independent variables. The broad nature of these covariates enables the research to better isolate the impact of remittances on schooling attendance and hence control for other factors. On household and individual levels, the model includes covariates related to age, family composition including number of children, number of adults, family size and age rank of individuals inside the household. Since education choices are believed to be taken collectively in the family, household demographics and characteristics have a direct impact on school attendance and thus should be controlled for. In addition, community covariates are twofold: measures depicting the supply side of education and regional controls. First, the supply side of education is controlled for by introducing a variable capturing the distance to the nearest school. This covariate measures the average distance between a household

³⁰ Refer to section 1.8.

living in a particular sub-district and the related education establishment. This variable has been constructed on a sub-regional level using the 2002 HIES dataset as such information is unavailable in the 2006 survey. To insure large variations in a country with only 12 governorates, this variable was constructed on a sub-regional level with 89 different clusters identified. The use of 2002 data was made possible due to the usage of same sampling units in both surveys. Second, controls for urban/rural are also included in the proposed model (4) as to depict regional perspective. To avoid collinearity, covariates representing Jordan's governorates were not included in the estimations. This is endorsed by the fact that governorates in Jordan are predominantly rural except for the governorate of the capital city Amman which is largely predominant urban. In effect, the 2006 HIES indicates that around 85% of the rural population lives outside Amman and 61% of the urban residents are living inside it. In addition, around 50% of the total Jordanian population resides in the capital city (refer to table1). From the above perspective, it is suggested using a binary variable depicting urban vs. rural residency of households as to control for the regional impact on education. On the other hand, parents' education is also captured in the proposed model. It is expected that parents with higher education influence positively their children's schooling regardless of remittances. From this perspective, the research has constructed covariates reflecting education attainment, more precisely the number of schooling years successfully completed, for both the father and the mother in each household. In addition, 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 children's schooling. Furthermore, mothers and fathers' education status might play different roles especially when looking at education choices from a gender perspective or from various age categories. This claim is supported by the empirical results as the study illustrates later on. One of these differences is depicted by Thomas (1990, 1994) who indicated 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 education background, it was emphasized in human capital and earnings model such as Al-Samarrai and Reilly (2008) who argued that highly educated fathers can exploit informal

network to secure better paid jobs for their children. The data available in the 2006 HIES does not allow to control for the ability of individuals. This constitutes a shortcoming of the dataset 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 in this survey to proxy innate ability in this study is parents schooling background estimated by mother and father's acquired years of education. Such proxy has previously been used in the literature such as the mentioned Al-Samarrai and Reilly (2008) paper.

1.7.2 - Controlling for Wealth Status

Having highlighted the importance to control for parents' education and other vectors of independent variables described in equation 3, this section turns to talk about the usage and construction of the covariates depicting wealth. 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. Doing so reduces risks of unobserved determinants of education and estimation problems resulting from omitted variables. From this perspective, wealth proxies could be captured using one of the following: income, expenditure or asset ownership status. The usage of each of the above proxy entails a set of characteristics that are unveiled below.

First, the 2006 HIES includes a module on household income. Questions related to income inflows from employment, different types of transfers, various rents, and property income including financial assets are all available. However, income data is often unreliable in household surveys. Indeed, 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. Non-labor income could also be difficult to recall especially when talking about different types of rent or revenues from financial assets such as savings deposits. Additionally, preliminary statistics have been constructed for the income data and showed inconsistencies in the figures due to misreporting and missing values. Acosta (2006) also raises the concern on whether pre-remittance income

should be considered or not. For all of the above reasons, the study refrains from using the income data as to measure wealth and control for its effect.

Second, expenditure is used in several economics studies to capture the economic status of households. Deaton (1997) explores the advantages of using expenditure as compared to income since it measures long run well being. This is true especially that consumption is much less volatile than income. Indeed, the latter fluctuates severely with any economic shock unlike expenditure, especially consumption, which needs more time to adjust. Thus income values reported at the time of data collection could be reflecting the shock rather than the true wealth status of the household. As indicated in the data description section earlier, the 2006 HIES uses a household expenditure diary method where aggregates are then computed by the study using price adjustments and adult equivalence scales. Although expenditure, mainly in per capita terms, is widely used in economic studies to proxy wealth and rank households by expenditure quintiles; introducing such variable in our augmented human capital model alongside Remittances could bias the estimated coefficients due to collinearity. Indeed, it is very likely that remittances and expenditure are correlated. Acosta (2006) argues that expenditure levels are affected by remittance inflows and thus using such variable will not be helpful in examining the role of selection in determining remittance recipients. This issue could also lead to potential endogeneity between remittances, expenditure and education outcome. To deal with such empirical challenge the study will need to instrument for expenditure. Nevertheless, common instruments used in the literature to capture expenditure are assets ownership. However, as highlighted later in the chapter, assets do impact directly education outcomes and are therefore not valid. Additionally income and expenditure data do not reflect necessarily past savings especially when a cross-sectional data is used. Other concerns are related to whether expenditure on durables, which is usually volatile, should be incorporated in the household total expenditure covariate at all.

In order to avoid all the previously mentioned concerns, asset ownership as a measure of wealth comes into play as a means to control for the impact of household economic status on schooling decisions. A concern could be raised that similar to expenditure, asset ownership and remittances could also be collinear especially that the data do not reveal whether these assets were purchased prior or after receiving remittance.

To address these concerns, the study argues that household ownership status of different assets is less likely to be affected by current remittances since assets are much less cyclical and volatile than expenditure. Therefore, assets are better able to reflect past savings and wealth status in general. Additionally, the chapter follows existing literature that has used assets to control for wealth. Indeed, Filmer and Pritchett (2001) suggest using a first order component statistical procedure to construct an asset index of different durable assets, access to utilities and housing. This technique consists of constructing a weighted linear index. Such index has been widely used in recent literature such as Acosta (2006) and McKenzie (2005). However, Lubotsky and Wittenberg (2005) indicate that the first component procedure may confuse wealth with tastes. Hence, they suggest using the full set of proxy variables for asset ownership rather than creating a summary index. This study has adapted this later methodology and chose the following covariates to measure wealth: ownership of computer, ownership of land, ownership of car and dwelling size. Further justification for the usage of such wealth proxies is illustrated by looking at table 5. This table captures the distribution of ownership of such assets by expenditure quintiles.

Table 5: Wealth Indicators by Expenditure Deciles

Expenditure Deciles	Household Ownership of:			Mean Dwelling Area (m²)
	Car	Computer	Land	
Decile 1	13%	11%	26%	98
Decile 2	22%	17%	24%	106
Decile 3	31%	23%	26%	112
Decile 4	31%	29%	27%	118
Decile 5	38%	32%	26%	121
Decile 6	43%	40%	29%	127
Decile 7	47%	42%	29%	128
Decile 8	61%	50%	29%	138
Decile 9	62%	60%	30%	148
Decile 10	79%	72%	37%	193

Note 1: expenditure deciles are based on per capita expenditure adjusted for regional price differences and adult equivalence

Note 2: The percentage distribution is based on individuals whose household own the asset

Table 5 indicates that only 13% of individuals in the poorest decile (i.e. decile 1) come from households owning a car compared to 79% for their counterparts in the richest decile (i.e. decile 10). Similar observations could be made for ownership of computers and land with respectively 11% and 26% for decile 1 compared to 72% and 37% for decile 10. The ascending trend in percentages highlighted by table 5 indicates that the ownership of a car,

a computer and land is a good proxy for the wealth of individuals' family. In addition, the same trend appears when looking at dwelling area. Table 5 points out that an individual from the poorest decile resides in a dwelling with an average size of 98m² compared to an average of 193m² for the richest decile. With a correlation coefficient calculated at 0.47³¹, dwelling area is also used as a covariate controlling for household wealth in the augmented human capital model under scrutiny. Before going further into the empirical analysis, it should be noted that the variables reflecting ownership of assets could be endogenous to education outcomes. While the problem is acknowledged for all assets, this is particularly the case when using computers. Endogeneity in this case could arise as a result of reverse causality between education attendance³² and the independent variable "ownership of computers". In effect, individuals who are currently enrolled at school/university along with those with more advanced education degrees have a higher probability of using a computer, and consequently owning one, compared to individuals who have dropped out earlier from the schooling system. If endogeneity exists then the coefficients of the ownership of assets are biased and consequently the results of wealth indicators are also biased and caution needs to be taken. Using instrumental variables to tackle potential endogeneity for wealth indicators is a difficult task due to limitations on using income and expenditure data, as explained previously, and due to the limited information offered by the household surveys in hand.

1.7.3 - Empirical Results

As previously discussed, the probit model presented in equations (3) and (4) was estimated for respectively males and females in order to determine the impact of remittance inflows receipt on school attendance for each gender separately. This probit model was conducted on two separate age categories: [15-17] where married individuals were dropped, and [18-24]. Such a divide was undertaken 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 these different age groupings, and to the accessibility of the labor force. These issues are discussed thoroughly below. The results of the school attendance model over the various sub-samples are depicted in table 6. It should be noted that results of the

³¹ This is the correlation of dwelling area on household per capita expenditures.

³² Or attainment as the chapter examines later.

pooled models by age categories are also displayed in this table along with the chow tests results. However, findings from this model are not discussed³³. Empirical estimates endorse the claim that remittances have a positive impact on education attendance for both genders. Indeed, the estimated coefficients for remittances appear to be all positive for both males and females. To estimate the magnitude of the impact and capture effectively this positive trend, marginal effects were calculated and displayed in table 7. Looking at the males sub-sample, the chapter notes that the only statistically significant impact registered by remittances is for individual males aged [18–24]. In effect, being a male in this age grouping and being in a household receiving remittances increases the probability of staying at school by 11 percentage points on average and *ceteris paribus*. This result indicates that remittances are encouraging Jordanian youth to continue their education and refrain from accessing the labor market at such age. For the mentioned individuals, remittances are allowing access to higher education or university since it should be the typical schooling level that individuals at this age normally ought to reach. Therefore, Jordanian males are opting to stay at school in order to reap higher returns from education and thus accessing the labor market at more highly graded jobs. On the other hand the statistical insignificance of the results for the other age grouping is understandable and can be interpreted in the context of Jordan. Indeed, remittances do not have an impact on education behavior for those aged [15–17] due to strict compulsory schooling laws that are enforced in the Kingdom. The 2006 HIES indicates that the enrollment rate for males in this grouping is 87%. Such high rate is mainly due to the large coverage of public schools that do not charge tuition fees and that subsidize books. Additionally, low earnings usually characterize the labor market for individuals with no high school degree. All of these factors help explain the insignificance of the impact of remittances on school attendance for youngsters below the age of 18 years.

³³ Section 1.5.3 has previously concluded on the need to estimate augmented human capital models by gender separately. Therefore only findings from gender specific models will be discussed.

Table 6: Probit Analysis for the Impact of Remittances on Education Attendance

Age	[15-17]			[18-24]		
Individual Currently in School	Pooled	Male	Female	Pooled	Male	Female
Remittances Receipt	0.132	0.155	0.104	0.174 *	0.293 *	0.049
Household Size	-0.171 *	-0.113 **	-0.243 *	0.053 **	-0.030	0.153 *
Number of Children Less than 5	0.016	0.056	-0.023	-0.045 *	0.024	-0.124 *
Number of Adults	0.150 *	0.122 *	0.192 *	-0.087 *	-0.094 *	-0.166 *
Number of Male Adults	-0.113 *	-0.079 **	-0.146 *	-0.116 *	-0.041	-0.030
Number of Siblings	0.119 *	0.050	0.192 *	-0.021	0.025	-0.086 **
Marital Status				-1.897 *	-2.422 *	-1.484 *
Urban	-0.433 *	-0.404 *	-0.463 *	-0.149 *	-0.172 *	-0.146 *
Birth Order of the Individual	2.2E-04	5.3E-05	4.7E-04	-2.9E-04 **	3.7E-05	-7.3E-04 *
Individual being the Oldest Child	0.041	0.015	0.079	-0.417 *	-0.450 *	-0.341 *
Mother Education	0.033 *	0.028 *	0.040 *	0.032 *	0.043 *	0.020 *
Father Education	0.033 *	0.028 *	0.039 *	0.024 *	0.025 *	0.020 *
School Distance (2002)	6.4E-05 *	1.1E-04 *	1.8E-05	1.1E-05	1.6E-05	2.7E-06
Area of Dwelling	0.002 **	0.001	0.003 *	0.0003	0.001 **	-0.0002
Ownership of Car	0.057	0.040	0.089	0.077 **	0.060	0.081 *
Ownership of Computer	0.549 *	0.578 *	0.525 *	0.473 *	0.507 *	0.439 *
Ownership of Land	0.038	0.102	-0.036	0.092 *	0.040	0.140 *
Constant	0.600 *	0.314	0.883 *	-0.308 *	-0.399 *	-0.117
Number of Observations	4701	2376	2325	9867	5342	4525
Pseudo R2	0.121	0.107	0.159	0.164	0.144	0.208
Wald Chi-Square	304	179	158	1396	781	744
Significance Level (Prob value)	0.000	0.000	0.000	0.000	0.000	0.000
Log pseudolikelihood	-1397	-818	-553	-5439	-2963	-2404
Chow Test F-statistic	51			143		
Significance Level (Prob value)	0.000			0.000		

Significance Level: *1% ** 5% ***10%

Note 1: Huber-White robust standard errors were used in the model. Standard Errors were clustered at the household level.

Table 7: Marginal and Impact Effect of the Impact of Remittances on Education Attendance

Education Attendance	Age			Age		
	[15-17]			[18-24]		
	Both	Male	Female	Both	Male	Female
Remittances Receipt ^{oo}	0.017	0.025	0.010	0.064 *	0.110 *	0.018
hhsiz	-0.024 *	-0.020 **	-0.024 *	0.019 **	-0.011	0.055 *
Number of Children Less than 5	0.002	0.010	-0.002	-0.016 *	0.009	-0.045 *
Number of Adults	0.021 *	0.021 *	0.019 *	-0.031 *	-0.034 *	-0.060 *
Number of Male Adults	-0.016 *	-0.014 *	-0.014 **	-0.042 *	-0.015	-0.011
Number of Siblings	0.017 *	0.009	0.019 *	-0.007	0.009	-0.031 **
Marital Status ^{oo}				-0.383 *	-0.341 *	-0.384 *
Urban ^{oo}	-0.053 *	-0.063 *	-0.038 *	-0.054 *	-0.062 *	-0.053 *
Birth Order of the Individual	3.2E-05	9.5E-06	4.7E-05	-1.1E-04 **	1.3E-05	-2.6E-04 *
Individual being the Oldest Child ^{oo}	0.006	0.003	0.008	-0.141 *	-0.152 *	-0.116 *
Mother Education	0.005 *	0.005 *	0.004 *	0.011 *	0.015 *	0.007 *
Father Education	0.005 *	0.005 *	0.004 *	0.009 *	0.009 *	0.007 *
School Distance (2002)	9.2E-06 *	1.9E-05 *	1.8E-06	3.9E-06	5.8E-06	9.9E-07
Area of Dwelling	0.0002 **	0.0001	0.0003 *	0.0001	0.0003 **	-0.0001
Ownership of Car ^{oo}	0.008	0.007	0.009	0.028 **	0.021	0.029 *
Ownership of Computer ^{oo}	0.075 *	0.096 *	0.051 *	0.172 *	0.183 *	0.160 *
Ownership of Land ^{oo}	0.005	0.017	-0.004	0.033 *	0.014	0.051 *

Significance Level: *1% ** 5% ***10%

^{oo} Impact effect was used for the case of dummy variables

Note 1: Marginal Effects were calculated at the mean of the variables

Note 2: Huber-White robust standard errors were used in the model. Standard Errors were clustered at the household level.

On the female side, tables 6 and 7 indicate that no statistically significant impact for remittance on women's education attendance is found in any of the two age categories used. For females in Jordan, two factors play a key role in preventing education attendance: age and marriage. The chapter will not introduce though an age control variable, even for the male sub-sample, given that the variation in the age measure is small and delimited by the narrow age brackets. As for the second factor, being married decreases the probability for women aged [18-24] of staying at school by 38.4 percentage points, on average *ceteris paribus*³⁴. Having highlighted the magnitude of the impact of marriage on human capital formation, it could be said that societal pressure plays a negative role on female's education. It is expected from young women in Jordan to find

³⁴ It should be noted that a double causality relationship might exist between education outcomes and marital status. Therefore, the chapter has estimated the econometric model again while taking out the marital status covariate and found no noteworthy differences in the estimated coefficients especially for the remittances receipt coefficient. This is replicated for all variations of the human capital model in this chapter. Results were not displayed but are available upon request.

husbands as they grow older and to establish their own families; thus preventing them from having time to continue education. Although remittances might alleviate budget constraints and increase the household's production function; the family's decision will be to primarily invest the generated income surplus in the education of sons rather than daughter's. 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. Doing so could be either from staying in Jordan or in many cases migrating abroad. Male migration is viewed as a diversification of family income as compared to females who are not expected to migrate and hence less weight is put on their education especially for families with limited resources. On the other hand, the gender perspective is accentuated by the difference in magnitude of the impact of remittances on school attendance between men and women. Remittances in Jordan seem to play a larger role in human capital formation for male youth as compared to their female counterparts. Such results point to the importance of males' education in the household investment choices while societal pressures continuing to be a relevant factor affecting negatively female educational achievements.

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 in equations (3) and (4). Let us first look at the effect of parental education and the role it plays in determining children school behavior at all age categories. It is expected that educated parents do value education and will therefore invest further into their children's human capital. In addition, those parents will be able to increase the quality of the education received as they will be capable to supervise and assist in their children's schooling work. From this perspective, tables 6 and 7 indicate that the estimated coefficients for both parents' education level are positive and statistically significant. On the father's side, the biggest impact is perceived for individuals aged [18-24]. A father with one additional year of schooling increases the probability for the young adult to remain enrolled at school by 1.5 and 0.7 percentage points for males and females respectively, on average and keeping other controls constant. As for the mother's education background, tables 6 and 7 highlight that the largest impact is depicted for the same age category mentioned above. Interesting findings suggest that the mother's education status

has a similar if not larger impact on schooling attendance compared to the father's³⁵. Such an observation suggests that educated mothers are gaining additional bargaining power in household decision-making. They are prone to participate in their children's schooling decisions as actively as their husbands despite the fact that fathers, in their traditional function as head of households in Jordan, have a higher weight in family decisions. This is more relevant in a gender context. Indeed, in a society where female education is perceived as less important than male education, an educated parent, especially the mother, will value his or her daughter's education and invest in it beyond compulsory education. The positive coefficient for individuals aged [18-24] also indicates that a mother's education plays a much larger role in the education process of young men since it will provide support for continuing higher education especially at university level.

The findings for regional residency status obtained using this probit model are particular. As indicated by tables 6 and 7, living in an urban area decreases the probability of attending school in Jordan for both genders. This is a result that contradicts, to the best of the author's knowledge, previous findings in the education literature. It is often believed that rural areas lack sufficient numbers of schools and universities, and that individuals sometimes will have to travel for large distances to reach their school or university. However, the statistical significance of the negative coefficient for the urban covariate indicates that the issue in Jordan is not related to lack of schooling institutions in rural areas. In support of this claim, the school distance control employed in this human capital model appears to have a statistically insignificant impact across different gender and age grouping. Even for the sub-samples that have indicated a statistical significant coefficient for this covariate, the magnitude of the impact was very small (see table 7). In addition, it should be noted that unlike most literature, this model looks at Jordanian youth aged between 15 and 24. Indeed, the study is looking at individuals who are old enough to be employed. From this perspective, to interpret the mentioned result, the issue becomes a question of ability to access the labor market. Urban youth are more tempted to quit schooling as labor opportunities are often more available in urban areas compared to rural

³⁵ This claim has been tested empirically. The difference in estimated coefficients for paternal and maternal education has been tested to see if it is equal to 0 using a chi-square test. Results indicated that the difference is statistically significant (H_0 rejected) for males aged [18-24] sample only. Estimates are available upon request.

ones. On the other hand, household demographics indicate that individuals from larger families tend to have a lower probability of schooling attendance. The magnitude of this impact appears to be larger for females. The difference in the magnitude of the impact of household size between genders is mostly consigned to those who are of university age [18-24]. This substantiates the claim that women's education in Jordan is still perceived as of secondary importance to males. It appears that education investment preferences for larger families, with obviously higher consumption, will go primarily towards sons especially under a constrained budget. Adding to the gender dimension, table 7 indicates that being the eldest daughter aged between 18 and 24 decreases the probability of staying at school by 11.6 percentage points, on average *ceteris paribus*. This could be attributed to the fact that women at this age in Jordan are expected to help in domestic chores or in raising younger children. As for men aged [18-24], being the oldest child in a household reduces the probability of school attendance by 15.2 percentage points on average *ceteris paribus*. These members of the households are indeed expected to work to provide additional sources of income especially in large families. As for wealth proxies in this human capital model, empirical results in tables 6 and 7 suggest that the common trend in the literature is upheld. Individuals from wealthier families seem to be more prone to stay at school/university as the household budget dedicated for education investment is less constraint.

Remittances seem to have a positive impact on education attendance of men aged [18-24]. Such results suggest that private transfers coming from abroad are enabling young Jordanian men to remain at school and continue to higher levels of education. Therefore, remittances seem to be contributing to the human capital formation of Jordanian youth. Findings also reveal a gender dimension as the positive impact on school attendance depicted for men was not statistically significant for women. This could be attributable to societal pressure and the perception of women's education in the Jordanian society. However, care should be observed when interpreting the above results as the probit model described in equations (3) and (4) could suffer from a potential endogeneity problem that has its source in the relationship between remittances receipt and education attendance. Endogeneity leads to a bias in the estimated coefficients and thus implies a potential for the misinterpretation of the results. In order to address this challenge, instrumental variables

(IVs) are needed. The issue of endogeneity and instrumental variables methodology are examined next.

1.8 - Endogeneity and the Instrumental Variables

1.8.1 - The Endogeneity Challenge

McKenzie and Sasin (2007) identify two main conceptual and empirical challenges that need to be addressed when estimating models used to determine the impact of migrant remittances on educational attendance and attainment. These challenges are: endogeneity and censoring. Both of these issues should be carefully investigated as they could bias the estimated coefficients when the econometric analysis is undertaken. Therefore the statistical significance, the magnitude and even the signs could all be questionable. This section describes the issue of endogeneity between the remittance variable and education attendance. As for censoring, this topic will be discussed later when describing the school attainment model.

Endogeneity arises because remittances may not constitute an exogenous shock. The decision to migrate, remit and attend school could well be made simultaneously by households. In this case, it will be difficult to establish a causal relationship. Additionally, reverse causality between the two variables can also occur. Indeed while the chapter delves into the impact of remittances on education attendance and the channels through which this impact is revealed, one could not neglect the possibility that higher education attendance could in its turn increase the probability of migrants sending remittances. This double causality could be accentuated in a country like Jordan with migrants often characterized as having high education degrees. From a mathematical perspective, the above implies that the vector of household characteristics Z_i explaining migrant remittances may also determine education patterns. The vector Z_i may include characteristics from H_i or any other covariate determined in equations (3) and (4). Translating the above into mathematical terms, the study examines the following equations³⁶:

$$R_{ij} = 1 \text{ if } \theta Z_{ij} + \varepsilon_{ij} > 0 \quad (5)$$

³⁶ All of the symbols in this sub-section depicting the various covariates have been previously identified and mentioned in the research when the equations of the school attendance model were laid down.

Such condition implies the following:

$$E(Ed_{ij}=1 | H_j, Pa_i, C_{ij}, A_j, R_{ij}=1) = \alpha_1 H_j + \alpha_2 X_i + \alpha_3 Pa_i + \alpha_4 C_{ij} + \alpha_5 + \alpha_6 A_j + \rho E(\mu_{ij} / \varepsilon_{ij} > -\theta Z_{ij}) \quad (6)$$

In the later equation, $\rho = corr(\mu_{ij}, \varepsilon_{ij})$ the standard error terms of equations (4) and (5). Therefore if the correlation ρ is not equal to zero, the typical reduced form regression in equation (4) will then generate bias estimates if failure to control for such case. In order to investigate the claim that $\rho = 0$, the study employs a “Wald test for exogeneity of the remittance regressor”. The test will determine whether endogeneity of the remittance variable is supported by the evidence requiring the need to instrument the remittance variable within the augmented human capital model under scrutiny.

Endogeneity could also arise due to potential correlations between remittances and unobserved determinants of education attendance. Under such observation, R_{ij} will be correlated with μ_{ij} rather than the covariates vectors specified in the human capital model of equations (3) and (4). Acosta (2006) specifies that one of the most common unobserved determinants is represented by income shocks. Indeed, migrant remittance inflows could be compensating for the variability in the household income which in its turn impacts education attendance of children. In this case, remittances will be correlated with the error term of the school attendance model. This becomes similar to a problem of omitted variables and can also lead to an endogeneity issue that potentially biases the estimated coefficient for the remittance effect. The issues of estimation bias resulting from the correlation of remittances with observable or unobservable household/individual characteristics could be overcome by using instrumental variables (IV). The research hence resorts to Amemya’s GLS methodology known as the IV-probit. In effect, the common 2SLS approach will not give efficient coefficients in binary models as suggested in Newey (1987). By using the IV-probit technique, the study is able to deal with the problems of endogeneity, omitted variables and measurement errors that might occur. To do so, the study identifies valid and relevant instruments for remittance receipt. It then runs an instrumented human capital model before conducting tests of exogeneity to see whether the remittance variable is actually endogenous or not. The outcome of the latter tests allows us to determine whether the non-instrumented education attendance probit model suffers from

endogeneity and thus potentially provide biased coefficient estimates. However, if findings suggest regressor exogeneity, then the estimates previously obtained are empirically valid. Issues related to the methodology, identification and effects of instrumental variable usage are described in the following paragraphs.

1.8.2 - Instrumental Variables

As noted earlier endogeneity leads to a bias in the estimated coefficients if it occurs. To resolve this problem, the study uses instrumental variables in the human capital model. The research introduces IVs to the probit model described in equations (3) and (4) and thus uses a model commonly known as “IV Probit”. The IV Probit model selected is in effect Amemiya’s Generalized Least Square Estimates (GLS). The later methodology was preferred in this study as Newey (1987) suggests that the usage of a two stage least squares (2SLS) model in the context of a binary outcome (in this case school attendance) and a binary endogenous variable (remittances receipt) can result in an inconsistent estimator. Although Angrist (1991) provides some conditions for where the 2SLS estimations perform greatly, Acosta (2006) specifies that such conditions are difficult to meet in practice. Therefore, the Amemiya GLS specification used in the research utilizes maximum likelihood estimations to fit a probit model where the Remittance receipt regressor is endogenously determined. It should be noted that IVs could vary substantively in nature. Hence, the literature has usually left it to the imagination of researchers to come up with the most valid instruments. This is mainly due to usual lack of data especially in Middle East countries such as Jordan. The general methodology though consists of choosing IVs that do not have a direct impact on school attendance apart from their impact on remittances. To the best of the author’s knowledge, determining IVs is not common in empirical studies in the Middle East region particularly in the field of migration, remittances and education.

1.8.3 - Choice of Instrumental Variables and Rational of Usage

Seven instruments are used for remittances in the model described above. 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. 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 validity tests. The rationale behind choosing the above mentioned instruments is described in the following paragraphs.

First, historic state or district level migration rates have been widely utilized in the literature as an instrument for current migration stocks and remittances. This type of IV has been first used by Woodruff and Zenteno (2001) in Mexico and was followed in empirical work such as Henson and Woodruff (2003), Mora and Taylor (2005), Lopez Cordova (2005), McKenzie and Rappoport (2006), and others. Indeed, the literature has argued that historic regional migration rates indicate the presence of migration networks that lower the cost of migration for future members of the region or community. Therefore these networks will influence both migration and remittance decisions of individuals at present. The identifying assumption is that past migration rates, in this essay's case from 12 years ago, do not affect current education choices and outcomes apart from their influence through current remittance decisions. From this perspective, this instrumental variable becomes reliant on the above exogeneity assumption. A historical count of migration rates for different districts is not available in Jordan. Therefore the study uses a proxy that reflects the percentage of Jordanians abroad in 1994 on a sub-district level. The population census of 1994 conducted by the Jordanian Department of Statistics counts the individuals who have left the country for less than 6 months. This information is available on a sub-regional level with 52 sub-districts identified by the census. Although these individuals are not classified as migrants, it is believed that many Jordanian usually travel for short periods for vacation, work and treatment in host countries where family, friends and community members reside. Doing so usually increases convenience and reduces traveling costs. In addition, the 1994 census accounts for individuals on family visits outside Jordan mainly spouses that travel to meet their husbands who are currently working abroad. From this perspective, the rate of Jordanian abroad by sub-district becomes a good indicator of the historic migrant network and is therefore used as an instrument.

Second, the usage of ownership of bank deposits and livestock is justified by the causal relationship between such assets and remittance receipt. A migrant will find it easier

to transfer money from abroad to his household using a family bank account in the home country. A bank account allows for fast, cheap and regular financial transactions which the migrant and his family could then benefit from. Therefore, households owning a bank account will have a higher probability of receiving remittances than their non-owner counterparts. As for livestock ownership, the impact on remittance receipt could be perceived through two channels. The first channel takes place when livestock is considered as an investment which produces future returns for the owners. In this case, remittance inflows could be viewed as an additional source of income to protect and expand such investment. The second channel resides in the wealth status of cattle owners. Indeed a good part of households with livestock are usually rural families with lower income. Thus, these are the families who tend to send one of their members abroad, or even to urban areas, in order to diversify their sources of income and consequently receive remittance inflows. In both cases, ownership of livestock positively impacts the probability of receiving remittances. With some caution, the thesis argues that the ownership of the above two assets does not impact school attendance or any other education outcome except through the amount of remittances sent by the migrant. Such claim supports the suitability of those instruments. It should be noted that the 2006 HIES includes information related to household ownership status of both assets. Angrist (2001) specifies that estimation problems in empirical practices usually occur when using dummy endogenous variables, such as remittances receipt status in this case, in estimating limited dependant variables that are binary and non-negative such as school attendance. To avoid difficulties, the study uses continuous variables that proxy household ownership of bank accounts and livestock. To do so, the study benefit from the breakdown on the sub-district level that is offered by the 2006 HIES in order to construct percentage of ownership of each asset. The breakdown into 52 sub-regions offers the required variability for both instruments. Hence, the percentage of households owning assets and those owning livestock on a sub-district level are used as two additional instrumental variables for remittances receipt. However, the study is careful when adopting these instruments as intuitive concerns over the exogeneity of these instruments arise. Looking at bank account ownership, one could argue that the concentration of banks or high ownership of bank accounts in one district may be correlated to the level of education of the community and residents of these districts.

Indeed, more educated individuals have a higher probability of using banking services and opening bank accounts; pushing banks to open more branches in the areas near those clients' residency where the number of transaction is greater. Such potential reverse causality weakens the exogeneity assumption of this instrument vis-à-vis the education outcomes identified in the study's empirical model. This assumption will be tested statistically when IV validity tests are conducted in the next section. Similar concerns are raised when examining ownership of livestock. It can be argued that regional characteristics of these high-share livestock districts, especially wealth status and rural features, might influence education decision beyond remittance receipt. This is also tested statistically below.

Third, the idea behind the usage of an array of household demographics stems from the concept of altruism as a motive for sending remittances as explained by Cox et al (1997) and introduced in the above literature review section under the "endogenous migration approach" of ElBadawi and Rocha (1992). The study argues that the composition of households could influence the decision made by the migrant to send remittances and consequently increases the probability of receiving those private foreign inflows. The instruments used to capture such demographics follow the above rationale. Migrants have a stronger incentive to send back remittances in support of the declining household income due to retirement or lower productivity of an aging head or father - the main provider of a family - and in support of the increasing expenditure especially medical ones of older members of the family. This justifies the usage of age of household head or father, and number of individuals aged above 50 as instruments. The incentive also exists if the number of females in a family is higher. This mainly occurs in conservative societies where women often do not work and are viewed as vulnerable members of the household and thus the need for the migrant, often a male, to send additional remittances. The above selected household demographics do not influence schooling outcomes since education decisions and investments are usually taken by parents before the aging factor comes into play (older parents often have children who finished schooling) despite the gender decomposition of the family. This claim is supported empirically when the chapter examines the validity and relevance of all the instruments in the below section.

1.8.4 - Relevance, Orthogonality and Exogeneity Testing

The selection of IV vectors for each age and gender cohort has been made on two bases. First, the economic rationale founded on the economic literature and presented in the previous section. It should be noted though that the IVs adopted for the age cohorts are different. Indeed this reflects the particularity of the two age categories; individuals aged [15-17] are often limited in their travels and are therefore not expected to migrate, especially given that labor opportunities in destination are very limited for those young workers. In this case, the impact of migrant networks on education becomes less important. This is reflected empirically as the impact of those networks on education attendance was not statistically significant. Hence this instrument was dropped for the sample [15-17]. Second, the statistical basis in which IVs fulfilled statistical validity criteria. The latter is achieved through conducting tests for relevance and orthogonality, before reverting to the exogeneity test at a second stage. Table 8 lists the vectors of IVs selected for each sub-sample. The results of the statistical tests are presented below.

Table 8: Instrumental Variables Selected for the IV-Probit by Sub-Sample

Sub-Samples	Male	Female
Age [15-17]	Rate of Bank Deposit Ownership	Rate of Livestock Ownership
	Rate of Livestock Ownership	Age of the Father
	Age of the Father	Number of Household Individuals above 50
	Number of Household Individuals above 50	
Age [18-24]	Rate of Jordanians Outside the Country	Rate of Jordanians Outside the Country
	Rate of Bank Deposit Ownership	Rate of Bank Deposit Ownership
	Rate of Livestock Ownership	Age of the Household Head
	Number of Females in the Household	

First, to examine the relevance of the instrumental variables under scrutiny, the study examines whether these IVs have a direct impact on remittance receipt status. To do so, the study has conducted a simple probit model where it has regressed remittance receipt R_{ij} on the vectors of covariates identified in the augmented human capital model (refer to equation 3) and on the selected instruments. Instruments are said to be relevant if their respective coefficients as estimated via the remittance receipt probit model are statistically significant. The following hypothesis is thus tested:

$$H_0 : \beta_{IV1} = \beta_{IV2} = \dots = \beta_{IVn} = 0 \quad (a)$$

with n being the number of instruments used. This test has a χ^2 distribution with n degrees of freedom. In order for the validity criterion to hold empirically, H_0 should be rejected. Table 9 presents the outcome of above test and coefficients of the instruments estimated by the suggested probit model. Estimates of the other covariates from the remittance receipt model are not displayed for brevity. Results in table 9 indicate that all instruments have a statistically significant impact on remittance receipt status, and that the proposed H_0 is rejected for all sub-sample models. All selected IVs in this study are therefore relevant.

Table 9: Impact of Instruments on Remittance Receipt Status

Remittance Receipt Instrumental Variables	Male				Female			
	[15-17]		[18-24]		[15-17]		[18-24]	
	<i>Coefficient</i>	<i>P-Value</i>	<i>Coefficient</i>	<i>P-Value</i>	<i>Coefficient</i>	<i>P-Value</i>	<i>Coefficient</i>	<i>P-Value</i>
Rate of Jordanians Outside the Country	not used	not used	36.377	0.000	not used	not used	28.386	0.000
Rate of Bank Deposit Ownership	not used	not used	5.277	0.000	not used	not used	4.175	0.000
Rate of Livestock Ownership	1.515	0.019	1.775	0.000	1.492	0.011	not used	not used
Age of the Houshold Head	not used	not used	not used	not used	not used	not used	0.011	0.003
Age of the Father	-0.008	0.020	not used	not used	-0.008	0.014	not used	not used
Number of Household Individuals above 50	0.209	0.006	not used	not used	0.194	0.011	not used	not used
Number of Females in the Household	not used	not used	0.122	0.002	not used	not used	not used	not used
Testing $B_{IV1} = B_{IV2} = \dots = B_{IVn}$								
Chi 2 distribution	14.19	0.003	60.67	0.000	14.41	0.002	33.12	0.000

The second criterion examined is orthogonality. An instrument is said to be orthogonal if it does not impact directly the outcome variable, which in this case is school attendance. To examine that, the study estimates the education attendance probit model described in equations (3) and (4) and introduces the selected IVs to the vector of covariates. In order to be orthogonal, the coefficients estimated for the IVs should be statistically insignificant reflecting the lack of any impact of those instruments on the schooling outcome under investigation. Table 10 displays the estimates of the IVs coefficients from the later model³⁷. The overall set of results reveal that all selected instruments exert no statistically significant impact on education attendance, hence the orthogonality of those IVs.

³⁷ Estimates for other covariates were omitted for brevity as the study is not interested in such results for this section.

Table 10: Impact of Instruments on Education Attendance

Individual Currently in School Instrumental Variables	Male				Female			
	[15-17]		[18-24]		[15-17]		[18-24]	
	<i>Coefficient</i>	<i>P-Value</i>	<i>Coefficient</i>	<i>P-Value</i>	<i>Coefficient</i>	<i>P-Value</i>	<i>Coefficient</i>	<i>P-Value</i>
Rate of Jordanians Outside the Country	not used	not used	-0.725	0.875	not used	not used	-6.79	0.176
Rate of Bank Deposit Ownership	not used	not used	0.764	0.17	not used	not used	0.126	0.841
Rate of Livestock Ownership	0.804	0.166	0.343	0.159	0.391	0.389	not used	not used
Age of the Household Head	not used	not used	not used	not used	not used	not used	-0.002	0.57
Age of the Father	-0.002	0.358	not used	not used	-0.002	0.584	not used	not used
Number of HH Individuals above 50	-0.039	0.532	not used	not used	0.006	0.936	not used	not used
Number of Females in the Household	not used	not used	0.012	0.635	not used	not used	not used	not used

The instruments appear to be both relevant and orthogonal suggesting that they comprise a valid set of instruments. However, there is the provision here that the strength of the correlation between the identifying instruments and the remittance variable, though statistically significant at a conventional level in all cases, is not as strong as desired with the notable exception of the male and female [18-24] age category³⁸. This may have implications for both the distribution of the IV probit estimates but also their consistency. Nevertheless, we are constrained by the fact that instruments are the best available given the datasets used.

The last criterion prior to adopting an instrumented human capital model is to test for the endogeneity of the remittance receipt variable. To do so a Wald test of exogeneity is undertaken. The test determines whether the error terms in the structural equation (the education attendance probit model) and the reduced form equation for the endogenous variable (remittance receipt probit model) are correlated. This is translated in testing the hypothesis $H_0: \rho = \text{corr}(\mu_{ij}, \varepsilon_{ij}) = 0$ (b) (refer to section 1.8.1). The rejection of the null hypothesis (b) indicates the rejection of exogeneity and therefore the need to instrument the remittance variable. Although selected IVs fulfilled relevance and orthogonality criteria, the results of the Wald test of exogeneity undertaken for the various sub-samples

³⁸ By “rule-of-thumb” the F-statistic value for the relevance of instrument test should usually exceed 10.

and illustrated in table 11 suggest no trace of endogeneity between remittance receipt and education attendance since the null hypothesis cannot be rejected.

Table 11: Testing for Remittance Variable Endogeneity – Education Attendance Model

Wald Test of Exogeneity	Male		Female	
	[15-17]	[18-24]	[15-17]	[18-24]
<i>Age group</i>				
Chi 2 distribution	0.780	1.850	0.550	0.200
Prob. Value	0.378	0.173	0.458	0.651

This result comes in disaccord to the existing literature on migration and remittances³⁹ and implies that the estimates obtained from the education attendance probit model are consistent and unbiased. The study moves next to examine the impact of remittances on the second education outcome identified in this essay, education attainment.

1.9 - Remittances and Education Attainment

1.9.1 - Education Attainment as an Outcome of the Human Capital Model

Empirical findings from the human capital model proposed in equations (3) and (4) highlighted the positive effect that receipt of remittances exerted on individuals to attend school, at least for males aged between 18 and 24. However, to complement the above analysis, the research needs to determine whether these private transfers coming from abroad assisted students in progressing at different levels in school or university. Therefore, there is a need to examine education investment decisions made by households at various schooling levels and investigate whether remittances impact education behavior differently depending on the student's schooling levels. The research tries to determine empirically the education levels at which remittances become most influential in a household's schooling decision. By doing so the chapter is able to argue whether remittances are facilitating Jordanian youth to continue their further education especially to high school and university levels. From this perspective, the chapter turns to investigate an augmented human capital model with education attainment as the outcome of interest. This outcome is measured by the individual's number of years of schooling successfully completed. This comes as a second specification for the general human capital model

³⁹ As explained earlier this may be linked to the weakness of some of the identifying instruments especially for the sample age [15-17].

described earlier. Using education attainment as an outcome of the education model entails looking at various features: the choice and ordered nature of the outcome variable itself, the specifications of different identification strategies used to examine such outcome, the particularity of the distribution of the sample under such human capital models, and the empirical difficulties resulting from potential endogeneity and censoring related to the frequency distribution of this educational outcome. All these topics are discussed in the subsequent sections.

1.9.2 - Constructing the Education Attainment Variable

The education attainment model also stems from Becker's (1982) production function where human capital is introduced. Equation (1) that was depicted also in Holmes (2003) captures the suggested framework where the various determinants of education attainment, among which are included migrant remittances, are grouped into one function. Therefore, the study follows the methodology used for education attendance and draws its model on schooling attainment from the general "treatment effect" model proposed in Acosta (2006). This later model is in effect presented in equation (2). Having said that, the reduced linear form of the human capital model reflecting education attainment as outcome can be re-written in the following form:

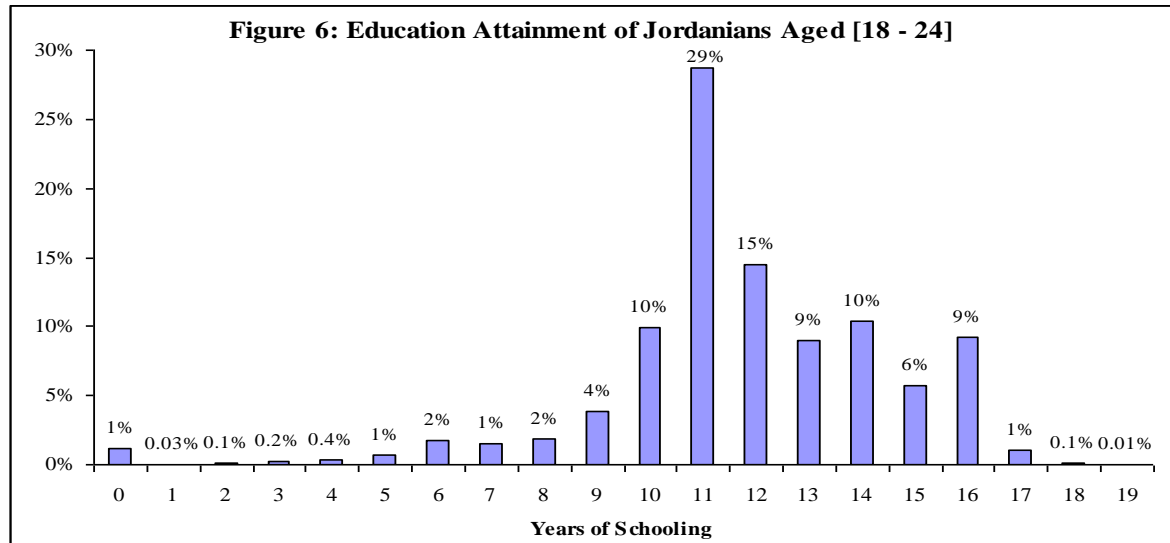
$$S_i = \beta_0 + \beta_1 R_{ij} + \beta X_{ij} + \varepsilon_i \quad (7)$$

where S_i indicates the years of schooling successfully 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 migrant remittances. Additionally, X_{ij} summarizes a set of vectors related to covariates describing individual, household, community, regional and wealth characteristics. These vectors are similar to the ones utilized in the education attendance model presented in equations 3 and 4. The rationale of using these sets of characteristics was previously described in the chapter. It should be noted at this stage that equation (7) could be evaluated using different econometric techniques. However the most appropriate empirical model is the censored ordered probit. This will further be explored as we proceed with the study. Having said that, it should be noted that few papers in the literature have

examined models related to determinants of educational attainment and consequently discussed the resultant impact effects for variables of interest. Indeed, 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 directly related to the literature on human capital, such improvements encouraged recent papers in the field of education to explore various topics related to educational attainment. Among these recent empirical works are McKenzie and Rappoport (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 also be noted that the literature has not emphasized such work in the Middle East region. To the best of the author's knowledge, very few empirical works have been conducted on the determinants of education attainment and school completions for countries in that region. This research should thus be interpreted as one of the first empirical pieces tackling this issue in the Middle East region, hence providing an additional value added contribution of this chapter.

The construction of the education attainment variable used in equation 7 is quite particular and accounts for specific features related to the Jordanian education system and to the age bracket of the sample. The study follows Holmes (2003) and McKenzie and Rappoport (2006) in using the number of years of schooling successfully completed by individuals to measure schooling attainment. The process of construction of this variable was thoroughly described in a previous section entitled "Remittances and Schooling Variables". As previously mentioned, figure 1 was constructed to portray the distribution of Jordanians by schooling years completed and age. The distribution of the sample is critical in order to determine the econometric model to be estimated and consequently the education categories. Following this perspective, figure 1 reveals that the sample distribution is not normal as peaks are observed for several values of schooling years

observations. The structure of this variable and its progressive nature entails looking at ordered outcome models such as the ordered probit model. Doing so necessitates the construction of schooling categories reflecting education attainment as an outcome. Since attainment is naturally linked to age, the study depicts a need to construct different schooling categories separately for age categories [18-24] and [15-17]. These categories are used as values for the dependant variable in equation (7) and reflect the sample distribution of schooling years for the two age groupings. Such distributions are respectively graphed in figures 6 and 7. The plots allow the delineation of obvious categories and this will be done through assigning a schooling category for each peak observed. By doing so for the age grouping [18-24], eight schooling categories are identified (refer to figure 6). The respective thresholds for the later categories account for the behavioral changes, as represented by the non-linearity of the schooling patterns, and for the Jordanian education system specificities.

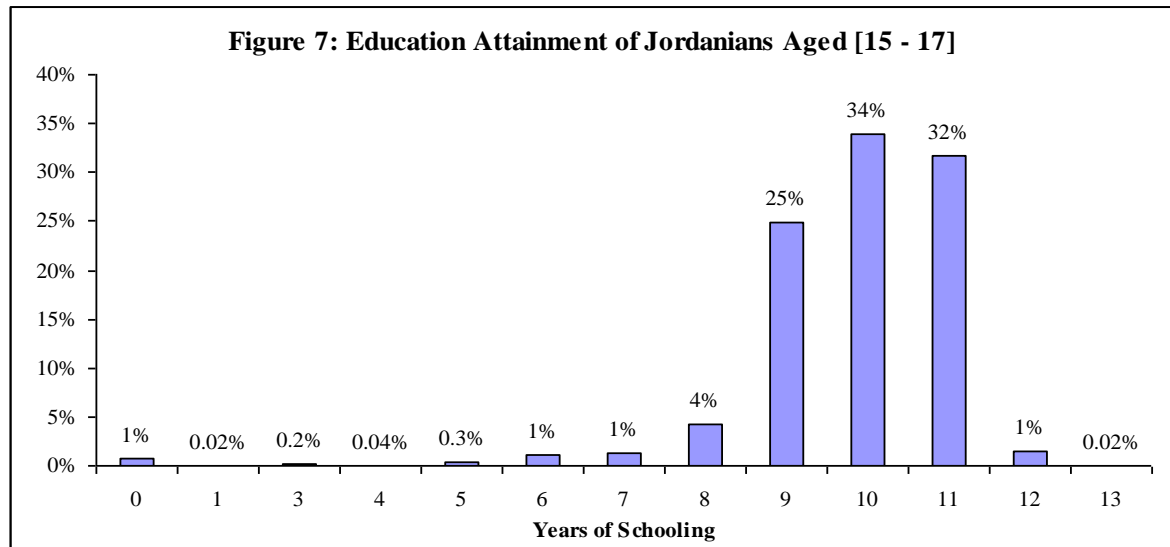


A discussion on the rationale behind the choice of these categories for this particular age grouping and their linkages to the Jordanian education system was elaborated in a previous section of this paper⁴⁰ when the entire sample of individuals aged [15-24] was considered. Therefore, the eight categories for schooling attainment constructed for age category [18-24] are the following: 0 years of schooling. This category captures illiterates who have never accessed school, Elementary education with [1-6] years of schooling, Preparatory education with [7-8] years and Basic education for [9-10] of successfully completed years

⁴⁰ Refer to section 1.3.2.

of schooling. As for higher levels, secondary education is divided into two categories where those with 11 and 12 years of education are considered separately. As for University education, a category capturing the undergraduate level was constructed for [13–15] years of schooling and another for postgraduate studies with 16 years and above.

On the other hand, figure 7 indicates that the schooling categories identified for attainment of individuals aged [15-17] is different than what was constructed earlier. If a Jordanian typically enters the education system at around the age of 3 or 4, then an individual aged [15-17] could not have completed more than 13 years of schooling. Taking this fact into consideration along with the peaks shown in figure 7 that reflect different education choices at various schooling levels, the age categories constructed for this particular sub-sample are the following: 0 years of schooling capturing illiterates, Elementary education with [1-6] years of schooling and Preparatory education with [7-8] years. As for basic education, it is split into two categories, 9 and 10 years of schooling. For secondary education two categories will be considered as well, 11 years of schooling and 12 years and above. Having displayed the various groupings, the analysis for the empirical model used takes into account both sets of categories as a unit of measurement.



The chapter also uses for this purpose the terminology of McKenzie and Rapoport (2006) in referring to these categories by “schooling grades”. This terminology is to be adopted for the rest of the analysis.

1.9.3 - Features of the Education Attainment Model

Having specified schooling grades as the measure for education attainment, the study moves to evaluate the different estimation techniques that the human capital model specification of equation (7) entails. To undertake such analysis, the next paragraphs examines features related to the choice of the sample, choice of the structural form of the model and the most efficient estimation technique that is available under such kind of augmented human capital model. From this perspective, those three specifications are described below.

First, looking at the determinants of education attainment would ideally involve examining the final level of schooling that any individual of the sample have attained or completed. In addition, it is desirable to observe household and community characteristics that surrounded each individual when schooling decisions related to his education completion were being undertaken. Doing so is essential when examining impact effects of a particular schooling determinant as it allows control for the other characteristics. However, surveys are usually limited in providing the above necessary information for the adults in the sample. Indeed no information is available for the first generation which refers to the heads of households, wives and husbands. Information on adult members that are other than sons and daughters does not exist either. Missing information is usually related to this first generation's respective families and parents' attributes. Important information are hence missing such as whether they have lived in households with migrant members or whether their respective families received any remittances from abroad. Factors 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. For those observations, the survey would have accounted for all information and characteristics related to their entire respective households. This is one of the features of the sample used by this research. The above is considered as another 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 hence the background in which schooling decisions have been made. On the other hand, 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. This is applicable for Jordan who witnessed various structural changes in its economy and large growth patterns. This renders the comparison of education status across generations difficult.

The second feature relates to the fact that the education attainment model used here only allows for specific estimations techniques to be undertaken. Using OLS or 2SLS methodologies is not possible due to two major restrictions. The first restriction is related to the nature of the outcome variable “years of education successfully completed”. This dependant variable is a discrete variable and not a continuous one. As for the second restriction, it is related to the non-negative constraint that the sample imposes. In reality, negative education outcomes are not possible and therefore a bulk of the observations represent to zero years of schooling for those who did not receive any education. To summarize, least squares estimations are therefore biased and inefficient due to the discrete nature of the dependant variable and the left censoring imposed on the sample. It should be noted at this stage that estimation problems related to left censoring can be overlooked in the Jordan case since only a mere 1% of the sample of Jordanians aged [15-24] reported receiving zero years of schooling. As specified earlier in the chapter, this is due to the strict compulsory education laws enforced in this Kingdom for basic and primary education⁴¹. Earlier work in the education literature has used least squares techniques in various papers that examined education attainment determinants despite problems of biasness and efficiency. These papers cover different countries from various regions of the world except MENA. 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,

⁴¹ The World Development Indicators (WDI) published by the World Bank indicates that Jordan’s literacy rate for adults defined by individuals age 15 and above reached 99% in 2005 (latest figure). In addition, youth, defined as people aged [15-24], literacy rate is depicted at 91% for the same year. This is due to the strict compulsory education laws applied.

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. It should be brought to the attention of the reader that none of these papers looked at remittances as a determinant of school attainment. This theme of the literature remains fairly recent.

Having rejected both OLS and 2SLS, 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 feature implies that the choice of investing in education for an additional year when the individual is passing from one schooling level to another is different in nature from the choice made to continue this extra year during the same level. 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 represents a problem of the sample being right censored. Censoring is the second main conceptual and empirical challenge that McKenzie and Sasin (2007) identify when estimating models related to impact of migrant remittances on education attendance and education attainment⁴². Hence, treating the completed years of schooling 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 year of schooling 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 if a standard ordered probit model is used. Any estimation technique needs to account for this right-censoring issue. The work of King and Lillard (1983, 1987) undertaken in the literature on the economics of education has made it

⁴² The first challenge is endogeneity. Refer to the previous section of this paper.

possible to establish such a technique that accounts for right-censoring along with the discreteness of the dependant variable. This estimation methodology is called the censored ordered probit and is described next.

1.9.4 - The Censored Ordered Probit for Estimating Education Attainment

The idea behind using the censored ordered probit model is to try to estimate the final year of schooling 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. The censored ordered probit 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.

The rationale behind a censored ordered probit model is to construct and combine two likelihood functions. The first function reflects the schooling behavior of individuals in the uncensored sample (individuals who completed schooling). As for the second function, it reflects the likelihood for education attainment of censored observations (students still currently enrolled). Both functions include the same school determinants. Indeed, these covariates are similar to the ones used in the school attendance model of equations 3 and 4. These vectors of variables reflect: individual and household characteristics, community features, parents' education levels, assets ownership as proxy for wealth controls and remittance receipt status as the main variable of interest. To summarize the idea mathematically, applying the censored ordered probit framework to equation (7) gives us the following latent education attainment function:

$$S^*_i = \beta X_{ij} + \varepsilon_i \quad (8)$$

where the desired level of schooling S^* is not observed. For simplicity, the study adopts X_{ij} as the vector representing all the covariates 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:

$$\begin{aligned}
S = 0 & \text{ if } S^* \leq \mu_0 \\
S = 1 & \text{ if } \mu_0 < S^* = \mu_1 \\
S = 2 & \text{ if } \mu_1 < S^* = \mu_2 \\
S = U & \text{ if } \mu_{u-1} = S^*
\end{aligned} \tag{9}$$

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. It should be noted that this study uses eight (or seven) schooling grade categories and thus seven (or six) cut-off points (or thresholds) for age grouping [18-24] (or [15-17]). This was determined previously when the paper looked at the distribution of schooling grades in figure 6 (or 7). Following equation (9), the probability that the latent schooling function S^* falls within a certain threshold bracket can be written as:

$$\begin{aligned}
\text{Prob. } (S = 0) &= \Phi(\mu_0 - \beta X) \\
\text{Prob. } (S = 1) &= \Phi(\mu_1 - \beta X) - \Phi(\mu_0 - \beta X) \\
\text{Prob. } (S = 2) &= \Phi(\mu_2 - \beta X) - \Phi(\mu_1 - \beta X) \\
\text{Prob. } (S = U) &= 1 - \Phi(\mu_{U-1} - \beta X)
\end{aligned} \tag{10}$$

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

$$\begin{aligned}
L_u &= \Phi(\mu_s - \beta X_{ij}) & \text{for } S = 0 \\
L_u &= \Phi(\mu_s - \beta X_{ij}) - \Phi(\mu_{s-1} - \beta X_{ij}) & \text{for } S = 1 \text{ to } (U-1) \\
L_u &= 1 - \Phi(\mu_{s-1} - \beta X_{ij}) & \text{for } S = U
\end{aligned} \tag{11}$$

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 implies:

$$S^* > \mu_{s-1} \text{ which is then translated into } \varepsilon_i > \mu_{s-1} - \beta X_{ij} \text{ for } S = 0 \text{ to } U \tag{12}$$

Equation (12) 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:

$$L_c = 1 - \Phi(\mu_{s-1} - \beta X_{ij}) \quad (13)$$

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

$$L = \prod L_u \prod L_c \quad (14)$$

The combined likelihood function L is the one that is maximized in order to estimate the magnitude of the coefficients for all school determinants. This functional form known as the censored ordered probit model is adopted in this study for the two age categories [15-17] and [18-24] independently. As before, the model is also estimated for gender separately. This gender separation is once again upheld by the results of a likelihood ratio test version of the Chow test undertaken for the censored ordered probit for education attainment in table 12. 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 except in one paper conducted by McKenzie and Rappoport (2006) for Mexico; hence the empirical contribution made by this essay to the literature. The paper turns now to discuss the findings from estimating this model.

1.9.5 - Empirical Results

The censored ordered probit described above was estimated for both the male and female sub-samples separately. Additionally, age sub-samples were chosen similar to the groupings selected in the education attendance model. These categories are: [15-17] and [18-24]. The estimated results are reported in table 12. Let us first examine the effect exerted by remittance receipt on schooling attainment of Jordanian male youth. Table 12 indicates that private transfers from abroad are enabling males aged [18-24] to reach further levels in their education. Indeed, the statistically significant positive coefficients registered in table 12 suggest that Jordanian males in this age category and living in remittance receiving families attain more schooling than their non receiver counterparts. This age group reflects individuals who are at an age corresponding to more advanced education grades. Therefore, foreign remittances are allowing youth to pursue higher education degrees or even proceed into university. This positive pattern is not upheld when looking at boys aged [15-17]. Having said that, the positive coefficient for foreign remittances is statistically insignificant and consequently no impact can be derived from this result. From a female perspective, the results from the censored ordered probit model also suggest a positive impact of remittances on women's human capital. Table 12 highlights the fact that being a female, whose family receives private transfers from abroad, significantly increases final schooling attainment. This result is true for women between the age of 18 and 24 (statistically significant coefficients for this age sub-groupings). As for younger girls aged [15-17], no statistical significance appears for the estimated coefficient of the remittance covariate. This suggests that remittances exert no impact on school attainment for girls at this young age. Looking at the above findings, foreign private transfers seem to have an evident role in human capital formation for the older Jordanian youth. This result is not only confined to men, however adult women aged between 18 and 24 are also acquiring more education due to such transfers. Looking at the age categories of individuals positively impacted, the study concurs that remittances do indeed support youth in achieving higher educational attainment levels such as university. Other characteristics also seem to play a significant role in determining the education attainment of young Jordanians. As indicated previously, one of the most important determinants is a parent's education qualifications. Table 12 highlights the fact that having

parents with higher education qualifications will have an impact in increasing the children's schooling levels. This finding supports the notion that educated parents value the education of their children and are more prone to investing in their schooling. In addition, educated parents are more able to assist their children academically and as a result increase the probability of successfully completing additional education years. It should be noted though that the magnitude between the impact of the father's education and the mother's status differs and is evident in table 12⁴³. Evidence from the table indicates that the effect of the mother's education background is greater than the father's one for both males and females. This result appears in the age category [18-24] with the sub-sample [15-17] showing a slightly bigger impact for a father's education. The rationale behind such an outcome perhaps relates to the idea that mother's are usually more in touch with their children's daily life and monitor more closely their educational process. This is true especially in a country like Jordan where the tendencies are for women with children to acquire less restrictive jobs with lengthy office hours. In addition, mothers' education is sometimes an indicator of the household wealth as women's investment in education was viewed as secondary. In reference to wealth, the probability of attaining higher schooling for a member of a wealthier family is higher than their less fortunate counterparts. The wealth impact trend is supported by the statistically significant and positive coefficients observed for many of the asset ownership and dwelling area covariates across genders and in different age categories.

⁴³ As previously mentioned, the study has tested for the statistical significance of the difference in the estimated coefficients of father and mother's education.

Table 12: Censored Ordered Probit Analysis for the Impact of Remittances on Education Attainment

Individual Currently in School	Age [15-17]			[18-24]		
	Pooled	Male	Female	Pooled	Male	Female
Remittances Receipt	0.127	0.177	0.063	0.281 *	0.375 *	0.174 **
Household Size	-0.194 *	-0.156 *	-0.237 *	-0.134 *	-0.108 *	-0.134 *
Number of Children Less than 5	-0.019	0.018	-0.053	-0.045 **	-0.005	-0.077 *
Number of Adults	0.165 *	0.141 *	0.199 *	0.151 *	0.056 *	0.155 *
Number of Male Adults	-0.098 *	-0.066	-0.130 **	-0.166 *	-0.019	-0.120 *
Number of Siblings	0.129 *	0.090 ***	0.161 *	0.076 *	0.037	0.072 *
Marital Status	na	na	na	-0.684 *	-0.765 *	-0.629 *
Urban	-0.455 *	-0.436 *	-0.464 *	-0.207 *	-0.260 *	-0.158 *
Birth Order of the Individual	1.4E-04	-9.7E-07	3.5E-04	5.3E-06	-6.8E-05	-1.8E-04
Individual being the Oldest Child	0.124	0.116	0.141	0.049	0.056	0.101 **
Mother Education	0.036 *	0.030 *	0.046 *	0.048 *	0.036 *	0.066 *
Father Education	0.038 *	0.034 *	0.044 *	0.036 *	0.037 *	0.030 *
School Distance (2002)	4.6E-05 **	9.5E-05 *	-6.9E-06	1.3E-05	2.8E-05 *	-4.8E-06
Area of Dwelling	0.002 *	0.001	0.004	0.003	0.003 *	0.003 *
Ownership of Car	0.011	-0.025	0.087	0.086 *	0.072 **	0.098 **
Ownership of Computer	0.656 *	0.703 *	0.614 *	0.582 *	0.665 *	0.500 *
Ownership of Land	0.096	0.193 **	-0.013	0.187 *	0.191 *	0.187 *
<i>Threshold</i>						
μ_1	-1.975 *	-1.702 *	-2.283 *	-1.836 *	-1.988 *	-1.688 *
μ_2	-1.518 *	-1.243 *	-1.808 *	-1.222 *	-1.251 *	-1.169 *
μ_3	-1.085 *	-0.770 *	-1.419 *	-0.884 *	-0.873 *	-0.871 *
μ_4	-0.808 *	-0.495 **	-1.127 *	-0.132 ***	-0.042	-0.208 **
μ_5	-0.400 **	-0.082	-0.710 **	0.632 *	0.777 *	0.519 *
μ_6	0.891 *	1.119 *	0.739 **	1.057 *	1.188 *	0.990 *
μ_7	na	na	na	1.470 *	1.469 *	1.551 *
Number of Observations	4701	2376	2325	9867	5342	4525
Wald Chi-Square	370	195	158	3156	1568	1688
Significance Level (Prob value)	0.000	0.000	0.000	0.000	0.000	0.000
Log pseudolikelihood	-1848	-1104	-718	-12568	-6976	-5401
Chow Test F-statistic	52			382		
Significance Level (Prob value)	0.000			0.000		

Significance Level: *1% **5% ***10%.

Note 1: Thresholds for the age group [15-17] are different than the ones for [18-24]. Refer to the text for listing of various values.

Note 2: Huber-White robust standard errors were used in the model. Standard Errors were clustered at the household level.

Looking at other household and individual characteristics, no surprising patterns appear when estimating the education attainment model. Factors such as household size and marital status reduce significantly schooling levels for both male and female. When comparing these results across gender, it is evident that those factors play a larger negative role for females. This is consistent with the idea, which was previously been mentioned in

the education attendance model, 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 these Jordanian women to get married and start their own families. Two other findings previously perceived in the school attendance model were also confirmed in table 12. The first result comes from the regional residency status of individuals. Urban residents, for five out of the six age categories across genders, attain significantly less schooling than their rural counterparts. As explained previously, this is due to easier access for urban individuals to labor market in comparison to rural areas. The second finding suggests that school distance is not associated with less schooling as findings indicate a very weak correlation between such distance and education attainment.

In summary, the empirical findings suggest that foreign remittances significantly increase schooling attainment for individuals aged [18-24] across both genders. Such a result supports the claim that private transfers from abroad are playing a significant role in human capital formation in Jordan as it is enabling young men and women to increase their education qualifications rather than accessing the labor market. Looking at other determinants of education attainment, estimates reveal that maternal educational background significantly increases children's schooling. As for household characteristics and regional dimensions, results confirmed previous findings in the literature especially those related to the size of households, though urban residency status, somewhat surprisingly, negatively impacts education attainment of Jordanian youth.

1.9.6 - Endogeneity and the IV Censored Ordered Probit

Having dealt with censorship issues through introducing a censored ordered probit model, another empirical challenge arises: endogeneity between schooling attainment and remittance inflows receipt. Similar to the education attendance model, endogeneity could occur due to the fact that remittances might not constitute an exogenous shock. As explained previously in the chapter, decisions related to school completion and remittances are taken simultaneously by households. Therefore, the causal relationship between those private transfers coming from abroad and individuals' acquiring additional schooling grades could become somehow distorted. This is translated in the education attainment model by yielding a potential bias in the coefficient of the remittance receipt covariate. This could distort the pattern and magnitude of the impact of remittances for all age and

gender categories. In order to investigate this issue, the IV censored ordered probit model is used. The general idea in such methodology is to choose instrumental variables that have no direct impact on school attainment apart from their effect on remittances. However, claims of endogeneity need to be tested empirically. To do so, the study resorts to the same techniques utilized earlier for the education attendance model when IVs were selected based on instrument validity before conducting a Wald test to check for the exogeneity of the remittance receipt variable. The section will not dwell further on issues of IV selection, rational and testing⁴⁴. Instruments are selected from the same set identified earlier in the analysis⁴⁵, and are not used simultaneously when estimating the education attainment model. Table 13 lists the various vectors of IVs utilized for the different gender and age specifications of the schooling attainment human capital model.

Table 13: Instrumental Variables Selected for the IV-Censored Ordered Probit by Sub-Sample		
Sub-Samples	Male	Female
Age [15-17]	Rate of Bank Deposit Ownership	Rate of Livestock Ownership
	Rate of Livestock Ownership	Age of the Father
	Age of the Father	Number of Household Individuals above 50
	Number of Household Individuals above 50	
Age [18-24]	Rate of Jordanians Outside the Country	Rate of Livestock Ownership
	Rate of Bank Deposit Ownership	Age of the Father
	Rate of Livestock Ownership	
	Number of Females in the Household	

Looking at the relevance criterion, the results of the probit model for remittance receipt status displayed in table 14 indicate that the IVs identified do have a statistically significant impact across all gender and age categories. Additionally, the hypothesis regarding the instruments being simultaneously equal to zero as presented in hypothesis (a) is rejected. These findings signals that the IVs selected for the education attainment model are all relevant.

⁴⁴ These topics have been discussed in previous section under the education attendance model particularly in section 1.8.3.

⁴⁵ The list of IVs under scrutiny 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.

Table 14: Impact of Instruments on Remittance Receipt Status

Remittance Receipt	Male				Female			
Instrumental Variables	[15-17]		[18-24]		[15-17]		[18-24]	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
Rate of Jordanians Outside the Country	not used	not used	36.377	0.000	not used	not used	not used	not used
Rate of Bank Deposit Ownership	3.166	0.001	5.277	0.000	not used	not used	not used	not used
Rate of Livestock Ownership	1.354	0.036	1.775	0.000	1.492	0.011	0.945	0.023
Age of the Household Head	not used	not used	not used	not used	not used	not used	not used	not used
Age of the Father	-0.008	0.018	not used	not used	-0.008	0.014	-0.004	0.025
Number of Household Individuals above 50	0.201	0.008	not used	not used	0.194	0.011	not used	not used
Number of Females in the Household	not used	not used	0.122	0.002	not used	not used	not used	not used
Testing $B_{IV1} = B_{IV2} = \dots = B_{IVn}$								
Chi 2 distribution	22.190	0.000	60.670	0.000	14.41	0.002	10.85	0.004

On the other hand, the orthogonality criterion is also upheld. Indeed, adding the vector of instruments to the independent variables of the censored ordered probit model for education attainment reveals that the estimated coefficients of the IVs are statistically insignificant (refer to table 15⁴⁶). This indicates that the selected instruments do not impact schooling grades directly except through their impact on remittance receipt.

Table 15: Impact of Instruments on Education Attainment

Individual Currently in School	Male				Female			
Instrumental Variables	[15-17]		[18-24]		[15-17]		[18-24]	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
Rate of Jordanians Outside the Country	not used	not used	-11.992	0.102	not used	not used	not used	not used
Rate of Bank Deposit Ownership	3.12	0.108	1.282	0.107	not used	not used	not used	not used
Rate of Livestock Ownership	0.607	0.16	0.385	0.139	0.01	0.983	0.079	0.7
Age of the Household Head	not used	not used	not used	not used	not used	not used	not used	not used
Age of the Father	-0.001	0.67	not used	not used	-0.002	0.609	0.0004	0.734
Number of HH Individuals above 50	-0.026	0.692	not used	not used	0.063	0.428	not used	not used
Number of Females in the Household	not used	not used	-0.005	0.807	not used	not used	not used	not used

Having empirically established the validity of the IVs selected, these instruments are used to test the potential endogeneity of the remittance receipt variable. To do so the study follows Rivers and Vuong's (1988) methodology and applies it to the specification of the education attainment human capital model. A censored ordered probit was applied for schooling attainment excluding the remittance covariate and incorporating instead the

⁴⁶ Tables 14 and 15 only display the results for the coefficients of the IVs selected and not findings from other covariates.

residuals predicted from a remittance receipt probit model with all exogenous variables along with selected IVs. The statistical significance of that residual, treated as an independent variable in the censored probit, is then tested. The results of this exogeneity test highlighted in table 16 indicate that residuals for different gender and age categories are statistically insignificant reflecting the fact that the remittances variable under scrutiny is once again legitimately treated as an exogenous regressor.

Table 16: Testing for Remittance Variable Endogeneity – Education Attainment Model

Test for Residuals Statistical Significance	Male		Female	
	[15-17]	[18-24]	[15-17]	[18-24]
<i>Age group</i>				
Residual Coefficient	1.513		1.679	0.214
Prob. Value	0.103		0.2	0.788

These findings indicate that the study does not need to instrument remittances and therefore will not resort to an IV Censored Ordered Probit model to examine the impact of remittances on education attainment. The estimates from the education attainment censored ordered probit are interpretable as consistent and unbiased and hence some confidence is justified from the emphasis drawn from such results. Nevertheless, interpreting the magnitudes of the estimated coefficients in ordered models is not straightforward and needs to be accompanied by marginal effects calculations. A discussion on marginal effects along with further interpretations is discussed presented next.

1.10 - Marginal Effects for the Censored Ordered Probit

1.10.1 - Calculating Marginal Effects – Theoretical Background

After interpreting the patterns suggested in table 12, the next step is to estimate the magnitude of the different impacts. However, the size of such effects is not easily detected from the coefficients of a censored ordered probit. Even the interpretation of the coefficient could be complicated as results may differ from one category to another. Greene (2000) indicates that the interpretation of the coefficients for a censored ordered probit is most clear for the first and last category. From this perspective, the study moves to calculate the marginal effect of a change in status of a remittance receiving household on the probability of acquiring an additional schooling grade in each of the model's schooling grades'

categories⁴⁷. In addition, McKenzie and Rappoport (2006) specify that marginal effects in censored models can be further complicated given that a change in the covariate of interest, in this case remittances, will influence both years of schooling attained at the time of the observation, and the probability for this observation being censored if the individual is still currently enrolled. However, the marginal effects calculated in this study take into account censorship through capturing the effect of remittances on both samples (censored vs. uncensored). Doing so will therefore provide a magnitude for the final education attainment. It should be noted at this stage that the study will only calculate marginal effects for remittances as it is the variable of interest in this research. It will thus forgo other calculations on the remainder of the school attainment determinants and will settle for the patterns detected in table 12. Having clarified the last issue, the marginal or more precisely the impact effect of remittance receipt on education attainment for each of the eight schooling grades can be calculated in the following way.

Let us first recall the general equation for the education attainment model:

$$S_i = \beta X_{ij} + \beta_1 R_{ij} \quad (11)$$

where S_i represents one of the school grades attained by individual i , X_{ij} stands for the vector of all independent variables defined above in the study and R_{ij} indicates the status of remittance receipt of individual i in household j . For simplicity, the determinants i and j will be omitted in the rest of the calculations. Estimating equation (11) using an IV censored ordered probit, the study calculates the impact effect of remittances on education attainment for each of the eight schooling grades for the [18-24] sub-sample in the following way:

For Schooling grade = 0:

$$d_0 = \Phi(\mu_1 - (\beta X + \beta_1)) - \Phi(\mu_1 - \beta X) \quad (12)$$

⁴⁷ The correct terminology is in effect Impact effect rather than marginal effect as the covariate Remittances is a dummy variable. Schooling grades categories are 7 and 8 for the respective age sub-samples [15-17] and [18-24].

For Schooling grades= 1 to 7:

$$d_s = [\Phi(\mu_{s+1} - (\beta X + \beta_1)) - \Phi(\mu_{s+1} - \beta X)] - [\Phi(\mu_s - (\beta X + \beta_1)) - \Phi(\mu_s - \beta X)] \quad (13)$$

For Schooling grade = 8

$$d_7 = (1 - \Phi(\beta X + \beta_1)) - (1 - \Phi(\beta X)) \quad (14)$$

It should be noted that similar equations are utilized for the [15-17] sub-sample taking into account substitutions of the schooling grade indices as to accommodate for seven instead of eight categories. Applying equations (12), (13) and (14) enables the chapter to offer some insights on the magnitude of the impact of remittances on education attainment at different schooling levels. This will allow assessing whether such foreign private transfers are enabling Jordanian youths across genders to proceed for higher levels especially university and postgraduate studies. In addition, the study estimates what it calls the “overall impact” by calculating a certain weighted average of the different marginal effects and the schooling grades constructed. Indeed, this “overall impact” is inspired by Holmes (2003) and is used in the literature for ordered choice models such as the IV censored ordered probit model. Mathematically, this overall effect will take the following general form identified as equation (15):

$$\frac{\partial E(S_{ij} / Rij)}{\partial Rij} = \left[\frac{\partial(\text{Pr ob}(S_{ij} = 0))}{\partial Rij} \right] * 0 + \left[\frac{\partial(\text{Pr ob}(S_{ij} = 1))}{\partial Rij} \right] * 1 + \dots + \left[\frac{\partial(\text{Pr ob}(S_{ij} = U))}{\partial Rij} \right] * U$$

where U represents the upper bound selected for schooling grades. Equation (15) could therefore be simplified and adapted to fit the schooling grades defined in this study using equations (12) to (14). The “overall effect” is hence written:

$$d_0 * 0 + d_1 * 1 + d_2 * 2 + d_3 * 3 + d_4 * 4 + d_5 * 5 + d_6 * 6 + d_7 * 7 \text{ for [18-24] age category} \quad (16)$$

$$d_0 * 0 + d_1 * 1 + d_2 * 2 + d_3 * 3 + d_4 * 4 + d_5 * 5 + d_6 * 6 \quad \text{for [15-17] age category} \quad (17)$$

This “overall impact” will therefore allow the study to depict the magnitude of the change in the expected schooling grades resulting from a change in remittance receipt status for individuals in both genders.

1.10.2 - Calculating Marginal Effects – Empirical Results

Having described the equations needed to calculate marginal effects, the study moves to investigate some of the empirical findings it obtained from applying the above formulas. Table 17 highlights the various marginal effects estimated for different schooling grades using the censored ordered probit. The coefficients estimated in table 17 appear not to be linear. This suggests that the impact of remittances on education attainment is not homogenous across schooling grades. Consequently, receiving remittance inflows from abroad has different effects at different levels of schooling. Therefore, additional care should be taken when investigating the results reported in table 12 especially that these effects do change signs from one schooling grade to another.

Let us first examine the results for male sub-samples aged [18-24]. Effectively, this is the age group where a statistically significant impact for remittances on education attainment was registered as compared to younger individuals aged [15-17] (refer to table 12). Looking at the above mentioned age categories, table 12 indicates that remittances do encourage Jordanians to acquire higher levels of education. Indeed, living in a household receiving remittance increases the probability of having completed successfully 12 years of schooling by 3.4 percentage points on average for men aged [18-24]. These figures suggest that remittances are encouraging male youth in finishing at least a high school degree which is the education degree corresponding to 12 years of schooling. Results go further in depicting an even larger role played by those foreign private transfers in pushing male youth towards opting for additional education degrees in university especially on an undergraduate level. This claim can be endorsed by investigating table 17 where coefficients indicate that receiving remittances increases the probability of acquiring between 13 and 15 years of schooling (university equivalent level) by 10.5 percentage points on average for Jordanians aged [18-24], holding other factors unchanged.

Table 17: Censored Ordered Probit for Remittances Impact on Education Attainment

Marginal Effects		Age [15-17]	
Schooling Grades		Male	Female
No Schooling		-0.039	-0.018
1 to 6 years		-0.00005	-0.0001
7 to 8 years		0.001	-0.001
9 years		-0.028	-0.005
10 years		0.018	0.007
11 years		0.045	0.018
12 years or more		0.001	0.000
<i>Overall Effect</i>		0.228	0.099

Marginal Effects		Age [18-24]	
Schooling Grades		Male	Female
No Schooling		-0.093	-0.038
1 to 6 years		0.003	0.001
7 to 8 years		-0.0002	-0.0001
9 to 10		-0.006	-0.004
11 years		-0.044	-0.016
12 years		0.034	0.012
13 to 15 years		0.105	0.043
16 years or more		0.002	0.001
<i>Overall Effect</i>		0.615	0.253

It is interesting to see that such remittances' positive impact starts to materialize only when high school grades or higher education levels are considered. In effect, a general trend could be perceived where remittances seem to have a positive impact on more advanced schooling grades and a negative one for lower levels. For levels of schooling corresponding to less than 12 years, the impact changes and becomes negative. For example, receiving remittances decreases the probability of completing secondary education (11 years of schooling and less) by 4.4 percentage point on average and *ceteris paribus* for Jordanians aged [18-24]. This can be explained by the fact that male individuals at such a relatively old age and who have not yet reached high school are more prone to quit schooling as the returns from getting an additional year of education or additional degree is much lower than accessing the labor market. These individuals receiving remittances and who did not finish school will consider the option of migrating to countries where they have migrant networks in order to search for work. Hence, remittances received could therefore be financing the cost of traveling especially that getting such private transfers indicate that receivers do have links with a migrant member that could facilitate the individual's move. This is a factor that is potentially missing for non-receivers. Looking at the overall impact, table 17 suggests that receiving remittances

increases education attainment by an average of around 0.23 and 0.62 schooling grades for Jordanian males respectively aged [15-17] and [18-24].

On the other hand, the human capital model discussed above (refer to table 12) indicates that the impact of remittances on women's education attainment is only significant for females aged [18-24]. Therefore, this is the only grouping for which marginal effects analysis is conducted. Marginal effects calculated in table 17 point out that the largest impact for remittances on women's education is perceived at the university level. As highlighted in table 17, being a Jordanian woman aged [18-24] whose family receives remittances increases the probability of having between 13 and 15 years of schooling by 4.2 percentage points on average and holding other factors constant. In addition, the second largest impact is depicted at the high school level which is equivalent for 12 years of successfully completed school. Both of the above results confirm the claim that remittances do encourage human capital formation of Jordanian women particularly at higher education degrees. However, it should be indicated that this impact is not universal for Jordanian women. Indeed it was previously shown that private transfers from abroad did not contribute in the education process of young women below 18 years old. Having said that, table 17 also illustrates that the effect of remittances is negative when it comes to lower education levels. This result is similar to what was depicted for the males sub-sample. Older women, in this case females aged 18 to 24, who have less than 12 years of schooling will not benefit from remittances when it comes to acquiring additional education. Table 17 specifies that receiving remittances will decrease the probability of having 11 years of schooling by 1.6 percentage points on average and *ceteris paribus*. This is explained by the high opportunity cost of staying at school at this stage since return on education are lower and societal pressure is higher especially if women are expected to get married or undertake family work and chores. Looking at the overall impact, results indicate that the increase in expected schooling grades for women aged [18-24] occurring due to remittances receipt is of a magnitude of approximately 0.25. This supports the earlier findings that remittances contribute to an increase in the education qualifications of Jordanian women.

To summarize, the marginal effects calculated in table 17 suggest that remittances are particularly important for older youths to acquire additional years of education at high

school and university levels. This result is confirmed by all the positive estimates calculated across all gender and age categories especially those who exerted a statistically significant impact. The importance of such findings is that remittances not only assist in the human capital formation process but are also permitting young Jordanians, males and females, to acquire higher skills that are much needed in the labor market. This has therefore a potential impact on the overall economy through enhancing labor force productivity, provided that individuals with such newly acquired labor skills do not migrate themselves. In addition, a general pattern is delineated when looking at the signs of the estimated marginal effects at different education levels. The trend indicates that remittances negatively affect attainment for education levels lower than 12 years of schooling⁴⁸. These findings are particularly true due to the fact that education returns for Jordanians at older ages and with few schooling accomplishments is lower than that resulting from accessing the labor market. Indeed, these individuals are better off in finding work or migrating especially to countries with migrant networks. To go further with the analysis, the magnitude of the marginal effects appears to be different between genders. Indeed, the marginal effects calculated for males are much larger than those estimated for females. This suggests that remittances are more efficient in stimulating household decisions related to men's education as compared to those of women's. Such result supports the claim that investing in women's schooling is considered as a secondary option in the household investment decisions compared to males.

1.11 Conclusion

The chapter concludes that migrant remittances do increase the human capital of youth in Jordan, an investment that is critical when advocating sustainable growth in middle income countries. To reach the above conclusion, the essay has opted to estimate an augmented human capital model with two outcomes: education attendance and education attainment. The study used a probit model to estimate the determinants of education attendance and a censored ordered probit model for depicting the determinants of schooling attainment. Empirical estimates were undertaken on different age categories

⁴⁸ Most of the thresholds from the education attainment model have a statistically significant impact in particular those with the negative signs that indicate education levels lower than 12 years (see table 12).

reflecting the demographic spectrum of Jordanian youth. These age groupings were [15-17] and [18-24], sub-samples corresponding to different education levels mainly high school and university. The analysis was also conducted for both genders separately in order to capture the gender dimension in a household's education investment decision. Findings from those human capital models indicated that the magnitude of the remittances impact on education is larger for men when compared to that of women. Statistical significance was also observed more frequently for males' sub-samples. Using the above estimation techniques, the study uncovers robust and consistent estimates that take into account both selection and endogeneity problems in estimating the impact of remittance receipt on education decisions. In conflict with the existing literature's results, empirical testing revealed that the endogeneity of the remittance variable does not occur. The study suggested a set of instrumental variables: 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, the number of household members aged above 50 and the number of females in the household. These instruments did broadly satisfy instrument validity criteria but failed to prove endogeneity when the Wald tests of exogeneity were conducted. In summary, the findings of the non-instrumented models suggest that remittances are enabling Jordanian youth education. The probit model indicates that foreign private transfers increase the probability of staying at school for only male members aged [18-24]. No significant results were perceived for other age groupings. This is mainly due to the compulsory education laws and quasi free education costs for the younger age bracket; or to low future returns on education when compared to the potential earnings in the labor market for older age brackets. This is mainly true if those individuals are at lower education levels. Those results are endorsed when looking at education attainment. The estimates of the censored ordered probit model show that migrant remittances significantly increase schooling for both men and women aged [18-24]. Remittances are therefore participating in the human capital formation of Jordanian youth from both genders. When calculating marginal effects at different schooling grades, a common pattern appears. For levels equivalent to 12 or higher years of education, remittances are positively impacting attainment for all sub-samples. This supports the claim that receiving foreign private inflows encourage

Jordanians in acquiring high school and university degrees. Therefore, migrant remittances are seen as playing a role in building the skills of the future Jordanian labor force which will reflect positively on the overall economy. As for lower schooling grades (below 11 years), remittances seem to exert a negative effect especially for individuals at the above ages. This is additional evidence that individuals at higher ages do drop out from school if they have not reached advanced levels due to the high opportunity costs associated with remaining in education.

As evidenced throughout the chapter, remittances positively impact education behavior through a combination of several effects. The first effect is manifested through the increase in resources available for education investments. Remittance in this case fulfills the role of alleviating budget constraints which allows additional household investments in the children's human capital. However, the problem appears when men and women's education are not of similar priority. This was made apparent from the statistical significance status and magnitude of the coefficients estimated for remittances in the augmented human capital models. Indeed, coefficients related to male sub-samples were larger and more significant. Hence, results suggest that remittances are contributing to increasing human capital formation of Jordanian youth however it is doing so on an unequal basis across genders. Women's education is set as second in priority in household's investment decisions compared to male members. The second channel for the positive impact of foreign private transfers exerted on education is perceived throughout the expected future returns from acquiring additional schooling degrees. Individuals opt for higher degrees of education in the hope of accessing better profiled jobs with higher returns which are more probably found outside Jordan. In this case, remittances encourage youth to undertake higher education degrees especially at university levels in order to migrate at a later stage. Families receiving remittances usually have access to migrant networks which could lower migration costs. Such effect is endorsed by the significant positive impact estimated in the education attainment model. Indeed, marginal effects calculated indicated that remittances were significantly increasing schooling the most at 13 to 15 years of schooling which corresponds to university level especially for males aged 18 and above. The later individuals are more prone to migrate as compared to women from the same age group. These findings bring to attention the brain gain theory. Expected

returns from migration could promote education investments in developing countries as seen through the results on the impact of remittances. From this perspective, the brain drain phenomena could then end up to be beneficial to the origin country as the later might wind up with higher levels of human capital after netting emigration. This claim is supported by Beine et al (2001) and Stark and Wang (2002) who found evidence for such mechanism. However, one should be careful when considering the brain gain theory. Mismatches could be observed between the human capital gain and the labor markets in developing countries. In this case labor requirements and returns are often lower than what is expected by the new skillful labor. This causes additional migration of competent workers with all the negative consequences on the overall economy. This is encouraged further if migration networks are previously established and migration costs are lower. Additional work is still being undertaken in the brain gain literature tackling the above issues and yet to be revealed.

Other interesting findings depicted are parental educational background and regional residency status. Parental educational qualification impacts school attendance and attainment. This positive impact is depicted for both parents at different magnitudes where the mother's qualifications seem to have a higher effect on males' education as compared to the father's and vice versa when looking at women's schooling. This stems from the different bargaining power that each member of the household traditionally holds, especially in a conservative society such as Jordan. A father with higher education background will decide to invest in his daughter's education. This is possible since his opinion has the most weight among household members. As for mothers, their role stem from following up on children's education process. As for regional determinants, findings have signaled that schooling decisions are linked to labor market opportunities. Indeed, results estimated in the human capital model indicated that individuals residing in urban areas are less prone to acquire education than rural residents. This is true since individuals at an age where they are more able to find a job in the city compared to rural regions.

The findings revealed by this essay open the door for a policy debate on two important issues. First policy measures should be designed to facilitate the channeling of foreign private transfers towards human capital in Jordan. This becomes a very relevant topic since it consequently has implications on the overall economy and its sustainable

long term growth. From this perspective a deeper reflection needs to take place regarding policy actions and financial tools that enhance the magnitude and reduce costs related to such foreign transfers. Second, issues related to gender inequality remains valid and important to tackle. Policy discussions here should focus on equating chances for citizens by creating distribution mechanisms that improves allocation of household education investment evenly between young men and women. Such actions are also expected to have a longer term impact on the growth of the economy.

Annex Tables:

Table A1: Summary Statistics of Education Attendance by Age and Remittances Cohort

Age	Total		No Remittances Receipt		Remittances Receipt	
All Sample	Mean	Freq.	Mean	Freq.	Mean	Freq.
15	93.61	1,576	93.42	1,474	96.08	102
16	89.65	1,583	89.17	1,468	94.78	115
17	82.33	1,597	82.07	1,467	85.38	130
18	68.92	1,573	68.25	1,471	77.45	102
19	55.02	1,514	53.93	1,400	67.54	114
20	46.89	1,506	45.43	1,400	65.09	106
21	35.09	1,396	33.92	1,297	50.51	99
22	21.16	1,376	20.30	1,281	32.63	95
23	12.19	1,247	10.73	1,156	29.67	91
24	8.46	1,255	8.05	1,168	13.79	87
Females	Mean	Freq.	Mean	Freq.	Mean	Freq.
15	94.39	817	94.26	767	96.23	50
16	90.36	796	89.81	723	95.89	73
17	84.58	763	84.23	703	88.52	60
18	72.29	779	71.88	726	77.78	53
19	61.03	696	60.81	642	63.64	54
20	54.77	699	53.55	646	69.09	53
21	35.44	646	34.55	600	46.81	46
22	17.83	609	16.87	568	30.95	41
23	8.75	533	7.16	485	25.00	48
24	5.99	563	6.07	522	4.88	41
Males	Mean	Freq.	Mean	Freq.	Mean	Freq.
15	92.77	759	92.52	707	96.15	52
16	88.93	787	88.68	745	93.18	42
17	80.29	834	80.00	764	83.33	70
18	65.62	794	64.84	745	77.55	49
19	49.94	818	48.29	758	69.84	60
20	40.05	807	38.49	754	62.26	53
21	34.79	750	33.43	697	52.83	53
22	23.83	767	22.97	713	35.19	54
23	14.76	714	13.22	671	37.78	43
24	10.47	692	9.54	646	23.40	46

Table A2: Summary Statistics of Education Attainment by Age and Remittances Cohort

Age	Total		No Remittances Receipt		Remittances Receipt	
All Sample	Mean	Freq.	Mean	Freq.	Mean	Freq.
15	9.02	1,576	9.05	1,474	9.27	102
16	9.91	1,583	9.90	1,468	10.11	115
17	10.45	1,597	10.48	1,467	10.60	130
18	10.87	1,573	10.88	1,471	11.37	102
19	11.47	1,514	11.47	1,400	11.91	114
20	11.72	1,506	11.77	1,400	12.73	106
21	11.90	1,396	11.88	1,297	12.84	99
22	12.19	1,376	12.20	1,281	13.52	95
23	12.09	1,247	12.04	1,156	13.67	91
24	12.08	1,255	12.09	1,168	12.97	87
Females	Mean	Freq.	Mean	Freq.	Mean	Freq.
15	9.08	817	9.07	767	9.23	50
16	9.94	796	9.92	723	10.18	73
17	10.59	763	10.58	703	10.64	60
18	11.03	779	11.02	726	11.22	53
19	11.80	696	11.77	642	12.11	54
20	12.17	699	12.08	646	13.13	53
21	12.31	646	12.23	600	13.26	46
22	12.48	609	12.35	568	14.26	41
23	12.46	533	12.31	485	13.98	48
24	12.38	563	12.38	522	12.46	41
Males	Mean	Freq.	Mean	Freq.	Mean	Freq.
15	9.05	759	9.03	707	9.31	52
16	9.89	787	9.89	745	10.00	42
17	10.40	834	10.38	764	10.57	70
18	10.79	794	10.74	745	11.53	49
19	11.25	818	11.21	758	11.73	60
20	11.55	807	11.49	754	12.32	53
21	11.64	750	11.58	697	12.47	53
22	12.14	767	12.08	713	12.94	54
23	11.94	714	11.85	671	13.33	43
24	11.96	692	11.86	646	13.40	46

Chapter 2: The Impact of Migrant Remittances on Household Education Expenditure Pattern - The Case of Jordan

2.1 Introduction

Recent literature has argued for a positive contribution put forth by remittances inflows that goes beyond increasing household consumption levels and entails encouraging different types of investments in the home country. Works of economists such as Adams (1992, 2005) have indeed established linkages between remittances and investments generating future returns to households and consequently to the overall economy. In support of this view, the main argument proposed here is that remittances do free up other financial resources that are directed towards different investments. This defeats the commonly acknowledged idea of looking at remittances as a mere additional source to maintain or increase consumption, and therefore opens the door for further analysis of such a phenomenon. As such, one of the important investments that a household could engage in is in effect the human capital of its members. Consequently, with large amounts of foreign private transfers pouring into developing countries and potentially going towards investments, the current study picks up an interest in investigating the impact of remittances on household budget allocations for education as an entrance to examine human capital formation. This study looks at the case of Jordan, a middle income country from the Middle East with a relatively large Diaspora⁴⁹, a young population and important remittances inflows⁵⁰.

By using an expenditure model that is based on a variation of the Engel's curve called in the literature the Working-Leser model, the chapter capitalizes on the Jordan 2006 household income and expenditure survey to analyze the behavior of migrant remittance receivers towards education expenditure and compare it to households not receiving such private inflows⁵¹. The comparison is made possible by calculating marginal and average budget shares for four household groupings: those receiving international remittances from

⁴⁹ According to the Migration and Remittances Factbook of the World Bank, 11.2% of Jordan's population is considered to be migrants.

⁵⁰ The World Development Indicators 2007 point out that the share of remittances to GDP in Jordan is around 20.3%; making it the world's 10th top remittance receiver proportionally to GDP (Migration and Remittances Factbook, The World Bank).

⁵¹ The terminology private inflows, private transfers and remittances will all be used interchangeably in this chapter.

outside Jordan, those receiving internal remittances from domestic sources, those receiving both types of remittances, and those with no access to any sort of remittances. The objectives from estimating this type of empirical model are two-fold. First the study looks at changes in the household's investment decisions on human capital as a result of remittance receipt, while controlling for socio-economic conditions, regional discrepancies, and intra-household decision making factors to better isolate and capture the impact of such remittances. Second it takes a gender dimension where it examines whether the impact of migrant remittances changes as a function of the gender of the household head. The study argues that male vs. female headed households behave differently when it comes to uses of financial resources and spending decisions. Therefore the impact of remittances on household budget allocations for education could potentially differ. This argument is founded on a stream of literature that discusses remittances and intra-household expenditure models where the bargaining power of different members influences the household's spending decisions. The study further extends this analysis and observes the implication of household gender demographics on education expenditure. The interest is focused on looking at the household composition especially in terms of the characteristics of the women members of the family, and whether these characteristics are correlated with an increase or decrease in household education budgets.

The chapter's interest in examining these issues is motivated by the fact that general literature on migrant remittances is not unified in its findings. Competing theories exist on the effect of such private transfers on expenditure behavior. Two branches of the literature emerge. The first suggests that remittances are primarily being channeled towards mere consumption rather than investment. In this case, they play only the role of a current safety net without having the ability to neither create future income nor generate future economic growth for the country as a whole. The second stresses the fact that contrary to the previous findings, households receiving remittances actually spend less at the margin on mere consumption. They actually prefer to increase their expenditure proportion set for investment spending. This entails that remittances do play a vital role in generating future income for households and consequently contribute significantly to the country's growth process. More recent literature that emerges from the classical theories on principal agent models, where the principal is defined as the migrant and the agent being the household,

has also started investigating the role of the gender of remittance senders and receivers in determining household budget allocations. Indeed it is widely believed that women do spend more on education and health while men prefer to increase consumption or acquire additional physical capital. Looking at the Jordanian context, the chapter focuses on depicting whether remittances follow the specific patterns proposed by one strand of the literature, or constitute a mixture of both theories. It should be mentioned here that in this case study, investment is reflected through investments in human capital and therefore the focus of the empirical model is solely made on education expenditure. The latter is vital as human capital formation is an important element for maintaining a sustainable high growth prospect in the future of any country.

To the author's best knowledge, the chapter is the first study that examines remittances and education expenditure patterns in Jordan. By drawing comparisons between the spending behavior of households receiving internal or international remittances and those with no access to such private inflows; the study depicts whether migrant remittances are being channeled towards human capital formation in Jordan. Consequently, it determines whether such increments in income generate future growth on both household and the whole economy levels. By doing so, this empirical work lays the ground for further research especially on the policy level. Having determined the spending patterns of different remittance recipients' groupings, additional research can investigate the policies and institutional set-ups needed in order to organize such transfers. Further research will also be able to design specific programs to direct those financial inflows into targeted sectors in an attempt to boost the growth of the whole Jordanian economy.

The remainder of the chapter is composed of nine sections. Section 2 is a literature review highlighting different works undertaken on causes and effects of remittances and the use of those private transfers. Section 3 gives a theoretical background on remittances and expenditure models, before looking at channels and mechanisms guiding remittances impact on household budget allocations. Section 4 describes the household survey utilized in the empirical estimations and identifies some of the data limitations. Section 5 illustrates the education expenditure profile of Jordanian households with different remittance receipt status. Section 6 presents the functional form of the basic expenditure model under scrutiny and describes the covariates that are used in the study. It also highlights the

empirical results obtained from estimating such a model and computes education marginal budget shares and elasticities for various remittance receiving households. Section 7 extends the basic model and therefore describes the remittance interactive model. The section lays down the related empirical results along with the newly calculated marginal budget shares and elasticities for education. Section 8 tackles the issues related to selectivity bias arising from the censorship of the sample and undertakes a Heckman selection correction procedure where new and unbiased coefficients are estimated. Section 9 explores a gender dimension for the remittance interactive model. In this section, the study examines the impact of remittances receipt on the household education budget shares for male and female headed households separately. It explains the rationale from analyzing such dimension before investigating the empirical findings estimated through this gender head models. The section also explores the impact of gender demographics in the family on education expenditure. Section 10 concludes.

2.2 - Literature Review

Remittances, as defined by Adams (1991 a), are “money and goods that are transmitted to households back home by people working away from their origin communities”. The growth in the magnitude of migrant remittances in the past two decades, the improvements in data collection related to such a phenomenon, and the progress made in terms of econometric modeling have all pushed economic theory towards taking interest in the analysis of migration and remittance patterns. Many remittances related topics have been investigated including: modeling various causes of remitting such in the altruism vs. exchange models in Cox et al (1997); investigating the channels of transmission of such private transfers from a macroeconomic perspective like in Chami et al (2003) or on a micro level as in the work of Adams (1991a, 2005); and means to decrease related costs as in the work of Freund and Spatafora (2001)⁵². This literature also highlighted and measured the effect of remittances on different socio-economic outcomes. Many of the topics related to migration and remittances are currently subject of debate, with economic theory still indecisive on many aspects of the literature. This indecision is mainly related to modes of utilization of these private inflows and their potential impact on

⁵² Further papers in the literature will be referred to below.

household expenditure patterns. Putting it in context, the literature review section is twofold. First it highlights the research conducted on the effects of remittances on household expenditure and presents some of the literature's contrasting empirical results. Second it describes the frameworks adopted in the literature to analyze remittances and household expenditure behavior.

The literature on the economic effect of remittances is not as widely developed as the one related to the causes leading to remittances. No firm conclusions have been reached on household usage of these private transfers. Chami et al (2003) summarizes the general perception in the literature in three points. First, the majority of remittances are spent on consumption. Second, a smaller part of those private transfers tend to be oriented towards savings or investment in both physical and human capital. Third, investments made possible via remittances are productive to individual households and not necessarily to the overall economy. The general productivity effects coming from remittances appear when new capital such as equipments is introduced. Only then does economic growth come into the picture. Many empirical papers support the above claims. Lipton (1980) considered that 90% of migrant remittances are absorbed into consumption and consequently do not generate future wealth neither on the household nor on the whole economy levels. Perwais (1980) in Pakistan wrote that "such earnings are frittered away in personal consumption", while Sofranko and Idris (1999) found that very little Pakistani private transfers from the Middle East were channeled to create new businesses. Lopez and Seligson (1991) reported that in El-Salvador, 40% of small businesses owners who received remittances do not invest any such funds in the business, and Glytsos (1993) emphasized that in Greece, migrants' private transfers were first spent on consumption and then on housing.

More recent empirical works have however started to challenge the existing theory and went to conclude firmly that remittances were actually being used into investment and ultimately had an impact on the overall development of the economy. The corner stone of this hypothesis is that the analysis should not stress on the expenditure behavior between consumption and investment for remittance receiving families or individuals; but rather on the behavior of such groups in comparison to non-remittance receivers. Adams (2005) argues that if remittances were not being spent on investment they could probably have

freed other resources to do so. Many similar papers endorsed such a claim. Adams (1991b, 2005) calculated marginal budget shares and found that households receiving remittances spent proportionately less on consumer goods as compared to non receivers, while they increased expenditure on “education and housing” and on “land and agricultural equipments” in Guatemala and rural Egypt respectively. Alderman’s paper (1996) revisited the Pakistani migrants’ inflows and showed that remittances are oriented towards land and building development. Gilani et al (1981) found that although consumption formed 62% of the total remittances expenditure; the difference in the expenditure propensities among remittances recipients and non-recipients was largely significant, and hence households’ receiving those private transfers from abroad were more keen to spend on investment in housing, businesses and the financial sector.

In a stock taking exercise on analysis frameworks for remittances and household expenditure patterns, Taylor and Mora (2006) highlight two empirical approaches used in the literature. The first approach is based on conducting remittance usage surveys. These surveys require households that receive remittances to recall and list directly the various goods and services purchased using these private inflows. Although the advantages of this approach reside in its ability to investigate direct questions on remittances, however it exerts many weaknesses. One such weakness is that this approach ignores a principal assumption that Adams (1991, 2005) advocates on the nature of income, fungibility. Income sources including remittances are pooled into the overall household budget, which is then considered in its entirety when spending decisions are made on various expenditure categories. Under the fungibility of income assumption, the manner in which remittances are spent in particular becomes of little importance; hence, the effect of those remittances on expenditure patterns will not be captured in their entirety. Additionally, remittance use surveys may suffer from problems related to the recalling methodology, where households may misreport amounts of remittances similarly to any source of income. The second approach is an econometric modeling process where, as Taylor and Mora (2006) specify, income from remittances is added as an explanatory variable in a system of household demand equations. These demand models were advocated by Alderman (1996) and Adams (1991, 1998, 2005), where household demand was considered not only as a function of income, prices and socio-economic covariates but also as a function of remittance amounts

or receipt. The advantage of such an approach, besides taking into consideration the fungibility of income assumption, resides in these models' ability to capture the independent effects of remittances on expenditure behavior. This approach has widely gained importance and is increasingly being utilized in the literature. Nevertheless, this modeling approach has three main disadvantages. First, it utilizes a remittances covariate rather than a migration one. The latter could have effects on household spending patterns that remittances are not able to capture. Unfortunately migration information is less available in surveys than remittances. Second, these models could suffer from estimation bias as a result of endogeneity, which could arise from the potential linkages between remittances and expenditure outcomes or due to linkages between migrant earnings and remittance behavior (Lucas and Stark, 1985). Third migration might be a selective process, as indicated by Hatton and Williamson (2004), and not necessarily a positive selection. This indicates that households who have migrants might be fundamentally different than those who do not. Therefore, the effect of selection might be confused with the impact of migration (or remittances) on household expenditure. To solve this issue, Taylor and Mora (2006) suggest the need to control for the determinant of migration when modeling for the effect on expenditures. This section will not dwell further on these empirical challenges at this stage and will leave it to further sections.

In summary, modeling and interpreting the effects of remittances remains undecided. The literature has expanded the debate to focus on the effect of those private transfers on households' expenditure behavior and the effects on the economy as a whole. However, no consensus is yet reached on the nature of these effects or on the methods to evaluate them. A large number of empirical studies tend to come up with different conclusions that are usually conflicting. Two competing strands of the literature emerge: one supports the idea that remittances are spent primarily on what Itzigsohn (1995) calls "basic subsistence needs", while the other promotes the fact that a difference in behavior exists between migrant and non-migrant households, and that the former has a tendency to increase their investment spending leading to a positive effect on the growth of the whole economy. Among the two hypotheses, this chapter stands out as an interesting case study on Jordan remittances where the investment component is represented by education expenditure; thus highlighting the human capital perspective. The chapter adopts the

econometric modeling approach to analyze the impact of remittances on household spending patterns. Unfortunately, the lack of data on migration status within households prevents the proposed model of utilizing a migration covariate. Alternatively, the model only examines remittance receipt.

2.3 - Remittances and Expenditure Models

Having examined the literature on impact analysis in the field of migration and remittances, the study turns to describe the theoretical background behind the usage of expenditure models. In a first sub-section, the study underlines the generalized theoretical approach that led to the evolution of these models to incorporate a remittances framework. It discusses the main assumptions behind these models, argues for their validity, and highlights both advantages and limitations of using these models as a basis to analyze the impact of remittances on household spending patterns especially investments in human capital. In a second sub-section, the study describes the various channels and mechanisms through which remittances impact household expenditure behavior. These will justify the usage of the empirical model and will help clarify the estimated impact results.

2.3.1 - Theoretical Background

Expenditure models also known as consumer models, such as the one constructed in this study, generally hold two main assumptions. The first assumption is related to household utility maximization. These models assume that households allocate their budget across different expenditure items so as to maximize their utility at current times or in the future. Such decision is bound by a certain income constraint. Maximizing utility at present time occurs when budget is allocated on consumption of goods and services; while investment expenditure takes place when household maximizes future utility and welfare. The second assumption is fungibility of income (Adams 1991, 2005). The literature emphasizes that household expenditure models usually assume fungibility of income where all income sources are pooled together before undertaking any spending decision. Taylor and Mora (2006) emphasize that such an assumption ignores income source effects. Such effects are treated using intra-household resource allocation models where income sources are separated. Intra-household models are still at early stages of development in the literature and are therefore considered as a novelty. Implementing such models often

requires a high level of detail and accuracy in the data related to the various household income sources. To the best of the author's knowledge, this requirement is not so often met by household surveys. This is also not the case in the particular dataset that is being considered in this chapter. When ignoring income source effect, Taylor and Mora (2006) suggest a general framework for solving the above mentioned consumer model. This general framework considers a set of expenditure functions which take the following form:

$$e_{ij} = f(P_i, Y_j, Z_j) + u_{ij} \quad (1)$$

where e_{ij} represents expenditure on good i made by household j , P_j is a vector of prices, Y_j is household income, Z_j denotes a vector of control variables impacting marginal utilities and constraints on household spending behavior, and u_{ij} is an error term with standard econometric assumption (normally distributed with mean zero and variance equal to σ^2). Having listed the general expenditure functions, the aim is to be able to depict the change in expenditure behavior related to a shift in the income constraints of the family. This shift is usually the result of a change in one or many of the household's income sources. To depict this behavioral change, the second assumption where households pool different income sources together is utilized. This assumption is mathematically written in the following form:

$$Y_j = \sum_{k=1}^K y_{jk} \quad (2)$$

with Y_j representing household j 's total income, y_{jk} depicting specific income sources and K being the number of these income sources. By pulling equations (1) and (2) together, it is hence possible to investigate the impact of a marginal change from a particular income source k on household expenditure patterns. For the purpose of this study, k will be identified as migrant remittances. The marginal change in remittances will have the same effect on expenditure as a marginal change in any other income source. This marginal change is mathematically calculated from equation (3):

$$\frac{\partial e_{ij}}{\partial y_{kj}} = \frac{\partial f(P_j, Y_j, Z_j)}{\partial Y_j} * \frac{\partial Y_j}{\partial y_{jk}} = \frac{\partial f(P_j, Y_j, Z_j)}{\partial Y_j} \quad \text{since} \quad \frac{\partial Y_j}{\partial y_{jk}} = 1 \quad (3)$$

Equation (3) indicates that an increase (decrease) or an addition (omission) of any source of income, in this study's particular case migrant remittances, will loosen up (tighten) the budget constraints for households receiving this income and will thus shift the income constraint curve outward (inward). The magnitude of the shift depends on the amount of the increase (decrease) in this income. The impact is therefore translated into an increase (decrease) in demand of a particular expenditure item provided it is a normal good, or will decrease (increase) demand in case of an inferior commodity. The strength of this model is its ability to calculate expenditure elasticities which will be observed at a later stage in this chapter. The particular interest of this study is to look at education expenditure elasticities related to remittances receipt.

Recent works in the economic literature on remittances and expenditure have adopted these consumer models. Among these works are Adams (1991, 2005), Alderman (1996), Mora and Taylor (2006), Zarate-Hoyos (2004) and Castaldo and Reilly (2007). These listed studies have included a remittance receipt variable to equation (1) and utilized total household expenditure to substitute for total income. Introducing such independent variable, the model hence takes the below general form:

$$e_{ij} = f(P_i, E_j, Z_j) + u_{ij} \quad (4)$$

with E_j indicating total household expenditure that proxy for income level, and R indicates the remittance receipt status. The novelties introduced by this study to the above model are related to the choice of the set of vector Z , the introduction of various sources of migrant remittances along with the analysis of their respective effect, and the introduction of an intra-household bargaining framework which will determine education spending patterns taking into consideration the gender dimension and composition of the household. These features are all discussed in this study as it proceeds. It should be noted, that the influence of migrant remittances in the above expenditure models is observed through an

indirect impact resulting from the change in total income. As specified earlier, this is due to the fact that income source effects are not considered.

2.3.2 - Channels and Mechanisms of the Remittance Impact

Having described the general framework of the expenditure model, the study turns to describe the channels of impact that remittances exert over household expenditure patterns. The first channel of impact is an indirect channel where migrant remittances' effect over household spending is observed through the change induced by those private transfers on total household income. As specified earlier, an increase (decrease) in remittances obviously increases (decreases) total family income. This new total income will be used to purchase additional (less) goods and services depending on the nature of the product whether it is a normal or inferior good. This will be determined by the elasticity of each good. Expenditure models described above capture clearly this channel of impact of remittances. They also allow calculating marginal household spending on various goods and services along with their respective elasticities. This will be dwelt upon further in details in upcoming sections. It should be noted that this channel exerts the most common and perhaps the strongest effect of migrant remittances on household expenditure behavior. The second channel materializes in the correlation of remittance receipt with demand determinants other than household income. Looking at the general model in equation (1), these determinants are the vector of prices P and the vector of covariates Z . It should be noted that the vector P is not restricted to current market prices but could also include unobserved shadow prices for household non-tradable goods as specified by Straus and de Janvry (1984). These shadow prices could be influenced by household decisions to migrate and remit. Such influence is due to the fact that migrant remittances are a result of the household integration into the host country or outside community's labor markets (Taylor and Mora 2006). Therefore, migration and remittances facilitate access to foreign markets. Such access could eventually modify the prices faced by households for consumption or investment goods through lowering transaction costs for example. Looking at education spending in particular, household access to outside markets could imply lower cost on some goods related to education such as books, stationary and other schooling related items. Indeed these could be purchased from the host country or region where the remittance sender resides, using the household total income and on the basis of the foreign

market prices rather than the local ones. Additionally, households may decide to send members abroad to host communities with the purpose of acquiring additional education. This also alters households' education spending pattern and consequently spending on other goods and services depending on whether the tuition is higher or lower than the tuition in the local community. Another impact of remittances on expenditure patterns, which is related to shadow prices, comes from the change in the household composition and the linkages to shadow wages. The loss of household members to migration (depicted here through remittances due to lack of migration data) increases shadow wages since labor becomes scarcer and thus has a higher opportunity cost as specified by Taylor and Mora (2006). According to Becker (1965), 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 expenditure, the absence of household members and thus the absence of supplementary labor could indicate a loss of an additional source of income or additional work at home. If the opportunity cost of losing such labor is higher than the returns from migration a household may decide to stop the schooling of certain members in order to fill in the labor gap. Doing so alters the expenditure behavior of the household which among others will have to cut on education spending.

The third channel comes from the idea that migrant remittances do alleviate household constraints on expenditure from a perspective that is not solely related to income. Mora and Taylor (2006) identify these constraints 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 not found in local communities. Therefore, new patterns of consumption and investment goods are introduced into family decisions. Information hence brings in new expenditure traits for households and could even have a spillover effect over the whole local community. This leads us to talk about preferences. Migrants help bring local communities into the global economy. Such created linkages influence local demand on various products as new spending traits are introduced. Such influence on demand patterns of local communities intensifies when migrant networks become larger. Indeed, migrant networks reduce transaction costs as they become larger and more integrated into host countries. Therefore

they constitute attraction poles for member in the home communities to migrate and move to. In the case of education, these networks do encourage young member of the local community to migrate and even lower costs of migration in the purpose of continuing their schooling especially at higher levels, mainly university. 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 of quality of these education institutions in the home economy; and from home to foreign countries for individuals at university levels. Therefore, the above indicates an indirect role played by communities on household expenditure behavior in particular when it comes to education spending. As for the uncertainty and risk factors and their impact on spending behavior, these are related to the frequency of remittances and the levels of risk that households are willing to take. The risk profile of both the household and the source of income will impact the decision of increasing or decreasing expenditure across various goods and services. A risky source of income will be allocated more conservatively on investment goods by a risk-averse household, contrary to a risk taker counterpart. Remittances are usually perceived as a counter-cyclical income source. However, no agreement in the literature exists on the frequency of these transfers. A permanent flow of remittances increasingly encourages households to become more entrepreneurs and thus 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 increasing savings. The magnitude of that will depend on the degree of risk aversion of the household, the extent of its budget constraint, and its perception of the good or service under consideration. The later is associated with the expenditure elasticity of various consumption and investment goods. From this perspective, the impact of remittances on human capital spending becomes linked to the intensity and certainty of the remittances flows along with households' perception of risk and necessity of investing in human capital. Considering the generalized framework above, the chapter moves to examine the empirical model utilized in this study and describe the relevant data source.

2.4 - Data Description

2.4.1 - The Jordan Household Expenditure and Income Survey

The data used in this paper comes from a 2006 cross-sectional household survey entitled the “Jordan Household Income and Expenditure Survey” (HIES). The survey was conducted by the Jordanian Department of Statistics (DOS) in the third and fourth quarter of 2006 covering the period from July to December. The survey was conducted on a nationally representative sample of 12768 households from all 12 governorates in Jordan. Further details on the Jordanian survey were previously cited in chapter 1⁵³. The focus in this chapter is made on sections of the survey related to transfers where various sources of remittances are depicted. This is in addition to the expenditure module and education expenditure items in particular. Other modules are also utilized to construct various socio-economic controls that are employed in the empirical model of this study. These will be discussed further in subsequent sections.

2.4.2 – Remittances and Education Expenditure

The main variables of interest in this study are remittances, total household expenditure, and household expenditure on education. These are the relevant variables whose interaction is examined across this chapter. This sub-section first describes information available on remittances and their various sources before dwelling on household expenditure data. The study hence illustrates thoroughly how both variables are constructed.

The 2006 HIES offers several questions related to remittances under the household income module in general and the section on transfers in specific. This later section offers data on all sources of private and government transfers coming from inside the country and from abroad. Details on in-kind and cash amount of such transfers are also specified. This chapter defines international remittances as private transfers coming from individuals or relatives residing outside Jordan, and internal remittances as private transfers coming from individuals or relatives living inside the country. The data offers additional questions on the amount of those different sources of remittances and on the method followed to conduct such transfers via banks, post offices, individuals, by hand or other means. The

⁵³ Refer to section 1.3.1 in chapter 1.

study designs three dependant binary variables related to remittances to be utilized in the econometric models. These binary variables reflect whether a household receives international remittances, or internal remittances, or both types of private transfers. The empirical model in this chapter resorts to binary remittance variables rather than cash amounts (continuous variables). As pointed out by Cox-Edwards and Ureta (2003), remittances in cash amounts are not reliable information especially that households tend to pool different income sources when asked to recall the value of the transfers. This is very common in income and expenditure surveys similar to the Jordanian one. In addition, Freund and Spatafora (2005) and Acosta (2006) indicate that remittances tend to be underreported in household survey data. This is true when these figures are compared to macroeconomic figures of remittances presented in national Balance of Payments. Therefore, using amounts of remittances in a model might introduce measurement errors and a downward bias of the estimated coefficients on the impact of those private transfers on household education expenditure.

As indicated in the data description section earlier, the 2006 HIES uses a household expenditure diary method to collect information on household spending on about 570 commodities. The data for all commodities is collected on a quarterly basis for quarter 3 (July-September) and quarter 4 (October-December) 2006. The expenditure data is then aggregated into 33 expenditure categories including the one on education spending. These aggregates are computed using price adjustments between various governorates and adult equivalence scales. Once aggregated, the data is then adjusted as to reflect yearly per capita total household expenditure. The logarithm of this variable is utilized in the empirical model to construct the dependant variable education expenditure share, and to control for wealth status of households. As for household education expenditure - the covariate of interest - the survey collects data for 12 sub-items reflecting various aspects in relation to spending on education. These sub-items are then aggregated using the same price and adult equivalency parameters mentioned above. The 12 sub-items in question are: tuitions for kindergarten, private and public schools, community colleges, private and public universities; and expenditures on drawing and writing materials, textbooks, calculators and typewriters, school bags, Xeroxing, along with education training fees. Once aggregated, education expenditure is then adjusted to reflect yearly spending of families. This

aggregate is then considered for the construction of the dependant variable share of education spending out of total household expenditure as the study reflects when discussing the empirical model subsequently. Having highlighted the main variables of interest in this study - remittances receipt and education expenditure - the chapter turns to discuss some of the shortcoming of the data and their impact on the analysis.

2.4.3 - Shortcomings of the Data

The data utilized in this study presents three limitations that need to be flagged early on in the analysis. The first is the absence of any information on whether the household has any migrant abroad and on the characteristics of this migrant⁵⁴. The 2006 HIES only considers households with individuals living within the same dwelling. In the absence of data on migration and therefore the option to construct variables for presence of migrants in the household, the research assumes that the impact of migration on education expenditure is only through remittances. However, other channels are imbedded in the household composition and dynamics itself. An example could be set when the migrant is a parent and schooling choices are influenced through lack of parental control. Therefore, failing to control for such effects which are well described in McKenzie (2005) could lead to a potential bias due to omitted variables. The lack of such information could also lead to a migration selection problem. However, this might not constitute a problem if we consider the following. First, the above assumption has been adopted by most remittances impact studies due to the difficulty in obtaining data especially on migrants. Second, the empirical model used in this paper has shown great consistency and very encouraging results especially that it passed several statistical significance and model specifications tests as highlighted in later sections.

The second shortcoming of the data relates to the fact that the expenditure and income information are not collected over the entire year. Indeed, the 2006 HIES undertook the expenditure and income modules over two quarters of the year; to be more precise from July to December 2006. Doing so entails losing information on the magnitude of spending in the other half of the year⁵⁵. The study calculates household education expenditure and

⁵⁴ This is a common trait in household surveys.

⁵⁵ One shortcoming of the expenditure data is that it covers two months (July and August) that are typically considered as the summer holidays in Jordan. Therefore no schooling activities are usually observed during

total expenditure by summing the data over the two quarters and multiplying this sum by two to obtain yearly figures. This might not take into account potential seasonal cyclicity in spending over certain items. However this limitation applies to all households, be it those who receive remittances or those who do not, and will hence not affect the impact of remittance receipt on education spending especially since the study will be calculating relative marginal shares rather than focusing on exact magnitudes.

The third shortcoming of the data resides in the fact that the survey is only cross-sectional and does not follow the same group of households across time. Such panel structure would be ideal to incorporate fixed effects that capture variations for within households across time and thus deals with unobservable characteristics and selection issues. The lack of time series data prevents the analysis from looking at individuals and households who benefited from remittances prior to 2006. Such shortcoming could potentially be overcome by conducting temporal analysis using a panel data from 2002 and 2006 HIES since both surveys have similar primary sampling units⁵⁶. Lack of access to the 2002 HIES makes this issue go beyond this study. On another note, selectivity bias and censorship issues will be dealt with using various econometric techniques. A thorough discussion on these topics is made in upcoming sections.

2.5 - The Schooling System and Household Spending Profile in Jordan

Before dwelling on the econometric analysis, the chapter turns to describe some of the background context on education in Jordan. The study focuses on two main aspects: the education system in the Kingdom, and the expenditure profile of Jordanian households with different remittance receipt status. The introduction of such background information places in context the main findings and hypotheses that are tested in this study.

2.5.1 - The Education System in Jordan

According to the Jordanian Ministry of Education (MoE) statistics, the number of Kindergartens and schools in the Kingdom has reached 5690 during the schooling year 2007/2008. Amman holds the largest number of educational establishments (around 32

this period. Education spending in these two months will consist on education items other than tuition fees (exceptions could be for summer schools or some university courses). This shortcoming is observed equally across all sample observations.

⁵⁶ Analysis could be conducted using aggregates on a sampling unit level.

percent) reflecting the concentration of population in and around the capital city (MoE 2008). The general educational system in Jordan is founded on principles derived from the Arabic Islamic civilization (Al Jabery and Zumberg 2008) and is stretched over thirteen grades including a one year Kindergarten grade. Basic education is divided between primary and middle schools and accounts for grades one to ten; while secondary education reflects grades eleven and twelve. The peculiarity of the Jordanian educational system resides in the fact that the combined grades of the final three years of the basic educational stage (grades 8, 9 and 10) determines the stream of secondary education to be followed by the student. These streams are either academic with sub-tracks for sciences leading later on to university, or vocational education that aims at providing skilled labor. According to Al Jabery and Zumberg (2008), students' preferences are taken into account but the final decision rests with the MoE. Jordan's constitution guarantees the universal right of free and public education without discrimination based on gender, language, ethnicity or religion. Therefore, strictly implemented legislation mandates that basic education be compulsory and free in public educational establishments. Tuition fees for the secondary educational stage are minimal in public sector schools compared to the private sector; pushing the vast majority of Jordanian households to opt for public schooling. In effect, 69 percent of students go to public school, 22 go to private school, and the rest go to other types of institutions mainly UNRWA schools that target Palestinian refugees (MoE 2008).

Higher education in Jordan started in 1958 with the first university established in 1962. This university was the "University of Jordan", a public university that is considered the largest higher education establishment in the Kingdom today (MoHE 2009)⁵⁷. The higher education system in Jordan is currently composed of 10 public universities and 13 private ones, all under the supervision of the Ministry of Higher Education (MoHE) (Al Jabery and Zumberg 2008). Tuition fees in public universities are highly subsidized compared to fees in the higher education institutions of the private sector. In a study for the creation of a student financing facility in 2007, the International Finance Corporation (IFC) estimated the average annual tuition fee for private universities at JD3500 (around US\$4942) compared to an average annual tuition of JD1000 (around US\$1412) for public universities making the latter attractive and affordable to the majority of Jordanians.

⁵⁷ MoHE: Ministry of Higher Education.

Statistics from the MoHE for the academic year 2008/2009, indicates that 76 percent of undergraduate students are registered in public establishments compared to 24 percent for the private sector, and 89 percent of graduate students are enrolled in programs in public universities compared to only 11 percent for private ones. The high demand for public universities coupled with the limited seats offered each year creates a big competition among students as to secure a place in these intuitions. Similar to many countries in the Middle East⁵⁸, admission into public universities is determined by the grades received by the student in a standard test, called *Tawjihi*, which is typically presented at the end of secondary education (end of grade 12). The cumulative grade received on this test not only determines admission but also determines both the major and the location of the public university that the student is allowed to go into. Indeed thresholds are set yearly by the MoHE for acceptances into various majors and universities. Majors such as medicine or engineering do usually require the highest grades. Alternatives for unlucky students, who would like to continue in higher education, are to access private universities or travel abroad for studies. However, these are usually expensive alternatives and are not affordable to all Jordanians. Other choices include accessing public colleges. These are higher education establishments that are oriented towards vocational training and are perceived to be less prestigious by the Jordanian society. The admission system into private university is different and is based on either entry exams or the portfolio of the student including schooling grades and recommendations alongside *Tawjihi* grades. Higher education admissions' system in Jordan creates several distortions and could constitute a significant factor behind dropping out of schooling after secondary education or during university studies. From this perspective, remittances could play a role in inciting youth to access or stay in universities. This role is fulfilled directly through alleviating budget constraints and therefore allowing households to invest in private higher education in Jordan or abroad. The indirect effect is perceived through the role of migrants in bringing their households and communities into a more global economy; introducing new education

⁵⁸ Similar admissions' system exists among others in Egypt, Syria, Iraq and Palestine. Only Lebanon among the Middle East countries has a different higher education system.

choices; and providing migration networks for the young to travel abroad (or to the cities in case of urban-rural migration) in order to pursue university degrees⁵⁹.

2.5.2 - Spending Profile of Jordanian Households

Prior to the discussions on the econometric modeling and related estimates, the study turns to a descriptive analysis of the raw data. Focus is given on highlighting the spending pattern on education of various households through looking at some descriptive statistics. Table 1 reports the average budget shares of education spending by remittance receipt status of the household. Comparisons are made between average education expenditure shares of households receiving international remittances, households receiving internal remittances, households with access to both types of private transfers, and households with no access to such private transfers. Looking at the sample as a whole, the figures of table 1 indicate that a Jordanian household spends on average around 5.5 percent of its total budget on human capital. Investigating the descriptive statistics of households by remittance receipt status reveals that the various sub-groups of households are different in terms of education spending. Households receiving international remittances seem to spend on average around 1.8 percentage points more on education items than families that do not receive any type of remittances (reference group). A similar pattern is not upheld for the other two sub-groups of households. Indeed, those who receive internal remittances solely, spend on average 1.7 percentage points less on education than their counterparts with no access to remittances; while families in receipt of both types of private transfers spend on average 0.6 percentage points less on similar commodities as compared to the reference group. It should be noted that the study has conducted a student t-test for testing the hypothesis of equal means (or average education budget shares) between the various groups of remittance receipt households and the reference group of non receivers. Probability and t-values are reported in table 1 to highlight the statistical significance of the difference in various means. Results indicate that spending patterns of households receiving international remittances and households receiving internal remittances are in respective order statistically significantly different than families with no access to these private transfers.

⁵⁹ Refer to section 2.3.2 for a more detailed discussion on the channels of impact of remittances on education choices.

Table 1: Household Average Education Budget Shares for education expenditure

Education Budget Share for Households	Mean	Sample Size	Student t-test	
			T-value	Prob-value
Receiving International Remittances	0.072 *	706	4.99	0.000
Receiving Internal Remittances	0.038 *	1507	-7.08	0.000
Receiving Both Types of Remittances	0.049 *	109	-0.72	0.516
Receiving No Remittances	0.055 *	8671		
Total Sample	0.054 *	10993		

Note 1: Student t-test is reported to test the equal means hypothesis with No Remittances as reference group.

Note 2: * T-test results have shown that the means were all statistically different than zero at 1% significance.

In contrast, this is not the case when comparing the means of education budget shares of households receiving both types of remittances to non receivers. This lack of a statistically significant difference could arise as a result of the small cell size of the sub-sample of households receiving both remittances and which accounts to only 109 observations. This is much smaller than the 706 observations for international remittances sub-sample, 1507 observations for internal remittances sub-sample, and 8671 observations for non receivers. Such small sub-sample suggests that care ought to be taken when interpreting results and effects arising from the covariate reflecting receipt of both remittances when estimating the econometric model in the upcoming sections. Having said that, the descriptive statistics presented in table 1 suggests a potential relationship between remittances and expenditure on human capital items of Jordanian households. In specific, it suggests that receipt of international remittances seems to impact households' behavior in allocating a larger portion of their budget to spending on education as compared to non-receivers, while the receipt of internal private transfers decreases it as reflected by the statistically significant difference in means of average education budget shares. At this stage, the latter conclusions could not be confirmed. Differences in expenditure shares are not necessarily related to the various remittance receipt statuses but could also be attributed to other socio-economic, demographic or regional characteristics. In addition, having a higher share of expenditure on education does not explicitly entail having a higher marginal spending on human capital. For example, although international remittance receivers spend more on education items, their marginal budget share could be higher or lower than that of non-

receivers. It is thus possible that an increase in income, and therefore expenditure, entails a larger or smaller increase in investment on human capital for households with no access to remittances compared to those receiving these private transfers be it international or internal. The above results could only be confirmed through using econometric analysis where education expenditure patterns of remittance receiving households are compared to similar households with no remittances and controlling for various characteristics. Consequently, the divergence in expenditure shares observed in table 1 will be investigated through regression analysis and through the calculation of marginal budget shares for human capital. The following sections are devoted to the discussion of these particular matters.

2.6 - The Basic Empirical Model

2.6.1 - Description of the Functional Form of the Basic Empirical Model

The functional form of the empirical model used in this chapter is a variation of the Engel's curve. The objective of the functional form chosen is to assess the expenditure behavior of different groups of households. This objective is achieved through looking at consumption shares and determining the potential existence of certain patterns following the impact of a wide variety of covariates reflecting different socio-economic characteristics. In this chapter's case, emphasis will be made on education budget share in particular. Engel's curve based empirical models actually relates the household budget shares allocated across various expenditure categories to total household spending as per Castaldo and Reilly (2007). Additionally, Sadoulet and de Janvry (1995) specify that in the absence of time series data needed to examine price changes and observe price elasticities, economic research is limited to the estimation of Engel's curves. This will be the case in this chapter especially that the data utilized is a cross-sectional household survey. The Engel's curve framework is a popular framework in economic literature and has taken several functional forms that Deaton and Muellbauer (1980) document in their work. The one that is used in this particular study and that is explored subsequently is the Working-Leser specification described in Working (1943) and Leser (1963). This particular specification is consistent with household utility maximization as pointed out by Castaldo and Reilly (2007). Thus it is able to examine household spending preferences under an

income constraint. At this stage, it is worth indicating that recent empirical works such as the ones conducted by Zarate-Hoyos (2004), Adams (2005), Taylor and Mora (2006) and Castaldo and Reilly (2007) are used in this chapter as a starting point for the suggested model. The study builds on these papers in a number of different directions such as concentrating on education expenditure shares as a basis for determining households' investment patterns, using new sets of socio-economic covariates, looking at inter household spending on education from a gender perspective, and addressing selection issues. The new tracks are revealed as the analysis progresses further into the chapter.

Empirical models looking at the impact of remittances on household expenditure patterns and marginal propensities to spend under and Engel's curve framework should exhibit three mathematical features. These aspects are explored below and are characteristic of the empirical model constructed in this chapter. The first feature resides in the ability of the model utilized to provide a good statistical fit for a wide array of goods and commodities. These products range from food and durables to education, health and utilities. The empirical model should therefore exert flexibility so as to permit variation in the spending patterns on these various goods when total household expenditure levels change. The second feature is related to the variability of the Engel's curve itself in relation to income changes. Since these types of models are able to look at consumption of different items, the Working-Leser specification chosen for this chapter has a slope that changes unconditionally in relation to household income or total expenditure. One of the main interests in this chapter is to calculate marginal propensities to spend and corresponding expenditure elasticities. This will evidently need to be calculated following the estimated coefficients of the empirical model. Both components, marginal propensities and elasticities, are in relation to the slope and intercept of the Engel's curve in consideration. Hence, it is important that the model should not only be able to change the slope, but also vertically shift the curve upward or downward depending on the expenditure category under investigation. These curve movements are interpreted as an increasing, decreasing or constant marginal budget shares at different consumption levels. To highlight mathematically the relevance of this characteristic, only expenditure is considered as an independent variable at this stage. Thus let us assume that households differ only by their level of total spending. Covariates along with their specificities will be

introduced at a later phase of the analysis. Let us examine a model that imposes the same slope for all levels of expenditure and explore the causes of its failure. Such restricted model would be a linear Engel's curve of the following form:

$$C_{ij} = a_i + b_i EXP_j \quad (5)$$

where C_i = expenditure on good i of household j and EXP_j = total household expenditure. Equation (5) enables us to calculate marginal budget shares (MBS) which is the slope of the curve written as $(dC_i / dEXP)$. In this particular case where $dC_i / dEXP = b_i$, the restriction resides in the fact that once the latter parameter b_i is estimated, the marginal budget share of good i will remain constant (and evidently equal to b_i) despite any variation in the level of households' total expenditure. The third feature of the econometric model proposed is the additivity criterion. The latter consists upon the following rule: marginal propensities (or marginal budget shares) for all commodities should add up to one in order for the model to be internally consistent. The above feature was examined closely by Prais and Houthakker (1971) in the algebraic context of an Engel's curve. The authors specify that when using the latter function, the following constraint is imposed on the parameters: "the sum of all expenditures is equal to income at all income levels" Prais and Houthakker (1971). More explicitly, if the Engel's curve for the i^{th} commodity is given by $C_i = f_i (EXP)$ where EXP is total expenditure or income, thus f_i should be chosen so that $EXP = \sum C_i$ (restriction (a)). Therefore, in order to satisfy constraint (a), summing equation (5) for all expenditure categories will imply that $\sum b_i = 1$. Or, the observation $MBS_i = b_i$ proven previously entails $\sum MBS_i = \sum b_i = 1$: thus the justification of the additivity criterion. In addition, the results presented above are generalized to include wider variations of the Engel's curve rather than the simplistic equation (5). Nicholson (1941) proved the following theorem: "if the same form of the Engel curve is fitted to all commodities and the form is such to allow the fulfillment of the adding-up criterion, then the estimates of the curve obtained by the method of least squares will also satisfy the adding-up criterion". This theorem is also stated in Prais and Houthakker (1971), however the proof is not shown in this chapter. This theorem validates the suggested mathematical

model of this study in two aspects. First, it justifies the use of an Engel's curve for consumption of goods other than food (mainly education) and guarantees that the relevant equations conform to the additivity rule. Second it allows for certain variations, which will be introduced to equation (5) in the following sections, to deal with the restrictive linear form. Hence, the use of a non-linear model such as a semi-logarithmic one will be a valid choice that conforms to the features presented above. In particular, the Working-Leser specification of the Engel's curve chosen also exhibits these three mathematical characteristics. This is the specification used in the rest of the study.

Having specified the criterion of the econometric model and emphasized its non-linearity, Leser (1974) proposes a modification of the Engel's curve that takes a semi-logarithmic form. According to Prais and Houthakker (1971), semi-logarithmic forms tend to perform best. The functional form selected in this study's model is known under the name of Working-Leser model. This functional form accounts for the additivity rule and relates expenditure shares to the logarithm of household total expenditures. The model's basic equation takes the following form:

$$C_{ij} / EXP_j = a_0 + a_1 \log EXP_j + \varepsilon_{ij} \quad (6)$$

with C_{ij} / EXP_j representing the budget share of expenditure for good i in household j and $\sum C_i / EXP = 1$ since ultimately the sum of the amounts spent on each good should equal to the total expenditure of households as per restriction (a). Household expenditure behavior and preferences are not solely determined by the household's income level. In effect, various socio-economic, demographic and regional factors come into play. Therefore, the model should take into account such factors and try to control for their effects. From this perspective, the study utilizes a wide variety of covariates related to household, regional and community characteristics. Therefore, the basic Working-Leser model of equation (6) is extended as to include covariates assumed to have an impact on budget shares especially the one allocated to education expenditure since it is the category of interest in this study. The proposed model also includes determinants on the receipt of migrant remittances from different sources. The coefficients from these later covariates

will be utilized later on to determine the impact of migrant remittances on education expenditure budget shares and on marginal propensities to spend on human capital between receivers and non-receivers. With the inclusion of the above additional covariates, the general extended form of the suggested model is written as:

$$C_{ij} / EXP_j = a_0 + a_1(\log EXP_j) + a_2 X_j + a_3 Remit_j + v_{ij} \quad (7)$$

where C_{ij} / EXP_j is the budget share of good i and household j , EXP_j is total expenditure of household j , X_j is a vector of covariates including household, regional and community characteristics. A thorough discussion and listing of these covariates will be undertaken in a subsequent section. The error term v_{ij} captures unknown parameters for the i^{th} budget share of the j^{th} household and is assumed to be normally distributed at this stage with $E(v_{ij}) = 0$ and $Var(v) = E(v^2) = \sigma^2$. As for $Remit_j$, this term is a mutually exclusive vector of binary variables capturing the receipt of remittances by households from various sources. In this specific study, four mutually exclusive categories for remittance receipt sources are depicted: households receiving international remittances (i.e: from outside Jordan), households receiving internal or domestic remittances, households receiving remittances from both international and internal sources, and households with no migrant remittances. The later non-receiver group will be used as the base group of comparison in the empirical analysis. It should be noted that the Jordan HIES 2006 data does not allow for further categorization of the remittance receipt status especially that it does not indicate the countries from which the private transfers were sent. In all cases, further categorization could lead to too many groupings and therefore problems related to small cell sizes could appear as indicated in Castaldo and Reilly (2007). Equation (7) could thus be written in more specific terms:

$$C_{ij} / EXP_j = a_0 + a_1(\log EXP_j) + a_2 X_j + a_3 R_j + a_4 IR_j + a_5 RIR_j + v_{ij} \quad (8)$$

with dummy variables capturing household receipt of different sources of remittances in the following way: R_j for international remittances, IR_j for internal remittances, RIR_j

for both international and internal remittances. The estimates of coefficients a_3 , a_4 and a_5 contribute to determining the magnitude of the impact of different types of remittances on the related budget shares.

The model of equation (8) will be estimated at a first stage using an Ordinary Least Squares (OLS) technique. As specified earlier, the study is only interested in analyzing the impact of remittances on education spending patterns. Therefore, estimates for equations related to the other expenditures on goods and services will not be considered in this chapter. In this application, the dependant variable C_{ij} / Exp_j of equation (8) is interpreted as the education budget share with C_{ij} representing education expenditure of the j^{th} household. However, when dealing with expenditure on education, issues related to censorship could arise. Such issues constitute an econometric challenge that needs to be dealt with carefully especially when selecting the estimation technique. The decision of households to spend on education and the amount spent both depend on the level of household wealth and a set of observed socio-economic characteristics. These are reflected in equation (4) by the independent variable Exp_j and by the vector of covariates X_j . Nevertheless, the decision to spend on education is also influenced by two additional factors: unobserved latent variables and the household decision of whether or not to participate in the education process. In effect, expenditure by household j on education will only occur if members of this household are still at school or university and no severe income constraints are impeding the family from conducting such spending. However, many households do have an education expenditure that is equal to zero. This is due to one of two possibilities. First, income constraints prevent households from investing in education, and second, households do not exert any need to spend on education especially when household members have all completed schooling or are not at schooling age. In this second case, censorship arises since a pile of observation with zero education spending will be observed in the sample distribution. If the scale of the censorship is large enough it could bias the estimates of the OLS downward. Such restrictions imposed on the distribution of the sample could lead to selection problems. To deal with the censorship and selectivity bias, the study will resort to undertake a Heckman procedure to test for selectivity bias and correct it. It should be noted that studies on demand and consumer

models have utilized censored regression approaches in various economic literature. These include an Almost Ideal Demand System (AIDS) by Heien and Wessels (1990), a two step estimation of a censored model coupled with a Monte Carlo simulation by Shonkwiler and Yen (1999), and a two stage generalized Heckman procedure by Lazaridis (2003). In this chapter, the choice of estimation technique for the proposed econometric model of equation (8) (and for later models' specifications) is set on an OLS. As will be discussed in upcoming sections, censorship and selection issues will be addressed by applying a Heckman two-step procedure.

Before proceeding with the analysis, it should be highlighted that the study also estimates a semi-logarithm model with household per capita education as a dependant variable⁶⁰. The objective is to estimate education elasticity and examine whether similar results are obtained in both model specifications: budget shares and per capita amounts. Focus is made on testing for the unity of this elasticity, and therefore depicting the consistency of the budget shares estimations. Although the semi logarithm model is estimated all along the study, its results are not reflected upon. The estimates from this later model are reported in all tables, however only the comparison of elasticity will be highlighted.

2.6.2 - Description of Covariates Used

As indicated in equation (8), the education expenditure model estimated in this study uses wide vectors of independent variables as controls for various socio-economic characteristics that could influence education spending outside the channel of remittance receipt. The selected covariates can be grouped into five broad categories: household demographics, education level of various members of the household, regional residency controls, occupation of the head of household, and transfers received by households. This section investigates the covariates relevant to each of the above groups of control vectors. The broadness in the nature of these covariates enables the study to better isolate the impact of the receipt of various categories of remittances on education budget shares and thus control for factors that are not related to these private transfers⁶¹.

⁶⁰ The semi-logarithm model is conducted along with the budget share model using similar independent variables for controls.

⁶¹ A description of the different remittances covariates and household expenditure, which is used to control for wealth, was presented in an earlier section and is therefore not repeated here.

Since education choices are believed to be taken collectively in the family, household demographics and characteristics could have a direct impact on human capital spending and thus need to be controlled for in the above model. From this perspective, the study has opted for the following control variables: household size, number of elderly members of the household aged above 65, age of the head of household and the square age of this head along with his gender. In addition, the model controls for the household composition by including the following covariates: proportion of household members aged less than 5, proportion of household members aged [6-11], proportion of household members aged [12-14], proportion of household members aged [15-17], and proportion of household members aged [18-24]. The age brackets selected correspond to the various levels in the Jordanian schooling system, in a typical case where individuals do not repeat, skip or drop-out classes. Indeed a person aged [15-17] is typically at secondary school while those aged [18-24] are at a university level. On the other hand, the study has chosen to control for the education status of various members of the household as this is also believed to influence household spending behavior on education. This second vector of controls looks at the level of education reached by the parents in the family. It is expected that parents with higher education are more prone to invest in education especially in private schooling and higher levels regardless of remittances. Parents' education is captured by the construction of covariates reflecting the number of schooling years successfully completed 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 children's schooling. Furthermore, mothers and fathers' education status might play different roles especially when looking at education choices from a gender perspective or from various age categories. One of these differences is depicted by Thomas (1990, 1994) who indicated 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. Mother education status could also proxy wealth especially if female education is perceived as a luxury commodity. The third set of covariates represents regional residency status. This vector aims at controlling for existing regional discrepancies that might influence households' investment decisions on human capital. The study opts for including

dummy variables capturing the residency status of households in the 13 governorates of Jordan⁶². As for the fourth group of control variables, these capture the economic activity of the household head. Economic theory believes that the occupation of the head of the family could influence the spending decision on education. This claim is supported by the idea that heads are usually the largest contributor to household income. Therefore household budgets are affected by earnings related to various economic activities performed by the head. The study selected two vectors that control for the employment status and the economic activity in which the household head is involved. On one hand, the employment status vector includes binary covariates reflecting whether the head is an employee, an employer, works for his own account, or is engaged in unpaid work including family work⁶³. On the other hand, the vector controlling for economic activity includes binary variables reflecting the sectors in which heads work. The study has opted for the following sectors: farming, public sector, construction, tourism, finance and health⁶⁴. The fifth group of controls variables is related to public sector assistance. The model controls for government transfers and social benefits received by households. These additional inflows could be directed towards education spending and could hence free additional income sources such as remittances to be invested in other items or commodities.

Before going further, the question of endogeneity of remittances receipt should be acknowledged. Endogeneity arises primarily as a result of reverse causality. In effect, it can be argued that receipt of remittances might allow for more education spending. Simultaneously, a higher (or lower) education spending might also cause increase (or decrease) in remittance flows. This is occurs as educated migrants are more prone to get higher paid employment and consequently have larger means to send more remittances back to their families. If endogeneity occurs, then the estimated coefficients of the different remittance receipt covariates will be biased. Similar to chapter 1, the study has used the same instrumental variables (IVs) and computed similar validity and exogeneity tests.

⁶² The covariate reflecting residency in the governorate of Jerash was dropped as it is selected as reference group.

⁶³ The control group identified for this vector of variables is household heads that are employees. Therefore the related binary variable was dropped.

⁶⁴ According to the national accounts data published by Jordan's department of statistics, these sectors constituted 32.6 percent of the Jordanian GDP and employed about 40.9 percent of the Jordanian labor force in 2006.

Based on these tests, the study concludes that remittances receipt variables were not endogenous in this case. Again, as in chapter 1, the same caution over the strength of the instruments used applies. The study will not dwell further on this question and moves to discuss the empirical results in the next section⁶⁵.

It should also be noted that the household per capita total expenditure covariate used in the model of equation (8) might also be endogenous with education expenditure. This is also primarily due to reverse causality and to potential omitted variables especially if expenditure is treated as a signal of household wealth. While wealth, controlled for in this chapter by total per capita household expenditure, is positively correlated with education; such correlation can also be two-ways. Indeed, obtaining more education increases the probability of having a larger wealth and consequently having a more elaborate total household spending level. If this is the case, then the estimated impact of total expenditure on education spending can be biased. However, using instrumental variables to tackle potential endogeneity for wealth indicators such as expenditure is a difficult task for two main reasons. First, the limited information offered by the household survey in hand and the absence of a panel data that can provide further data. Second, this is an in-built weakness in the Engle's curve type of empirical models, as the one used in this chapter, which are all about estimating household expenditures and expenditure shares.

2.6.3 - Empirical Results of the Basic Model

Having described the basic empirical model, the study turns to discuss the estimates of the Engel curve model for human capital spending as suggested in equation (8). The chapter primarily highlights the results of the estimates of the coefficients a_3 , a_4 and a_5 as laid down in equation (8) as it is mostly interested in examining the effect of different types of remittances on education expenditure shares. Socio-economic, demographic, household and regional characteristics (vector a_2 in the equation) is briefly discussed

⁶⁵ Chapter 2 does not dwell on the issue of endogeneity of the remittances receipt variables as to avoid repetitiveness. This has been discussed thoroughly in chapter 1. Similar methodology and instruments have been used to tackle this empirical challenge.

towards the end of this section. Table 2 reports the empirical results of the education budget share equation estimated via OLS⁶⁶.

Table 2 suggests that receipt of private transfers from domestic migrants (or internal remittances) increases households' budget share allocated for education spending. However, this is not the case when international remittances are received. The impact estimated, although positive, is not statistically significant. The estimated coefficient of internal remittance receipt indicates that receiving these domestic private transfers raises the budget share allocated for education items by 0.3 percentage points on average while holding all other controls constant. As per table 1, the average budget share for household education spending for the whole sample is 0.054. Therefore, the impact effect depicted from estimating equation (8) implies that the budget shares on education is 5.75 percent higher for Jordanian households receiving internal remittances compared to households that do not receive any type of remittance, on average and *ceteris paribus*. This contrasts with the findings of the descriptive statistics⁶⁷ where average budget share on education of non-receivers was found to be higher than internal remittance receivers. On the other hand, receipt of international remittances does not seem to exert any clear effect on education budget shares as it is statistically not significant. The difference in impact between the two types of remittances may be due to the rural residency and poverty status of households receiving internal remittances. Indeed, computing some statistics from the 2006 HIES indicates that 17.9 percent of households receiving internal remittances were rural compared to only 7.4 percent for their international receivers' counterparts. Additionally by determining the per capita household expenditure quintiles of the survey sample, the study finds that 47.3 percent of families receiving internal remittances were in the lowest two quintiles compared to 17 percent of families receiving remittances from outside the Kingdom. Therefore, the fact that households receiving internal remittances are on average more rural and poorer entails that the transfers these families obtain from migrants living in urban areas will have a significant impact on their decisions to invest in human capital unlike international remittances which do not seem to exert a similar effect.

⁶⁶ The study also attempted a Tobit estimation technique. Results were very much similar to the OLS and are available upon request. However selection issues are better tackled by a Heckman procedure, which the chapter examines thoroughly in upcoming sections.

⁶⁷ Refer to section 2.5.2.

Table 2: Regression Analysis for the Impact of Remittances Receipt on Education Budget Share - The Remittance Basic Model

Ordinary Least Squares	Education Budget Share	Per Capita Education Expenditure
International Remittances	0.002	6.412
Internal Remittances	0.003 ***	7.324
Both Remittances	0.003	-9.679
Log per capita totalal Expenditure	0.031 *	179.907 *
Household Size	0.007 *	10.564 *
Number of Elderly	-0.004	-7.757
Share of people <5 in Household	0.007	109.61 *
Share of people [6-11] in Household	0.062 *	242.735 *
Share of people [12-14] in Household	0.027 *	176.411 *
Share of people [15-17] in Household	0.122 *	289.491 *
Share of people [18-24] in Household	0.133 *	335.542 *
Age of the Head of Household	0.003 *	5.206 *
Age^2 of the Head of Household	0 *	-0.035 *
Head is Male	-0.018 *	-28.935 *
Mother Years of Education	0.002 *	2.812 *
Father Years of Education	0.002 *	3.352 *
Amman Governorate	0.005	14.696
Balqa Governorate	0.005	9.093
Zarqa Governorate	0.006	9.161
Madaba Governorate	0.019 ***	17.287
Irbid Governorate	0.003	-1.667
Mafraq Governorate	0.01	36.01 *
Ajloun Governorate	0.009	25.682 ***
Karak Governorate	0.028 *	51.732 *
Tafilah Governorate	0.005	10.52
Maan Governorate	-0.007	-11.375
Aqaba Governorate	0.011	49.108 *
Head is an employer	0.005	6.813
Head works for own account	-0.002	-14.818 **
Head works in unpaid work	-0.042	-159.992 ***
Head is a Farmer	-0.015 *	-13.815
Head is in Public Sector	-0.009 *	-12.292 *
Head is in construction	-0.016 *	-13.268
Head is in Tourism	-0.018 *	-48.28 *
Head is in Finance sector	-0.004	11.363
Head is in Health Sector	0.003	10.604
HH Receives Social Benefits	0.027 ***	20.708
HH Receives Govt. Transfers	-0.007 *	-38.773 *
Constant	-0.334 *	-1531.711 *
Sample Size	10993	10993
F-test (df= 32, 10960)	66.4	30.99
Significance Level (Prob-Value)	0	0
R-squared	0.25	0.258

Significance Level: * 1% ** 5% *** 10%

Note 1: Governorate is the largest official geographical unit in Jordan

Note 2: Huber-White robust standard errors were used in the model.

Standard Errors were clustered at the household level.

Results for other covariates seem to be in line with common findings in the literature. With regard to household composition, families with more elderly members tend to have lower average budget shares on education while the statistically positive impact for shares of various age groups seem to increase as the age bracket gets older. This is related

to the fact that spending on education does increase when members are at higher levels of schooling where tuition and education inputs become more numerous and costlier. Table 2 indicates that the largest coefficient for this vector of dependant variables is observed for the age bracket [18-24] which roughly corresponds to members who are at university level education. Looking at family member's education level, estimates obtained suggest that the more years of schooling parents have successfully completed the higher the current average budget share on education is. This is inferred by the statistically significant positive impact of the education level covariates for parental education. Looking at one of the parents, table 2 indicates that mothers' number of successfully completed schooling years seem to increase the budget spending share on education items. Indeed, a mother with higher education levels tends to value the education her household members receive and will therefore push for more spending on education items such as tuitions for private schools/universities, additional resources such as books, or even additional years of schooling beyond compulsory ones especially at higher levels. Regional specifications do not seem to play a large determining role in budget spending shares on education in Jordan. This can be inferred from the few statistically significant coefficients estimated in equation (8) for the various governorates in Jordan. This is also the case for urban/rural residency which indicated no statistically significant effect on education budget share in a separate estimation of the model⁶⁸. Such a result could be attributed to the fact that the supply side of education in Jordan is not a constraint for receiving this education. Indeed schools and universities, especially the public sector ones, are well scattered around the Kingdom including rural areas⁶⁹. Two other interesting results are worth mentioning. First, being a household head working in the public sector decreases the budget share for spending on education. This could be attributed to the fact that public sector employees might prefer sending their family members to public schools/universities. Otherwise, public sector employees are considered as lower middle and middle income class and therefore might not have the means to invest in private education. Such analysis could not be expanded further due to lack of data on types of schooling institutions (public vs.

⁶⁸ The study has introduced an urban/rural dummy variable in the model to examine this regional dimension. The coefficient calculated was statistically not significant. This result is not reported in the study.

⁶⁹ This was empirically discussed in chapter 1 of the thesis when education attendance and attainment models were estimated. Regional and distance to school covariates were used in these models to show that attendance and attainment determinants were not related to supply of schooling institutions.

private) in the household survey. Second, the receipt of social benefits and government transfers seems to send different messages. Households' receipt of social benefits increases budget share on education while receipt of government transfers decreases it. This opens the door for further discussions on the nature and efficiency of public transfers and cash subsidy schemes in Jordan, a discussion that goes beyond the scope of the current chapter. The study turns next to calculate marginal budget shares and expenditure elasticities for families with different remittance receiving statuses. This allows comparing education spending behavior of remittance receivers vis-a-vis non receivers at the margins and therefore quantifies the incremental effect or change that each type of remittance brings to expenditure on human capital.

2.6.4 - Marginal Budget Shares and Elasticities for the Basic Model

Using estimated coefficients from equation (8), the chapter turns to calculate household Marginal Budget Share (MBS) for education spending. MBS allows the study to quantify the change induced by a change in one unit of the household total budget on education expenditure (1 Jordanian Dinar⁷⁰ is identified in this study as the currency unit), holding other parameters constant. Marginal Budget Share for education of the j th household is written mathematically in the following way:

$$MBS_j = \frac{\partial E_j}{\partial Exp_j} \quad (9), \text{ with } E_j \text{ being expenditure on education of household } j \text{ and } Exp_j \text{ the}$$

household total expenditure on all commodities. Since the budget share on education is defined by $S_j = \frac{E_j}{Exp_j}$ (10); therefore by using the decomposition rule on equation (10)

and utilizing equation (8), the partial derivative of the budget share S_j with respect to total household expenditure is calculated as follows:

$$\frac{\partial S_j}{\partial Exp_j} = \frac{Exp_j \cdot \frac{\partial E_j}{\partial Exp_j} - E_j \frac{\partial Exp_j}{\partial Exp_j}}{Exp_j^2} = \frac{a_1}{Exp_j} \quad (11)$$

where $E_j = C_{ij}$ with the i^{th} commodity being education in this particular case and

⁷⁰ The Jordanian Dinar (JD) is pegged to the dollar since 1994. The fixed exchange rate is US\$1.412 for JD1.

$$a_1 \cdot \frac{\partial \ln Exp}{\partial Exp} = a_1 \cdot \frac{1}{Exp} \text{ from equation (8).}$$

Solving equation (11) for $\frac{\partial E_j}{\partial Exp_j}$ gives the Marginal Budget Share for education:

$$MBS_j = \frac{\partial E_j}{\partial Exp_j} = a_1 + \frac{E_j}{Exp_j} = a_1 + S_j \quad (12)$$

It should be noted that MBSs for all types of goods and services are calculated using the above similar methodology and equations. However, these will not be shown as the study's main interest resides in expenditure related to education and therefore human capital. MBSs will be calculated on the average using the household Average Budget Share (ABS)

$$\bar{S} = \left(\frac{\bar{E}}{\bar{Exp}} \right) \text{ where both mean household expenditure on education and mean household}$$

total expenditure are considered. As for the coefficient a_1 , it is estimated via OLS using equation (8). Deriving both average and marginal budget shares from the above equations enables the study to calculate the expenditure elasticity of education. This is computed through:

$$\eta_j = \frac{MBS_j}{S_j} = \frac{a_1 + S_j}{S_j} = \frac{a_1}{S_j} + 1 \quad (13)$$

The results based on equations (12) and (13) are reported in table 3. Utilizing the coefficient of the logarithm of total household per capita expenditure estimated through equation (8), results in table 3 suggest that education is classified as a luxury commodity in the Jordanian case. In effect, education elasticity is calculated at around 1.60, higher than the unity threshold set for goods classified as necessary. To support this claim, the study has conducted a t-test to examine the unity of elasticity. Table 3 details the result of the test. Utilizing equation (13) to calculate the standard deviation for the elasticity, the value of the t-statistics computed suggests that the null hypothesis of education expenditure elasticity being equal to one is rejected⁷¹.

⁷¹ Table 3 suggests the same result for the per capita education expenditure model. Elasticity estimated is statistically significantly higher than one.

Table 3: Education Marginal Budget Share and Elasticity

Estimation Used	Education Budget Share	Per Capita Education Expenditure
Average Budget Share / Average per capita Expenditure	0.054	100.70
Marginal Budget Share	0.085	na
standard error	0.002	na
t-statistic (testing MBS=0)	49.777	na
prob-value	0.000	na
Education Elasticity	1.587	1.787
variance (elasticity)	0.001	0.015
t-statistic (test of unity of elasticity)*	18.563	6.426
prob-value	0.000	0.000
Percentage Change in Education Expenditure		
International Remittance	4.497	na
Internal Remittances	5.751	na
Both Remittances	5.508	na

*Note: t-test undertaken here tests for the assumption of unity of elasticity (H0: elasticity=1)

To calculate the t statistic, the variance (or standard deviation) of the elasticity needs to be calculated.

This can be derived from equation (13) and using estimated coefficients from the model of equation (8).

It can be written as:

$$\text{Var}(\text{elasticity}) = (1/\text{ABS})^2 * \text{Var}(a1)$$

with ABS: average budget share for education expenditure

a1: estimated coefficient for the covariate log per capita total expenditure

$$\text{t-statistic} = (\text{elasticity} - 1) / \text{Standard Error}(\text{elasticity})$$

As for MBS for human capital investment, the calculations from equation (12), also reported in table 3, indicate that for each 1 Jordanian Dinar (JD) increase in the household's budget, expenditure on education items rises by 8.5 cents (or 0.085 of a JD) on average and *ceteris paribus*. At this stage, no further analysis can be performed on sub-groups of households with various profiles of remittances receipt. This is due to the fact that the model of equation (8) does not contain mechanisms to account for the expenditure of various remittance receiving households. Indeed, no interactive terms between the covariates representing the three types of remittances and the covariate representing total household expenditures are introduced yet. This is done in the forthcoming sections when the basic model of equation (8) is modified as to account for the various sub-samples. Doing so enables the study to calculate marginal budget shares and elasticities accordingly

and therefore compare spending patterns between remittance receivers and non-receivers; with the latter being the reference group. This modified model is called the Remittances Interactive Model and is examined next.

2.7 - The Remittances Interactive Model

2.7.1 - Description of the Remittances Interactive Model

In the previous section the chapter found evidence that receipt of domestic remittances affected the spending decision of households on education for a given level of total expenditure. To expand the analysis further, a modified specification of equation (8) is re-estimated by including three interactive covariates defined as the product of the logarithm of total household expenditure with the three binary variables capturing the receipt of each category of remittances. Castaldo and Reilly (2007) argue that the use of the interactive covariates enables the model to determine whether the receipt of remittances from a particular source affects the household marginal propensity to invest in education. This is different from model (8) where remittances receipt only impacts the education budget shares for households at a given level of expenditure. Therefore, by using the interactive terms, the study is interested in identifying potential differences in the marginal budget shares and the expenditure elasticities for education between households that receive a particular remittance source and those that do not. As shown in the next section, without these interactive variables, the calculation of marginal budget shares and elasticities for each remittance category will not be possible. Hence we will be able to quantify how much additional funds will be allocated to investment in education if expenditures increased as a result of receiving remittances from each source and at various wealth levels. In addition to Castaldo and Reilly (2007), such interactive models have been used in the literature in other works such as Zarate-Hoyos (2004), Taylor and Mora (2006) and Adams (2005).

The new model therefore takes the following form:

$$C_{ij} / EXP_j = a_0 + a_1 \log(EXP_j) + a_2 X_j + a_3 R_j + a_4 R_j \cdot \log(EXP_j) \\ + a_5 IR_j + a_6 IR_j \cdot \log(Exp_j)$$

$$+ a_7 RIR + a_8 RIR_j \cdot \log(EXP_j) + v_{ij} \quad (14)$$

where the dependent and independent variables are as previously defined, and the covariates interactive terms being $R_j \cdot \log(EXP_j)$, $IR_j \cdot \log(EXP_j)$ and $RIR_j \cdot \log(EXP_j)$.

Mathematically equation (14) continues to be in compliance with the three features of an Engel's curve framework⁷² and, unlike the functional form of equation (8), it entails that the remittance impact will affect both intercept and slope of the Engel's curve (Zarate-Hoyos 2004). Intercept changes occurs through the coefficients of the dummy variables of remittance receipt. In this case the coefficients a_3 , a_5 and a_7 will shift the Engel's curve upward or downward depending on their respective sign. As for change in the slope, this occurs due to the interaction between remittances and the logarithm of total household expenditure. Therefore, the coefficients a_4 , a_6 and a_8 play the key role in such a change. This particular impact of remittances on the slope enables the computation of MBSs of households with various remittance receipt profile in comparison to the non-receiver families that constitute the base group. In the previous model of equation (8), the impact of remittances was only limited to a change in the intercept. Having said that, the estimated impact of the respective remittance receipt categories on household education budget share⁷³ is thus the sum of the coefficient of the remittance dummy and its relevant interactive term. The chapter turns in the next section to compute the MBS and elasticity of education spending from the model of equation (14).

2.7.2 - Education Marginal Budget Share and Elasticity in the Interactive Model

The study utilizes the coefficients of equation (14) to calculate households' MBS for education spending along with the expenditure elasticity on this investment good.

Similar to equation (9), MBS is defined as $MBS_j = \frac{\partial E_j}{\partial Exp_j}$ with budget share being

$S_j = \frac{E_j}{Exp_j}$ (equation (10)). For simplicity, the chapter considers grouping the remittances

independent variables of equation (14). The model is thus written as:

⁷² Good statistical fit for wide array of goods and services, variability of the movement of the Engel's curve, and additivity criterion.

⁷³ This is applied for the budget shares of all goods and services. However, as specified earlier, the focus of this study is on household education expenditure.

$$C_{ij} / EXP_j = b_0 + b_1 \log(EXP_j) + b_2 X_j + b_3 Remit_j + b_4 Remit_j \cdot \log(EXP_j) + v_{ij} \quad (15)$$

where Remit is a vector grouping the three categories of remittance receipt. This vector will be expanded when MBSs are computed for various sources of remittances. For now, having this vector makes computations less cumbersome. Deriving MBSs and elasticities from the interactive model uses similar procedures as the ones described in the previous section 2.6.4. The difference resides in that the interactive model allows for computing MBSs and expenditure elasticities for households receiving remittances and those with no access to such private transfers separately. By using the decomposition rule on equation (10) and utilizing equation (15), the partial derivative of the budget share S_j with respect to total household expenditure is calculate as follows:

$$\frac{\partial S_j}{\partial Exp_j} = \frac{Exp_j \cdot \frac{\partial E_j}{\partial Exp_j} - E_j \frac{\partial Exp_j}{\partial Exp_j}}{Exp^2} = \frac{b_1 + b_4}{Exp_j} \text{ if Remit}=1 \text{ (receive remittances)} \quad (16)$$

$$= \frac{b_1}{Exp_j} \text{ if Remit}=0 \text{ (no receipt of remittances)} \quad (17)$$

Solving equations (16) and (17) respectively for $\frac{\partial E_j}{\partial Exp_j}$ gives the Marginal Budget Share for education spending for recipients and non-recipient:

$$MBS_j = \frac{\partial E_j}{\partial Exp_j} = (b_1 + b_4) + \frac{E_j}{Exp_j} = (b_1 + b_4) + S_j \text{ if Remit}=1 \quad (18)$$

$$MBS_j = \frac{\partial E_j}{\partial Exp_j} = b_1 + \frac{E_j}{Exp_j} = b_1 + S_j \text{ if Remit}=0 \quad (19)$$

As for education expenditure elasticities, these are calculated from the above:

$$\eta_j = \frac{MBS_j}{S_j} = \frac{(b_1 + b_4) + S_j}{S_j} = \frac{(b_1 + b_4)}{S_j} + 1 \quad \text{if Remit}=1$$

(20)

$$\eta_j = \frac{MBS_j}{S_j} = \frac{b_1 + S_j}{S_j} = \frac{b_1}{S_j} + 1 \quad \text{if Remit}=0 \quad (21)$$

To put the MBSs and elasticities for education spending computed above into the context of various categories of remittances receipt, the study uses the coefficients of model (14) to integrate them into equations (18), (19), (20) and (21). This allows for introducing the following formulas:

Marginal Budget Share (MBS):

$$\text{For households receiving international remittances: } MBS_j = (a_1 + a_4) + S_j \quad (22)$$

$$\text{For households receiving internal remittances: } MBS_j = (a_1 + a_6) + S_j \quad (23)$$

$$\text{For households receiving both remittances: } MBS_j = (a_1 + a_8) + S_j \quad (24)$$

$$\text{For households receiving no remittances: } MBS_j = a_1 + S_j \quad (25)$$

Education Expenditure Elasticity:

$$\text{For households receiving international remittances: } \eta_j = \frac{(a_1 + a_4)}{S_j} + 1 \quad (26)$$

$$\text{For households receiving internal remittances: } \eta_j = \frac{(a_1 + a_6)}{S_j} + 1 \quad (27)$$

$$\text{For households receiving both remittances: } \eta_j = \frac{(a_1 + a_8)}{S_j} + 1 \quad (28)$$

$$\text{For households receiving no remittances: } \eta_j = \frac{a_1}{S_j} + 1 \quad (29)$$

All MBSs and elasticities for household education expenditure will be calculated at the respective sub-sample means with the coefficients estimated through OLS, and in later sections through Heckman procedure, from the model of equation (14). The empirical results are listed in tables 5 and 6 and are highlighted next.

2.7.3 - Empirical Results of the Remittance Interactive Model

Estimates of the basic model (equation 8) detected evidence that receipt of internal remittances affected household spending decisions on human capital. The interactive model (equation 14) goes further and suggests that despite the observed positive impact, the additional spending of those households was lower than the non-receivers. Additionally, international remittances seem not to exert any statistically significant impact in both models. Details on the findings, MBSs and elasticities are described below.

The addition of the interactive terms in equation (14) enables the study to determine whether remittances receipt affects households' marginal propensity to spend on education, and to compare MBSs marginal budget shares and elasticities of investment in human capital between remittance receivers and non-receivers. To achieve this objective, equation (14) was estimated via OLS on all the 10993 households in the survey. To address the problem of heteroscedasticity, regressions are estimated using White's robust standard errors. Since this paper focuses on understanding how remittances affect household expenditure patterns, the analysis examines mainly the two types of covariates reflecting the receipt of remittances from different sources. First, the dummy variables defined for receipt of each remittance source. These are the variables that push the Engel's curve upward or downward depending on the impact; and which could be observed through the coefficients a_3 , a_5 and a_6 in equation (14). Second, the interactive terms international remittances multiplied by log of per capita total household expenditure along with its equivalent for internal remittances and for receipt of both types of private transfers. From equation (14), these are indicated by the respective coefficients a_4 , a_6 and a_8 . In the context of the Engel's curve these coefficients impact the slope of the curve. Additionally, the importance of the interactive expressions is that they determine the effect of an increase in total expenditure on each consumption share for households receiving remittances, taking into consideration that such an increase is due to the receipt of such private transfers. To be more precise, the effect of total expenditure on the education expenditure share is calculated as the sum of the coefficient of log household per capita expenditure and the coefficient of the interactive term. According to equation (14), this effect is written as $(a_1 + a_4)$ for international remittances, $(a_1 + a_6)$ for internal remittances, and $(a_1 + a_8)$ for both receipt of remittances. Empirical estimates are all reported in table 4.

The study examines first the estimates of remittances receipt variables and their respective interactive covariates. Results of table 4 are consistent with the findings of the basic model in equation (8). Receiving internal remittances does increase education budget share, on average. This is evident from the related positive and statistically significant coefficient estimated via equation (14). However, this does not seem to be the case for the receipt of international remittances which exerts no statistically significant effect. Results for the receipt of both types of remittances are ignored due to the small cell size of the relevant sub-sample. In all cases no statistically significant effect is detected. The estimated effects for the interactive terms reveal some interesting findings. Due to statistical significance, the study examines only the interactive term for domestic remittances where estimates suggest a negative coefficient. This indicates that although additional income coming from domestic private transfers shifts the Engel curve for education expenditure upward, through the positive internal remittances dummy variable's coefficient (a_5), it reduces its slope as indicated by the negative coefficient of the interactive term for internal remittances (a_6). As noted below, this result has implications for the interpretation of MBSs for education especially that it signals that internal remittances increases spending on human capital items but at a diminishing rate.

Turning to the household expenditure estimates, the coefficient on the logarithm of per capita household expenditure reflects the effect captured for the base category of households not receiving remittances. This was not the case for the basic model of equation (8) where the coefficient of the per capita expenditure dependant variable took into account the average effect on all the sample (i.e. receivers and non receivers). In the interactive model of equation (14), the estimated effect is the sum of the coefficients for expenditure variable and the interactive term as signaled earlier. Adding both coefficients together using table 4, this is calculated as $(0.033 - 0.006 = 0.027)$, and shows that the estimated effect on education budget share resulting from an increase in total expenditure for households receiving internal remittance remains positive as expected and in line with economic theory. However, this impact is smaller than the one depicted for households with no access to such private transfers. This is an early indication that households receiving internal remittances are spending a lower share of their incremental increase in household expenditure, coming from a rise in income as a result of additional inflows of

internal remittances, on human capital as compared to families who are not receiving such private domestic transfers. This will be quantified in the calculations of the MBSs. The same results are found for the other two remittance receipt categories. No meaningful conclusions will be done on the latter estimates due to the statistical insignificance.

Table 4: Regression Analysis for the Impact of Remittances Receipt on Education Budget Share - The Remittance Interactive Model

Ordinary Least Squares	Budget	Education
International Remittances	0.036	-251.118
R*LogtotpcExp	-0.005	33.684
Internal Remittances	0.047 **	477.043 *
IR*LogtotpcExp	-0.006 **	-66.932 *
Both Remittances	0.151	29.18
RIR*LogtotpcExp	-0.009	27.501
Log pc total Expenditure	0.033 *	186.984 *
Household Size	0.007 *	10.423 *
Number of Elderly	-0.004 **	-8.229
Share of people <5 in Household	0.007	107.911 *
Share of people [6-11] in Household	0.062 *	241.541 *
Share of people [12-14] in Household	0.027 *	177.284 *
Share of people [15-17] in Household	0.122 *	292.623 *
Share of people [18-24] in Household	0.133 *	332.725 *
Age of the Head of Household	0.002 *	4.97 *
Age^2 of the Head of Household	0.000 *	-0.032 *
Head is Male	-0.018 *	-31.223 *
Mother Years of Education	0.002 *	2.67 *
Father Years of Education	0.002 *	3.296 *
Amman Governorate	0.005	16.383
Balqa Governorate	0.006	11.773
Zarqa Governorate	0.006	10.327
Madaba Governorate	0.019 **	19.067
Irbid Governorate	0.003	1.025
Mafrq Governorate	0.01	36.93 *
Ajloun Governorate	0.009	22.141
Karak Governorate	0.028 *	54.271 *
Tafilah Governorate	0.005	11.571
Maan Governorate	-0.007	-10.528
Aqaba Governorate	0.011	52.226 *
Head is an employer	0.005	5.051
Head works for own account	-0.002	-14.976 **
Head works in unpaid work	-0.043	-163.903 ***
Head is a Farmer	-0.015 *	-13.092
Head is in Public Sector	-0.009 *	-10.985 **
Head is in construction	-0.016 *	-13.405
Head is in Tourism	-0.018 *	-49.362 *
Head is in Finance sector	-0.004	11.417
Head is in Health Sector	0.002	9.632
Household Receives Social Benefits	0.026 ***	19.63
Household Receives Govt. Transfers	-0.007 *	-39.283 *
Constant	-0.344 *	-1572.45 *
Sample Size	10993	10993
F-test (df= 35, 10957)	71.76	31.09
Significance Level (Prob-Value)	0	0
R-squared	0.247	0.26

Significance Level: * 1%, ** 5%, *** 10%

Note 1: Huber-White robust standard errors were used in the model.

Standard Errors were clustered at the household level.

The study moves now to analyze the results of the calculations of the education marginal budget shares and elasticities for the various groups of remittance receiving households. Table 5 lists the results of various education marginal budget shares as calculated by equations (22) to (25), and the results of various elasticities by remittance receiving status as computed in equations (26) to (29). The table shows that the MBS for households receiving internal remittances is significantly lower than the MBS for households not receiving remittances. This indicates that while domestic remittance receiving families spend more on human capital, they do so at a lower rate than their non-receiver counterparts⁷⁴. By utilizing the computed MBSs, table 5 quantifies this difference in spending behavior. It suggests that for a 1 Jordanian Dinar (JD)⁷⁵ increase in the household's total budget, on average and *ceteris paribus*, households receiving internal remittances spend JD0.064 (or 6.4 cents) more on human capital as compared to JD0.088 (8.8 cents) for non-receivers. On the other hand, looking at the expenditure elasticities in table 5 reveals that expenditure elasticity of demand for education for households with domestic remittances is significantly different and higher than the same elasticity estimated for households with no private transfers; keeping all other control variables constant. This suggests that households with private domestic transfers appear to have a more elastic expenditure response to investments in human capital and that education is not considered as a necessary commodity since elasticity is greater than one. The hypothesis of a unitary elasticity is again tested for the interactive model through calculating standard deviations from equations 26 to 29, and then utilizing the outcomes to compute t-statistics⁷⁶. Results of the t-test highlighted in table 5 indicate that education expenditure elasticities for all remittance receivers sub-groups were found to be statistically different than one⁷⁷.

⁷⁴ This is what the thesis refers to as spending less at the margin.

⁷⁵ The exchange rate is 1.412 US\$ to JD1. The currency has been pegged to the dollar at this rate since 1994.

⁷⁶ As in the basic model, the hypothesis H0 is education expenditure elasticity is equal to unity.

⁷⁷ Consistency is upheld since similar results (both in terms of unity test and trends) were found when estimating elasticities from the per capita education expenditure model (refer to table 5).

Table 5: Education Marginal Budget Share and Elasticity

Type of Remittance Receipt	Average Budget Share	Marginal Budget Share	Standard		Variance of elasticity	t-stat*	Prob- value
			Error MBS	Elasticity			
Estimates via OLS (Education Budget Share)							
International Remittances	0.072	0.101	0.0051	1.392	0.005	5.544	0.000
Internal Remittances	0.038	0.064	0.0032	1.709	0.007	8.474	0.000
Both Remittances	0.049	0.072	0.0153	1.486	0.097	1.560	0.119
No Remittances	0.055	0.088	0.0017	1.600	0.001	18.974	0.000
Estimates via OLS (Per Capita Education Expenditure)							
	Average PC Education Expenditure						
International Remittances	185.682	na	na	1.188	0.029	1.104	0.270
Internal Remittances	58.698	na	na	2.045	0.069	3.978	0.000
Both Remittances	102.761	na	na	2.087	0.668	1.330	0.184
No Remittances	101.056	na	na	1.85	0.019	6.167	0.000

*Note: t-test undertaken here tests for the assumption of unity of elasticity (H_0 : elasticity=1)

To calculate the t statistic, the variance (or standard deviation) of the elasticity needs to be calculated.

This can be derived from equations (20) and (21) and using estimated coefficients from the model of equation (14).

It can be written as:

$\text{Var}(\text{elasticity}) = (\text{Var}(b1) + \text{Var}(b4) + 2\text{Cov}(b1b4)) / (\text{ABS})^2$ if Remittance Receipt=1

$\text{Var}(\text{elasticity}) = (1/\text{ABS})^2 * \text{Var}(b1)$ if Remittance Receipt=0

with ABS: average budget share of the relevant remittance receipt sub-sample

b1: estimated coefficient for the covariate log per capita total expenditure

b4: estimated coefficient for the relevant remittance interactive covariate $R * \text{LogtotpcExp}$

t-statistic = $(\text{elasticity} - 1) / \text{Standard Error}(\text{elasticity})$

The study rapidly mentions the results found for other covariates in the interactive model of equation (14) as they are pretty much aligned with the results and the analysis undertaken in the earlier section when the empirical outcomes of the basic model were discussed. On the household decomposition characteristics, the negative effect on education budget share exerted by having more elderly is still perceived in the interactive model. As for covariates related to proportion of family members in various selected age groups, the statistically significant positive impact on education budget share also remains with the highest magnitudes observed for brackets of individuals at an age typically related to higher education and university levels. Examining the education characteristics vector, patterns still persist in the model of equation (14). Indeed, households with mothers and fathers who have higher education levels do value education of family members and are

investing more in human capital compared to their counterparts with lower degrees. Additionally, regional residency characteristics do not seem to influence education expenditure patterns. This could be due to the concentration of population in the capital Amman and the closeness of rural towns to urban centers. Looking at the vector for the economic activity of the head of household, the employment status variables do not exert a statistically significant impact while a statistically significant negative coefficient was obtained for heads working in farming, public sector, construction and tourism. As for transfers, table 4 indicates a positive effect of social benefits on education budget share while government transfers seem to have a negative impact as originally seen in the basic model.

In summary, the estimates of the interactive model of equation (14) and its related MBSs, indicates that households receiving remittances do spend at the margin less on educational items than the non-receiver families. This indicates that the additional income coming from domestic remittances is not necessarily spent on increasing human capital but is directed toward other types of spending, be it on consumption or other investment items. Having said that, it is important to note that the demand elasticities calculated from the interactive model suggest that education is considered as a luxury good since education expenditures elasticities were found in all remittance receipt and non-receipt cases to exceed one⁷⁸. On the other hand, it is interesting to highlight the fact that the coefficient for international remittances was found to be statistically insignificant. Although the receipt of this type of remittances positively influenced human capital formation through its direct impact on education attendance and attainment especially for higher education, as per the results of the previous chapter, it does not seem to exert any impact on household spending patterns for education items. This indicates that these foreign private transfers influence household decisions to send family members to school but not the amount on which they will be spending on it. This is attributable to the fact that primary and intermediary education is very much accessible in Jordan especially that compulsory education laws for these levels are firmly implemented. The influence of international remittances is likely to be more prevalent on higher education levels especially university. Unfortunately due to

⁷⁸ This is true except for the category of households receiving both types of remittances where the elasticity was found not be statistically different that one (see table 5). However as mentioned previously this result can be ignored as it is driven by a very small sample size.

data limitations, spending on higher education and university levels cannot be discerned separately from other education items, especially in the case where the household has several members pursuing their education at different levels (e.g. primary, secondary and university). Having highlighted the main findings, the chapter now turns to investigate the issue of selectivity bias mentioned previously and tackles it using a Heckman two-step procedure.

2.8 - Censorship, Selectivity and the Heckman Procedure

This section comes to discuss an econometric problem that might occur in the OLS model due to some restrictions on the distribution of the observations. This problem is known as “selectivity bias”. The section is organized in the following way. In a first sub-section, the study presents the features of such problem and discusses its impact on the coefficients obtained from the OLS estimations of equations (8) and (14). It also describes the above empirical challenge mathematically. In a second sub-section, the chapter describes the Heckman procedure that is utilized to correct for this selectivity bias and looks at its various features including the selection equation. This sub-section also lays down the results of the various remittances coefficients obtained after applying the Heckman procedure, and calculates the new education marginal budget shares and elasticities.

2.8.1 - Features of Selectivity Bias

Selectivity bias arises in this model due to the fact that information on the regressand, household education expenditure share, is only available for a part of the sample. Indeed, the household sample in this study is a censored sample. Only households that have actually reported strictly positive education expenditure, and not a zero, are the ones whose information on expenditure shares is observed. In some of the cases, large number of observations had the value of zero for education expenditure share. These observations account for 27.5 percent of the sample, equivalent to 3018 observations. Zero education expenditure occurs when households do not spend money on such commodities and services either because they do not have the capacity to do so or simply they do not consume them in the first place. To be more specific, household decisions not to spend on human capital arise due to two broad factors: either because budget constraints force

households not to invest in human capital and rather direct their limited income towards more basic goods; or since households do not have young members at schooling age and have decided that all members (including themselves) have adequate levels of education and thus no need to pursue further schooling. In all of the above cases, expenditure on education will be reported as zero and thus information on education expenditure share will not be observed. Therefore the analysis cannot infer, for this specific group of households, the impact of remittances and other covariates on their education expenditure pattern. Consequently, the behavior emphasized by the calculation of marginal budget shares and elasticities will not adhere to their case. Hence, a classic selection problem occur leading to biased OLS estimates. The problematic issue of a sample selection problem resides in its relation to the normality of the distribution of this sample used to run the expenditure share regression. The assumption of a normal distribution does not necessarily hold due to the censoring of some observations. By including the censored household observations into the sample, the study will have a truncated model at zero. In addition, the regression model at hand is examined after the selection process occurred. The problem resides in this process itself since such a truncated regression model could jeopardize the random nature of the sample. As a result, a potential non-random sample implies that OLS application generates biased estimates. The bias in the coefficients of equation (8) or equation (14) will be transmitted to the estimation of education MBSs and elasticities. Thus, this could provide misleading interpretations for human capital spending patterns of various remittance receivers. Such a problem might be of acute nature when estimating the empirical model of equation (8) and equation (14) due to the scale of the censoring phenomena (i.e. 27.5 percent of the sample). The censoring at zero might therefore bias that OLS coefficients obtained.

The models of equations (8) and (14) are limited dependant variable regression models due to the restriction imposed on the regressand. Consequently, the basic and the interactive remittance models should be estimated accordingly. Statistically, the linear reduced form of these models is expressed in the following way:

$$\begin{aligned}
 y_j &= a + bX_j + \mu_j \quad \text{if } y_j > 0 \\
 &= 0 \quad \text{otherwise}
 \end{aligned}
 \tag{30}$$

where y_j is the education expenditure share of the j th household, X is a vector of covariates including all types of remittance receipt and interactive variables found in equation (8) or equation (14), and μ is the error term. Estimating equation (30) using solely the sample with observed education spending share will yield biased and inconsistent OLS estimates. Specifically, selectivity bias arises due to the fact that $E(y_j | y > 0) > bX$ (equation (31)) when estimating equation (30). Selection bias is accounted for and corrected in this chapter through utilizing a Heckman two-step procedure⁷⁹. This estimation technique is described below in the following section.

2.8.2 - The Heckman Selection Correction Procedure – General Description

As specified earlier, the chapter uses a Heckman two-step procedure to correct for selectivity bias. This econometric technique is briefly described in this sub-section prior to emphasizing the outcomes and results it presents. Heckman (1979) specifies that this estimation procedure is a simple econometric technique that could estimate behavioral functions that are free of selection bias in the case of censored samples. The Heckman two-step process can be summarized as a methodology that deals with the econometric problem of sample selection bias by treating it as a problem of omitted variables. To see how and using the methodology followed by Heckman (1979), equation (31) can be refined and extended. The derived general expression of equation (31) can be written in the following form:

$$E[y_j | y_{ij}^* > 0] = \beta X + \rho \sigma_\varepsilon \frac{\phi[\delta Z_j]}{\Phi[\delta Z_j]} \quad (32)$$

where y_j is household education share, y_{ij}^* is the unobservable index variable which occurs when spending on education is made, σ_ε is the standard deviation of the error term, X is the covariates vector (including remittance receipt and interactive terms) from the original OLS estimation of equations (8) or (14), Z is the covariates of the selection model which will be outlined shortly, $\Phi(\cdot)$ and $\phi(\cdot)$ denote the cumulative distribution function and the

⁷⁹ This estimation technique was introduced by James Heckman in 1979 and can be found in Heckman (1979).

probability density function operators respectively, and ρ is the correlation coefficient between the unobservables in the selection and outcome equations. Equation (32) indicates that if $\frac{\phi[\delta Z_j]}{\Phi[\delta Z_j]}$ is excluded from the model, OLS will give rise to specification errors in the regression analysis and will thus result in a biased estimate of β . Hence the Heckman procedure solves such problem by inserting a proxy variable that captures the omitted (or selection bias) component.

In order to undertake such a procedure, two steps are needed. First, the study estimates a selection model identifying the probability of the event occurring, in this case household spending on human capital. To do so, the study estimates a probit model whose reduced form can be written as follows:

$$\Pr(\text{Educ}_j = 1 | Z_j) = \phi(\alpha_0 + \delta Z_j + \mu_j) \quad (33)$$

where: $\text{Educ}_j = 1$ if $\text{Educ}_j^* > 0$, and $\text{Educ}_j = 0$ otherwise.

The dependant variable Educ_j is a binary variable taking the values of 0 if the j th household has a zero expenditure on education and 1 if there is positive education expenditure. Additionally, Z is a vector containing some of the relevant exogenous covariates used in equations (8) or (14) along with other regressors that affect directly the probability of spending on human capital without having any effect on the level of the educational share itself. These latter regressors are identifying instruments and chosen on the basis of the following empirical criteria: their coefficients should be statistically insignificant when introduced into the OLS model of equations (8) or (14), and significant in the probit model of equation (33). It should be noted that the selection model estimates are presented in table 6 where the new set of regressors are also specified for both basic and remittance interactive models. These latter covariates identified by the study are the number of employed individuals in the household, the share of female members in the family, and household ownership of land (refer to table 6). The coefficients of all three were not statistically significant when introduced into models (8) and (14)⁸⁰. Having

⁸⁰ Results are not shown in the tables but are available upon request.

identified and estimated the selection equation (33), maximum likelihood estimates are then calculated. Doing so enables the study to calculate the Inverse Mills Ratio (IMR) which is defined as $\frac{\phi[\delta Z_j]}{\Phi[\delta Z_j]}$. The second step of the Heckman procedure consists of conducting another OLS for equations (8) and (14) where the IMR, calculated from the selection equation (33), is introduced alongside the other covariates of vector X used in the basic model (8) and the remittance interactive model (14)⁸¹. The estimated coefficients obtained from this second-stage OLS should be unbiased. Mathematically, the second step of the Heckman procedure takes the following reduced form:

$$E_j = \alpha_0 + k_i X_j + \delta \lambda_j + \mu_j \quad (34)$$

where X is the vector of covariates utilized in equations (8) and (14), k is a set of newly obtained unbiased coefficients estimated through OLS, δ is the vector of coefficient related to the selection model which is asymptotically normal and λ represents the IMRs estimated from the selection equation using the probit model. The following sub-section quantifies the coefficient bias and presents the empirical results from conducting the Heckman two-step procedure.

⁸¹ As specified earlier, the vector X represents all covariates utilized in equation (8) and (14) including the three remittance receipt covariates and their respective interactive terms.

Table 6: Heckman Selection Equation - Probit for Education Spending Decision

Education	Basic Model	Interactive Model
International Remittances	0.101	-0.081
R*LogtotpcExp	na	0.024
Internal Remittances	-0.037	-0.33
IR*LogtotpcExp	na	0.041
Both Remittances	0.096	-3.929 **
RIR*LogtotpcExp	na	0.463 ***
Log pc total Expenditure	0.497 *	0.485 *
Household Size	0.356 *	0.356 *
Number of elderly	-0.15 *	-0.149 *
Share of people <5 in HH	1.822 *	1.823 *
Share of people [6-11] in HH	8.292 *	8.294 *
Share of people [12-14] in HH	6.791 *	6.785 *
Share of people [15-17] in HH	4.669 *	4.677 *
Share of people [18-24] in HH	1.592 *	1.588 *
Age of the Head of HHH	0.101 *	0.101 *
Age^2 of the Head of HH	-0.001 *	-0.001 *
Head is Male	-0.236 *	-0.239 *
Mother Years of Education	0.012 **	0.012 **
Father Years of Education	0.035 *	0.035 *
Amman Governorate	-0.389 ***	-0.39 ***
Balqa Governorate	-0.177	-0.18
Zarqa Governorate	-0.33	-0.33
Madaba Governorate	-0.295	-0.297
Irbid Governorate	-0.144	-0.145
Mafraq Governorate	-0.147	-0.144
Ajloun Governorate	-0.258	-0.262
Karak Governorate	-0.053	-0.057
Tafilah Governorate	-0.536 ***	-0.539 ***
Maan Governorate	-0.271	-0.273
Aqaba Governorate	-0.638 **	-0.643 **
Head is an employer	0.197 **	0.201 **
Head works for own account	0.082	0.083
Head works in unpaid work	-2.254 *	-2.253 *
Household Receives Social Benefits	0.222	0.221
Household Receives Govt. Transfers	0.119 **	0.12 **
Number of Employees in HH	-0.194 *	-0.194 *
Female share in HH	-0.272 **	-0.275 **
Household Ownership of land	0.038 ***	0.041 ***
Constant	-8.562 *	-8.476 *
Sample Size	10993	10993
Wald-test chi square	1758	1784
Significance Level (Prob-Value)	0	0
Pseudo R -squared	0.623	0.623
Log Pseudo-likelihood	-2439	-2465

Significance Level: *1%, **5%, ***10%

Note 1: Huber-White robust standard errors were used in the model.

Standard Errors were clustered at the household level.

2.8.3 - The Heckman Selection Procedure – Empirical Results

The discussion in this sub-section examines whether the problem of selectivity bias exists and whether it is statistically significant. It also assesses the magnitude and the sign of the coefficients obtained by using the Heckman two-step procedure.

The study will not go further into the theory behind the Heckman procedure but rather go directly towards interpretation. Outcomes of the Heckman are presented in Table 7. At first instance, the Heckman model of this sub-section will try to assess the selectivity bias with

respect to the OLS estimated in equations (8) and (14). It should be noted though that discussions in this section will focus on the Remittances Interactive Model (equation 14) and will only present the results of the basic model in the tables. It is important at this stage to highlight the aspects surrounding the use of the education share variable. The dependant variable education share is considered somewhat differently in the Heckman two-step procedure compared to the OLS models used in previous sections. The difference relates the constraint set to capture households that do not have any spending on education due to lack of young children and their fulfilled educational attainments. The reasoning behind highlighting these observations is that those households are the ones who voluntarily have a zero expenditure on education (i.e. do not need to spend on education) and thus could affect the expenditure pattern set by the rest of the sample. Therefore, the Heckman two-step procedure tries to assess this selectivity bias with respect to OLS and captures it through the estimation of the IMR. Consequently, if such a bias prevails, then the study needs to calculate new MBS and elasticities for human capital investment. The next question to ask is how to determine the selection effect itself. To do that, the study needs to calculate what is called the truncation effect otherwise known as the average selection effect. This effect can be computed as follows:

$$\text{Average Truncation Effect} = \lambda * \text{mean of Inverse Mills Ratio} \quad (35)$$

Using equation (35) and table 7, the truncation effect is calculated to be -0.01 (i.e: $-0.018 * 0.531$)⁸². This number indicates the extent to which education shares are shifted down due to the selection effect. The above outcome specifies that a household with sample average characteristics whose expenditure behavior is observed will have a lower education share of $[e^{0.010} - 1] * 100 = 1.01$ percent compared to a random household drawn from the population. Hence, a negative selection or truncation effect exists between the sample data and the population. Households in the latter, with similar characteristics, are thus expected to have higher education share compared with households drawn from the dataset sample. However, the study needs to examine whether such a claim or interpretation is valid from a statistical point of view. Thus it needs to undertake a t-test that acknowledges whether the

⁸² The result is rounded to the third decimal place.

lambda (λ) in question is statistically significant and different from zero. Again by using table 7, the t-ratio is equal to = -7.44. As a result, the null hypothesis of no selectivity bias is rejected by the data in this study's case. The result of the t-test indicates that there exists an evidence of downward selectivity bias inherited in the data. This implies that the coefficients obtained via OLS in equations (8) and (14) are subject to bias. Consequently, computation of MBSs along with education elasticities need to be re-computed from the coefficients estimated via Heckman.

Table 7: Heckman Estimations

Model Estimated (OLS)	Education Budget Share		Per Capita Education Expenditure	
	Basic Model	Interactive Model	Basic Model	Interactive Model
International Remittances	0.001	0.044	2.944	-232.365
R*LogtotpcExp	na	-0.006	na	30.77
Internal Remittances	0.004 **	0.042 **	9.419 ***	463.408 *
IR*LogtotpcExp	na	-0.005 ***	na	-64.718 *
Both Remittances	0.002	0.166 ***	-12.478	65.975
RIR*LogtotpcExp	na	-0.011	na	22.839
Log pc total Expenditure	0.029 *	0.03 *	173.297 *	180.716 *
Household Size	0.005 *	0.005 *	7.548 *	7.606 *
Number of elderly	-0.005 **	-0.005 **	-8.785	-9.174 ***
Share of people <5 in Household	-0.026 *	-0.026 *	26.903	30.473
Share of people [6-11] in Household	0.01	0.011	112.962 *	120.049 *
Share of people [12-14] in Household	-0.011	-0.01	81.943 **	88.797 **
Share of people [15-17] in Household	0.083 *	0.083 *	191.292 *	200.491 *
Share of people [18-24] in Household	0.107 *	0.107 *	269.116 *	270.623 *
Age of the Head of Household	0.001 **	0.001 **	1.112	1.143
Age^2 of the Head of Household	0	0	0.002	0.002
Head is Male	-0.019 *	-0.019 *	-32.628 *	-34.618 *
Mother Years of Education	0.001 *	0.001 *	2.603 *	2.479 *
Father Years of Education	0.002 *	0.002 *	3.046 *	3.008 *
Amman Governorate	0.006	0.006	17.481	18.914 ***
Balqa Governorate	0.006	0.006	10.341	12.861
Zarqa Governorate	0.007	0.007	12.276	13.206
Madaba Governorate	0.02 **	0.02 **	20.144	21.679
Irbid Governorate	0.003	0.003	-0.031	2.404
Mafrq Governorate	0.011 ***	0.011 ***	38.348 *	39.023 *
Ajloun Governorate	0.01	0.01	29.715 **	26.104 ***
Karak Governorate	0.029 *	0.029 *	53.306 *	55.688 *
Tafilah Governorate	0.008	0.009	19.312	19.808
Maan Governorate	-0.005	-0.005	-5.559	-5.117
Aqaba Governorate	0.015 ***	0.015 **	59.014 *	61.457 *
Head is an employer	0.004	0.004	4.994	3.398
Head works for own account	-0.002	-0.002	-14.745 **	-14.879 **
Head works in unpaid work	-0.016	-0.017	-93.149	-101.12
Head is a Farmer	-0.014 *	-0.014 *	-12.349	-11.772
Head is in Public Sector	-0.01 *	-0.01 *	-13.892 *	-12.544 *
Head is in construction	-0.016 *	-0.016 *	-13.848	-13.949
Head is in Tourism	-0.019 *	-0.019 *	-50.899 *	-51.786 *
Head is in Finance sector	-0.005	-0.005	8.572	8.781
Head is in Health Sector	0.002	0.002	9.15	8.296
Household Receives Social Benefits	0.027 ***	0.027 ***	22.119	20.968
Household Receives Govt. Transfers	-0.008 *	-0.008 *	-41.144 *	-41.495 *
Inverse Mills	-0.019 *	-0.018 *	-47.024 *	-44.003 *
Constant	-0.235 *	-0.244 *	-1279.015 *	-1335.463 *
Sample Size	10993	10993	10993	10993
F-test	73.62	68.95	33.5	33.09
Significance Level (Prob-Value)	0.000	0.000	0.000	0.000
R-squared	0.253	0.254	0.258	0.262
Mean Inverse Mills Ratio	0.53 *	0.531 *	0.53 *	0.531 *
Rho	0.240	0.242	0.1748	0.174

Significance Level: *1%, **5%, ***10%

Note 1: Huber-White robust standard errors were used in the model. Standard Errors were clustered at the household level.

The study moves next to examine the coefficients estimated by the Heckman procedure and the related education MBSs and elasticities for both the basic and the remittance interactive models. Tables 8 and 9 report the estimated results to be considered from models (8) and (14). It is fairly comforting that these results show great similarities with the OLS estimations in terms of magnitude, patterns and statistical significance. Therefore the study will not dwell on interpreting all the result but will focus on examining the remittance receipt covariates in the interactive model as interpretations made earlier in the chapter still clearly hold. Looking at the estimated coefficients of the remittances vector in table 7, it can be inferred that the only statistically significant impact remains the one related to the receipt of domestic private transfers. No other impact on household education spending seems to be exerted by the other two categories of remittance receipt. Having looked at statistical significance, the estimated effect for an increase in total household expenditure for internal remittance receivers is calculated as the sum of the coefficients for expenditure variable and the related interactive term. Adding both coefficients using table (7) ($0.030 - 0.005 = 0.025$) indicates that the estimated effect on education budget share resulting from an increase in total expenditure for household receiving remittances remains positive. However it is smaller than the effect exerted for the base group category households which do not receive any type of remittances. Consequently, by looking at the marginal budget shares calculated in table 8, the study confirms our previous findings that households receiving internal remittances are spending a lower share of their incremental increase in expenditure, coming from a rise in income as a result of additional inflows of internal remittances, on human capital as compared to families who are not receiving such private domestic transfers. The calculated magnitude of MBSs actually quantifies this effect. Indeed for an increase of 1 Jordanian Dinar in the household's total budget, on average and *ceteris paribus*, households receiving internal remittances spend around 0.062 of a JD (or 6.2 cents) more on human capital compared to 8.5 cents for non-receivers. No inference is done on the MBS of other remittances receipt categories as their respective estimated interaction coefficients are not statistically significant. As for the education expenditure elasticities computed using the Heckman adjusted coefficients (refer to table 8), the results suggest that both household groups (receivers and non-receivers) consider education as a luxury good. To affirm this result, the t-test conducted in table 8 rejects the

hypothesis of a unitary elasticity for all types of remittance receipt sub-groups⁸³. Indeed, education expenditure elasticities for receivers and non-receivers are statistically greater than one.

Table 8: Heckman Process - Education Marginal Budget Share and Elasticity

Type of Remittance Receipt	Average Budget Share	Marginal Budget Share	Standard Error MBS	Elasticity	Variance (elasticity)	t-statistics*	Prob-value
Remittances Interactive Model							
International Remittances	0.072	0.097	0.0053	1.339	0.005	4.590	0.000
Internal Remittances	0.038	0.062	0.0033	1.663	0.007	7.743	0.000
Both Remittances	0.049	0.068	0.0151	1.392	0.095	1.269	0.203
No Remittances	0.055	0.085	0.0021	1.552	0.001	14.715	0.000
Basic Model	0.054	0.082	0.00171	1.539	0.001	17.045	0.000

Type of Remittance Receipt	Average Pc Education Expenditure	Marginal Budget Share		Elasticity	Variance (elasticity)	t-statistics*	Prob-value
Remittances Interactive Model							
International Remittances	185.682	na	na	1.139	0.028	0.831	0.203
Internal Remittances	58.698	na	na	1.976	0.056	4.124	0.000
Both Remittances	102.761	na	na	1.981	0.658	1.209	0.227
No Remittances	101.056	na	na	1.788	0.016	6.230	0.000
Basic Model	100.701	na	na	1.721	0.016	5.700	0.000

*Note: t-test undertaken here tests for the assumption of unity of elasticity (H_0 : elasticity=1)

To calculate the t statistic, the variance (or standard deviation) of the elasticity needs to be calculated.

This can be derived from equations (20) and (21) and using estimated coefficients from the model of equation (14).

For interactive model, this can be written as:

$$\text{Var}(\text{elasticity}) = (\text{Var}(b1) + \text{Var}(b4) + 2\text{Cov}(b1b4)) / (\text{ABS})^2$$

$$\text{Var}(\text{elasticity}) = (1/\text{ABS})^2 * \text{Var}(b1)$$

with ABS: average budget share of the relevant remittance receipt sub-sample

b1: estimated coefficient for the covariate log per capita total expenditure (through Heckman procedure)

b4: estimated coefficient for the relevant remittance interactive covariate $R^* \text{LogtotpcExp}$ (through Heckman procedure)

$$t\text{-statistic} = (\text{elasticity} - 1) / \text{Standard Error}(\text{elasticity})$$

⁸³ Except for households that receive both types of remittances. Again this is driven by the small cell size.

The above section has revealed that selectivity bias was an issue to be considered in the estimation of the education budget share model. Results indicated that a statistically significant selection bias effect existed when looking at various coefficients and consequently marginal budget shares and elasticities. To correct for this bias, the study has opted for a Heckman two-step procedure. The new results obtained pointed out that international remittances did not exert any statistically significant impact on the education budget share contrary to remittances coming from domestic sources. In the case of the latter the impact observed highlighted the fact that households with internal remittances were spending less at the margin on human capital compared to their peers that do not receive any type of remittances. This result along with the other covariate estimates is in line with the pattern observed before the selection correction. Having said that, the study turns next to examine the spending behavior on human capital of various households through introducing a gender dimension to the impact of remittances. Indeed, the literature indicates that female headed households do react to various types of remittances differently than male headed ones. This hypothesis will be scrutinized in depth in the upcoming sections of this chapter.

2.9 - The Gender Dimension of the Remittances Interactive Model

2.9.1 - Rationale for the Gender Framework

Guzman, Morrison and Sjoblom (2008) describe the framework of the relationship between the remitter and the receiving household as being a classical principal-agent problem. In this framework the individual sending the remittances is defined as the principal. Causes and motives for remitting have been studied extensively in the literature and have been centered on Elbadawi and Rocha's (1992) "endogenous migration approach". This approach is based on the economics of the family where motives to send back remittances are centered on the family ties with the migrant. Individuals do remit either for altruistic reasons or because of self-interest or what is called exchange (Cox et al 1997)⁸⁴. Attempts have since been made to go beyond looking at motives from an aggregate perspective, and have investigated the gender dimensions. Indeed, the literature

⁸⁴ A thorough discussion on the causes of remittances has been conducted in the literature review of chapter 1.

has found that motives for remitting are not gender neutral and do depend on the gender of the remitters. Hoddinott (1994) depicted a positive correlation between males sending remittances and the parents' inheritable assets in western Kenya, a self-interest motive; while De la Biere et al (2002) concluded that insurance is the main motive to remit for female migrants when looking at Dominican Republic. Indeed, female remitters are more motivated by altruism compared to males as found by Vanwey (2004) in Thailand. Going beyond altruism and exchange motives, the principal or the remitter could have certain preferences over the use of the remittances back home. Those preferences are also linked to gender. Males and females may have different inclinations over the nature of the commodities and services that their remittances should be buying. A quick research review conducted by Guzman, Morisson and Sjoblom (2008) summarized the results for some of the current empirical findings in the literature so far. Female remitters act as insurers for the receiving households back home and prefer their remittances to be spent on education and health. This is compared to male remitters who are more inclined towards investments in housing, physical assets or capital, and means of production.

Looking at the remitter and investigating the linkage between gender and motives of remitting is only one side of the coin. The other side is the household receiving those private transfers. Remittance receivers do play the role of the agent and therefore they actually assign the allocation of remittances to various spending items. Therefore the question to be analyzed becomes twofold. First whether the remitter (the principal) is able to enforce his or her contract on the receiver of those remittances (the agent). Preference of males and females remitters, even if different, may not be implemented by households back at home due to the principal-agent problems. Chen (2006) discusses this question in greater detail and calls such behavior as "non-cooperative decision making and migration". Second if the remitter's will or preference is not the only factor that determines remittances allocations, then other determinants must exist for such decisions and consequently for determining household spending patterns. Household demographics and the bargaining power of each individual will therefore influence how remittances are spent. From this perspective the gender issue should also be accounted for, not only when looking at remitters, but also through the receivers. Therefore, the study has opted in this section to investigate a major determinant of remittance use and spending decisions: the gender of the

household head. This leads the chapter to discuss briefly intra-household bargaining literature as an entry to explain the rationale behind the choice of investigating the gender of the head of the household when examining the remittance impact on education spending decisions.

The literature on intra-household expenditure patterns has evolved from the “unitary household model” (Guzman, Morrison and Sjoblom (2008)) to models that takes into account multiple preferences functions. In effect the unitary model assumes that a household pools all of its resources together and has a single preference function which determines the various expenditure patterns. This model does not take into consideration the fact that preferences could differ between all the members of the same household; be it those migrating or those at the origin residency. Indeed this is what empirical works in the literature, presented above, tried to capture when they distinguished between the remitter and receivers preferences and when they examined this difference from a gender perspective (male vs. female expenditure preferences). Although preferences are different, it should be noted that intra-household models now account for the fact that the distribution of resources is determined by the bargaining power of each member within the household. Individuals who are more empowered could therefore force their preferences on the other members and thus influence strongly consumption and expenditure decisions. The literature on intra-household expenditure models and the relationship between distribution of resources and bargaining power has been discussed and reviewed extensively in the work of Straus and Thomas (1995), Quisumbing (2003), and Haddad et al (1997). Since the main determinants of resource allocation in these models are bargaining powers then the issue of gender becomes very much relevant. Indeed, women do make different choices when it comes to consumption and investments decisions than men usually do. This is mostly the case when women are empowered and have a large weight in the household’s decision making. Consequently the gender of the household is expected to have an impact on household expenditure decisions especially those related to investing in human capital. The literature actually supports such observed difference in expenditure patterns. In a review of the intra-household expenditure literature Quisumbing (2003) concludes that as the family resources are more controlled by women, allocations made for education, health and nutrition will increase. Looking more specifically at

education expenditure, the previous finding is echoed with other empirical work conducted by Quisumbing and Maluccio (2000) in Bangladesh, Ethiopia, Indonesia and South Africa. In these papers, it was found that across all countries there was a positive correlation between the increase in household education expenditure and the increase in percentage of income resources controlled by women. Quisumbing and Maluccio (2000) attribute this behavior to the fact that women often marry at an earlier age and have a longer life expectancy compared to men. Therefore investing in their children's education becomes equivalent to a social safety net where it is expected that those children will support the mothers' at old-age. On another note and in a work on the economics of intra-household allocations, Guyer (1997) argued that investments in human capital are a mean used by women to smooth household consumption over time especially in societies where assets are mostly controlled by men.

Having laid down the above, investigating the gender of both remitters and receivers becomes an issue that should be addressed when analyzing the impact of remittances on household expenditure patterns in general and household investments in human capital in particular. Unfortunately, the Jordan 2006 household income and expenditure survey does not allow us to take into consideration the remitters. Indeed, the survey does not ask questions related to the characteristics of the migrant. Therefore the gender of the remitter could not be captured in the education share model estimated. With this data limitation, the study loses information on some of the bargaining story especially that it does not control for the ability of the principal to influence spending. Typical controls that are therefore not included in the study's model due to data limitations are of the type Guzman, Morrison and Sjoblom (2008) utilize: the remitter's relationship to the household head, the country of residency of the remitter, the frequency of remitting, and most importantly his gender. On the other hand, the education share model that is used in this section captures the gender of the receivers. More specifically it controls for the gender of the head of the household, the member of the household who typically has an important bargaining power in family decisions. Indeed, the study aims at analyzing the impact of remittances on education expenditure shares from the perspective of households with male versus female heads. Details of the model utilized and the empirical findings are presented below.

2.9.2 - Descriptive Statistics of Education Budget Shares by Gender Head

Having described the literature on intra-household bargaining and emphasized the rationale behind the need to include the gender of the household head in the analysis; the study turns to examine some of the descriptive statistics on education expenditure of various family groups. Table 9 indicates the average budget shares allocated to expenditure on education according to gender of the household head and remittance receipt status. In total, eight household comparison groups are highlighted. By comparing female headed households with their male counterparts, results in table 9 infer that female headed households that receive international migration allocate on average a greater share of their family budget towards education. This finding is in accord with the literature on intra-household bargaining presented in the previous sub-section indicating preference of women in investing in children's human capital compared to men's. On the other hand, this spending trend is not upheld when looking at the other remittance receipt status: receipt of internal remittances, receipt of both types of remittances and receipt of no remittances. Indeed in all of these three comparison groups, male headed households seem to have a larger average budget share on education compared to families headed by females.

Table 9: Household Average Education Budget Share by Gender of Household Head and Remittances Receipt Status

Education Budget Share for Households	Male Head ⁽¹⁾	Female Head ⁽¹⁾	Student t-test ⁽²⁾	
			t-value	Prob-value
Receiving International Remittances	0.067 *	0.089 *	-2.501	0.013 *
Receiving Internal Remittances	0.039 *	0.034 *	1.023	0.307
Receiving Both Types of Remittances	0.053 *	0.042 *	0.54	0.615
Receiving No Remittances	0.055 *	0.052 *	0.456	0.746

* Significant at 1% level

(1) T-test results have shown that the means were all statistically different than zero at 1% significance level

(2) Student t-test is reported to test the equal means hypothesis

However, the results from testing for the means differences indicate that these differences among male and female headed households are not statistically significant (see table 9). These early findings suggest an impact of the gender of the household head on remittance allocations towards education commodities and services. This proposes mainly a preference of women receiving international remittances to allocate a larger budget for

investing in their children's human capital; and therefore a positive impact for those private transfers coming from outside Jordan on education spending for this sub-group of households. However, this cannot be confirmed by looking merely at the sub-samples' statistics. This will be investigated thoroughly in the next section when an education expenditure share model is estimated, taking into account the gender of the household head.

2.9.3 - Investigating Male vs. Female Headed Households Sub-Samples

The previous sub-sections have illustrated some of the literature on gender in household expenditure models and have described spending patterns on human capital for households with different remittance statuses headed by either males or females. The chapter turns below to describe the empirics used to examine the gender dimension previously highlighted for the education budget share model under scrutiny. To examine the impact of remittances on education spending for households with different heads, the study observes the education expenditure model laid down in equation (14) separately for female headed households and for male headed ones. It should be noted at this stage that the study examines the gender effect solely for the remittance interactive model (equation (14)) and ignores the basic remittances model (equation (8)). This is due to the study's interest in examining the effect of remittance receipt on the slope and intercept of the Engel's curve. To justify the separation of the sample, the study examined first the coefficient of the dummy covariate "head of household is male" when estimating equation (14) on all observations in the sample. It has found it to be statistically significant and negative. Indeed, keeping all other variables constant, table 7 indicates that having a male head of household decreased the share of spending on human capital. To justify the sample division statistically, the study conducts a Chow test. This test is used to determine whether the coefficients estimated in two linear regressions on different data sets, in this case the two sub-samples for female and male headed households, are equal. Having estimated equation (14) separately for male and female headed households, the study calculates the F-statistic of the Chow test in the following way:

$$F = \frac{(RSS_R - RSS_{UR}) / K}{(RSS_{UR}) / (n_1 + n_2 - 2k)} \sim F[K, (n_1 + n_2 - 2k)] \quad (36)$$

where: RSS_R is the residual sum of squares of the restricted model or the pooled one; RSS_{UR} is the residual sum of squares of the unrestricted model and it is equal to the sum of RSS s of the male headed household model and the female headed one; n_1 and n_2 are respectively the size of the male headed and female headed households sub-samples; K is the number of parameters used in the pooled model; and k is the number of parameters used in the restricted model. The degrees of freedom for this F-statistic is K for the numerator and (n_1+n_2-2k) for the denominator. The result from computing the F-statistic from the Chow test, presented in table (10), indicates that the null hypothesis of the equality of coefficients between the pooled and the segregated samples is rejected. This statistically upholds the idea of estimating the remittance interactive model distinctively for the two sub-samples. MBSs and elasticities for education spending by gender head sub-samples are estimated next.

2.9.3 - Empirical Results of the Gender Head Model

The Remittance Interactive Model of equation (14) is estimated separately for female headed households and for male headed ones. Average budget shares, marginal budget shares and elasticities are then calculated for each sub-sample. A Heckman two-step procedure has been used as to correct for selection. The study will not dwell on selection issues for the gender specific model as it similar to the discussions reported in previous sections⁸⁵. What should be noted though is that the Heckman estimated for the female headed household sample has revealed no selection problems as the estimated IMR was not statistically significant. The results of the gender specific Heckman, and its related MBS and elasticities calculations, are reported in tables (10) and (11)⁸⁶ and discussed in this section below, while similar results from the standard OLS estimation of the gendered head model are reported in annex tables at the end of the chapter.

Looking at tables (10) and (11), no statistically significant impacts were depicted for any type of remittances, be it international or internal, on education budget shares of

⁸⁵ See sections 2.8.1, 2.8.2 and 2.8.3.

⁸⁶ The study has included in this section additional covariates that are: the share of females aged respectively [15-17] and [18-24] in the household, the number of adult females, and the number of inactive females in the family. The objective is to control for female demographics in the household and observe whether it exerts any impact on education spending behavior. Results were mostly statistically significant suggesting the possibility of some impact that may be related to households' perception vis-à-vis women's education especially at higher levels. However, these results will not be dwelt upon further in this study.

households with a female head. On the other hand, interesting results are depicted from the regressions performed using on the male headed households. Estimates in table (10) indicate that the coefficient for international remittances was positive and statistically significant. In a household headed by a male, receiving remittances from outside Jordan increased education budget share, on average while holding other covariates constant. However the interactive term of expenditure and international remittance receipt seem to have a statistically significant negative coefficient. Therefore the estimated impact for an increase in total household expenditure for international remittance receivers coming from households where the head is a male is calculated as the sum of the coefficients for the expenditure variable and the related interactive term. Adding both coefficients from table (10) the final outcome remains positive ($0.033-0.010=0.023$). This indicates that the estimated effect on education budget share resulting from an increase in total expenditure for households with a male head and receiving international remittances remains positive. Looking at table (11), it is interesting to highlight that the MBS calculated for international remittances suggest that households with male heads are spending a higher share of their incremental increase in expenditure, coming from a rise in income as a result of additional inflows of remittances from outside Jordan, on human capital as compared to their non-receivers peer. The MBS identified above quantifies this impact: for an increase of 1 Jordanian Dinar in the household's total budget, on average and *ceteris paribus*, households with a male head receiving international remittances spend around 0.090 JD (or 9 Jordanian cents) more on human capital compared to 8.8 cents for non-receivers. Having explained the above, these result and analysis cannot be extended to include internal remittances. In effect, the estimated coefficient for internal remittances of male headed households was found to be a positive one, with its relevant interactive term being negative. This is similar to the trend observed from estimating equation (14) over the entire sample. However, no statistical significance was observed for these coefficients in the estimated model for male heads. This is also the case when estimating the model using the sub-sample of female headed households. Having examined the coefficient and MBSs, the section turns to look at elasticities. Resonating with previous findings, table 11 indicates that all households groups (i.e. receivers, non-receivers, male headed, female headed) consider education as a luxury good. This is supported by the statistically significant

results of the t-test of the elasticity unitary hypothesis. No inference can be made though on the elasticity comparison between receivers and non-receivers as the difference was not statistically significant⁸⁷.

Table 10: Hekman Estimationa for the Impact of Remittances Receipt on Education Budget Share - The Gender Head Model

Education Share	Male Headed Households	Female Headed Households
International Remittances	0.071 ***	-0.084
R*LogtotpcExp	-0.010 ***	0.012
Internal Remittances	0.024	0.035
IR*LogtotpcExp	-0.003	-0.005
Both Remittances	0.086	0.205
RIR*LogtotpcExp	0.001	-0.035
Log pc total Expenditure	0.033 *	0.044 *
Household Size	-0.001	0.005 ***
Number of Elderly	-0.009 *	0.005
Share of people <5 in Household	0.052 *	-0.002
Share of people [6-11] in Household	0.100 *	0.115 *
Share of people [12-14] in Household	0.068 *	0.086 **
Share of people [15-17] in Household	0.153 *	0.213 *
Share of people [18-24] in Household	0.180 *	0.190 *
Age of the Head of Household	0.002 *	-0.003 ***
Age^2 of the Head of Household	0.000 *	0.000 ***
Mother Years of Education	0.002 *	0.001
Father Years of Education	0.002 *	0.002
Amman Governorate	0.005	0.002
Balqa Governorate	0.004	0.007
Zarqa Governorate	0.006	0.004
Madaba Governorate	0.016 **	0.022
Irbid Governorate	0.002	0.005
Mafrq Governorate	0.009	0.027
Ajloun Governorate	0.007	0.033
Karak Governorate	0.027 *	0.043
Tafilah Governorate	0.007	0.022
Maan Governorate	-0.001	-0.015
Aqaba Governorate	0.013	0.041
Head is an employer	0.003	na
Head works for own account	-0.003	0.013
Head works in unpaid work	-0.028	na
Head is a Farmer	-0.008 ***	-0.067 *
Head is in Public Sector	-0.008 *	-0.013
Head is in construction	-0.014 *	-0.027 *
Head is in Tourism	-0.015 *	-0.032 *
Head is in Finance sector	-0.004	0.000
Head is in Health Sector	0.002	0.015
Household Receives Social Benefits	0.026	na
Household Receives Govt. Transfers	-0.009 *	0.004
Share of females [15-17] in Household	-0.059 *	-0.039
Share of females [18-24] in Household	-0.119 *	-0.096 *
Number of adult females	0.014 *	0.014 *
Number of inactive females	0.010 *	0.002
Inverse Mills	-0.005 *	0.006
Constant	-0.356 *	-0.305 *
Sample Size	9722	1271
F-test	58.59	10.9
Significance Level (Prob-Value)	0.000	0.000
R-squared	0.273	0.269
Rho	0.322	0.565
Chow Test:		
Residual Sum of Squares	53.564	9.468
Chow test (F-statistic)	1.787	df (40,10906)
Prob. Value of Chow test	0.000	

Significance Level: * 1%, ** 5%, *** 10%

Note 1: Huber-White robust standard errors were used in the model.

Standard Errors were clustered at the household level.

Note 2: The Chow test has been conducted using the standard OLS regression.

⁸⁷ Using elasticities variances from table 11, the study calculated t-tests to look at the difference in elasticity magnitudes between receivers and non-receivers. As indicated no statistical significance was found (results were omitted for brevity but are available upon request.

Table 11: Gender Head Model - Education Marginal Budget Share and Elasticity

Type of Remittance Receipt	Average Budget Share	Marginal Budget Share	Standard Error MBS	Elasticity	Variance (elasticity)	t-statistics*	Prob-value
Male Headed Households							
International Remittances	0.067	0.090	0.0053	1.339	0.006	4.257	0.000
Internal Remittances	0.039	0.069	0.0040	1.769	0.011	7.469	0.000
Both Remittances	0.053	0.087	0.0126	1.637	0.056	2.680	0.008
No Remittances	0.055	0.088	0.0021	1.592	0.001	15.489	0.000
Female Headed Households							
International Remittances	0.089	0.145	0.0155	1.631	0.030	3.627	0.000
Internal Remittances	0.034	0.073	0.0075	2.142	0.048	5.200	0.000
Both Remittances	0.042	0.051	0.0345	1.215	0.676	0.261	0.794
No Remittances	0.052	0.096	0.0087	1.842	0.028	5.003	0.000

Type of Remittance Receipt	Average PC Education Expenditure	Marginal Budget Share	Standard Error MBS	Elasticity	Variance (elasticity)	t-statistics*	Prob-value
Male Headed Households							
International Remittances	155.017	na	na	1.178	0.026	1.104	0.270
Internal Remittances	58.127	na	na	2.284	0.123	3.661	0.000
Both Remittances	87.997	na	na	2.229	0.246	2.478	0.013
No Remittances	101.008	na	na	1.876	0.023	5.776	0.000
Female Headed Households							
International Remittances	280.8849	na	na	1.242	0.125	0.684	0.000
Internal Remittances	60.62245	na	na	2.068	0.114	3.163	0.000
Both Remittances	128.23	na	na	1.191	2.123	0.131	0.000
No Remittances	101.597	na	na	1.817	0.135	2.224	0.000

*Note: t-test undertaken here tests for the assumption of unity of elasticity (H0: elasticity=1)

To calculate the t statistic, the variance (or standard deviation) of the elasticity needs to be calculated. This can be derived from equations (20) :

This can be written as:

$$\text{Var (elasticity)} = (\text{Var}(b1) + \text{Var}(b4) + 2\text{Cov}(b1b4)) / (\text{ABS})^2$$

$$\text{Var (elasticity)} = (1/\text{ABS})^2 * \text{Var}(b1)$$

with ABS: average budget share of the relevant remittance receipt sub-sample

b1: estimated coefficient for the covariate log per capita total expenditure

b4: estimated coefficient for the relevant remittance interactive covariate R*LogtotpcExp

$$\text{t-statistic} = (\text{elasticity} - 1) / \text{Standard Error}(\text{elasticity})$$

Looking briefly at the other covariates, table (10) indicates that the patterns reported in previous sections are still upheld for the gender head models. For covariates related to composition of families by age group, the largest impact on education share remains for families with larger portions of individuals between 18 and 24, the age bracket corresponding to higher or university level of education. The impact gets smaller as we move down to lower age brackets. This result is true for both households with female head and their peers who have a male head. Examining the parental education variables, the positive impact obtained earlier remains statistically significant only for the model with male headed households. Indeed in these latter households, mothers and fathers who have higher education levels do value education of family members and are investing more in human capital compared to their counterparts with lower degrees. Other results indicate that residency statuses in different governorates do not seem to exert any statistically significant impact. This is mainly due to the concentration of the population in and around the capital Amman; and due to the closeness of rural towns to urban centers. On the other hand, two interesting findings appear when estimating the remittance interactive model of equation (14) on female headed households. The first is related to the age of the household head. Indeed table (10) indicates that an increase in the age of the household impacts education budget share negatively, contrary to the estimations of the male headed families. Such a result could be related to earning potentials of women in Jordan that might be negatively correlated with age. This is an issue that goes beyond this study and will therefore not be dwelt upon. The second finding is the one related to social security benefits. It is interesting to highlight that no household with a female head received social benefits. Thus this covariate had to be dropped from the estimation. This may be due to the fact that social security benefits in Jordan are usually given to one person in the family; in most cases to heads that are usually men. However, female heads of households have a much higher probability to work in the informal sector or in low-skill self employed activities such as domestic servants compared to their male counterparts. Therefore, they do not have any access to social security. This is a key issue that needs further investigation but again goes beyond the scope of our analysis.

2.10 - Conclusions

The study has utilized the 2006 Jordan HIES to examine the impact of migrant remittances on household education expenditure. To do so, the study has opted to estimate an expenditure model whose functional form is a variation of the Engel's curve, referred to in the literature as the Working-Leser model. The model looks at the receipt of migrant remittances as a determinant of the share of household expenditure on education goods and services. The objective from selecting such functional form is to examine the marginal spending of remittances receiving households on education, and compare it to their non-receivers counterparts. The chapter distinguishes four categories of households, identified in relation to the source of the remittance flows: household receiving remittances from abroad which the study calls international remittances, households receiving internal remittances from sources inside the Kingdom, households receiving remittances from both domestic and international sources, and households that do not receive any kind of remittances. Accordingly the model determines whether the incremental increase in household expenditures, coming as a result of receiving remittances from different sources, is being directed towards spending on human capital. This is then compared to the actions taken by the control group, the households with no remittances. The empirical model uses two sets of covariates: binary covariates capturing the receipt of remittances from each source, and their relevant interactive variables with per capita total household expenditure. Resorting to both sets of covariates enables the study to capture the correct model specification where the impact of remittances is exerted on both intercept and slope of the Engel's curve; and consequently calculate MBSs for each group of households with the objective of highlighting marginal propensities to spend on education compared to the control group⁸⁸. Additionally, the choice of a semi logarithmic form, where the log of per capita household expenditure is constructed as an independent variable, allows the model to compute education expenditure elasticities for households with different remittance statuses. To account for censorship and selection bias, a Heckman selection correction procedure is adopted. Therefore coefficients estimated and consequently MBSs and elasticities computed should be all unbiased.

⁸⁸ Households that do not receive any type of remittances.

The empirical findings from estimating the education budget share model has yielded two main conclusions. Households receiving internal remittances do increase allocations on education goods and services but do so at a lower rate compared to their counterparts who do not receive similar private transfers. The estimates of the budget share model suggest a statistically significant positive coefficient for the binary internal remittances receipt covariate and a negative coefficient for its related interactive term. This result influences the computation of marginal budget shares and reveals the fact that households receiving internal remittances have a lower marginal propensity to spend on education items than the non receivers' families. The expenditure elasticities derived from the empirical model suggests that education is considered as a luxury good for all groups of households, receivers and non-receivers. Indeed computations revealed that all elasticities were statistically larger than unity. However, what is interesting to emphasize is the fact that the coefficients related to household receipt of international remittances were found not to be statistically significant. Although the receipt of this type of remittances positively influences human capital formation through its direct impact on education attendance and attainment especially for higher education⁸⁹, it does not seem to exert a statistically significant impact on household education spending pattern. This indicates that these international remittances influence a household's decisions to send family members to school but not the amount which they will be spending on their education. This could be interpreted by the fact that primary and intermediary education is very much accessible in Jordan, especially that compulsory education laws for these levels are firmly implemented. The influence of international remittances is exerted on higher education levels especially university. Unfortunately due to data limitations, spending on higher education and university levels cannot be depicted separately from other education levels and thus could not be examined in this study separately.

As a second stage analysis, the chapter included a gender dimension to the household expenditure model estimated earlier. In the absence of data on the gender of the sender, the study has opted to investigate the education spending patterns for households with different remittance statuses, headed by either males or females. To do so, the study opted to estimate the education budget share model for female headed households and for

⁸⁹ Refer to the findings of chapter 1.

male headed households separately. Following the literature on intra-household bargaining, findings suggested different behavior between households with different gender heads when it comes to the impact of remittances on human capital investment. No statistically significant impact was detected for any type of remittances, be it international or internal, on education budget share of households with female head. This was not the case for male headed families where estimates suggested a statistically significant impact for international remittances rather than internal ones. Indeed, while international remittances increased education budget share in absolute terms, households having a male head and receiving international remittances were spending more at the margin than the base group category household with a male head who do not receive any type of remittances.

Looking beyond remittances impact, the study has used a wide array of socio-economic covariates as to control for the various determinants of household education budget share. Estimates from the empirical model suggest three interesting findings. On household demographics, the amount allocated for education rises when more individuals from households access higher levels of education. This is shown by the statistically significant positive impact for the vector of covariates reflecting the share of household members from different age groups. Indeed, the magnitude of this impact increases as the age brackets get older and is therefore the largest for age group [18-24] which roughly corresponds to university level. This is mainly due to the fact that tuition fees and education needs become costlier as individuals move through to higher schooling levels. On the effect of parental education level, results obtained from the Jordan empirical case are in line with other findings from the literature. Educated parents tend to increase spending on their children's education. This is especially the case for educated mothers. Indeed, results suggest that a mother with a higher education level tends to value the education of her children or other members of the family and will therefore bargain for additional spending on education items such as tuition costs for private schools/universities or spending on additional resources such as books or other related material.

Finally it is worth highlighting results linked to the occupation of the head of household, and the public transfers received by families. On occupational status, estimations indicate that being a household head working in the public sector decreases the budget share for spending on education. The study attributes this effect to either preference

of public sector employees for sending family members to public schools/universities, or to income constraints preventing them from accessing private schooling especially that public sector employees are generally considered as being from lower-middle and middle income classes. Such analysis could not be expanded further due to lack of data on types of schooling institutions (public vs. private) in the household survey. On the other hand, results on the receipt of social benefits and government transfers seem to convey different messages. Households' receipt of social benefits increases budget share on education while receipt of government transfers decreases it. Additionally, the study found that no female headed household received any social benefits. This opens the door for further discussions and analysis on the nature and efficiency of public transfers and cash subsidy schemes in Jordan. This goes beyond the scope of the chapter but could constitute a future agenda for additional research.

Annex Tables:

Table 10B: OLS Regression Analysis for the Impact of Remittances Receipt on Education Budget Share - The Gender Head Model

Education Share	Male Headed Households	Female Headed Households
International Remittances	0.068 ***	-0.071
R*LogtotpcExp	-0.009 ***	0.011
Internal Remittances	0.025	0.032
IR*LogtotpcExp	-0.003	-0.005
Both Remittances	0.087	0.201
RIR*LogtotpcExp	0.001	-0.033
Log pc total Expenditure	0.033 *	0.041 *
Household Size	-0.001	0.004 ***
Number of Elderly	-0.01 *	0.005
Share of people <5 in Household	0.064 *	-0.013
Share of people [6-11] in Household	0.117 *	0.095 *
Share of people [12-14] in Household	0.082 *	0.068 **
Share of people [15-17] in Household	0.167 *	0.193 *
Share of people [18-24] in Household	0.191 *	0.175 *
Age of the Head of Household	0.003 *	-0.003 **
Age^2 of the Head of Household	0.000 *	0.000 **
Head is Male	na	na
Mother Years of Education	0.002 *	0.001
Father Years of Education	0.002 *	0.002
Amman Governorate	0.004	0
Balqa Governorate	0.004	0.005
Zarqa Governorate	0.005	0.001
Madaba Governorate	0.015 ***	0.018
Irbid Governorate	0.001	0.001
Mafrq Governorate	0.009	0.024
Ajloun Governorate	0.006	0.031
Karak Governorate	0.026 *	0.038
Tafilah Governorate	0.005	0.021
Maan Governorate	-0.002	-0.018
Aqaba Governorate	0.011	0.038
Head is an employer	0.003	-0.069 ***
Head works for own account	-0.003	0.014
Head works in unpaid work	-0.035	na
Head is a Farmer	-0.008 ***	-0.067 *
Head is in Public Sector	-0.008 *	-0.013
Head is in construction	-0.014	-0.027 *
Head is in Tourism	-0.015 *	-0.033 *
Head is in Finance sector	-0.004	-0.001
Head is in Health Sector	0.002	0.015
Household Receives Social Benefits	na	na
Household Receives Govt. Transfers	-0.008 *	0.003
Share of females [15-17] in Household	-0.062 *	-0.039
Share of females [18-24] in Household	-0.131 *	-0.09 *
Number of adult females	0.015 *	0.012 *
Number of inactive females	0.01 *	0.003
Constant	-0.381 *	-0.257 *
Sample Size	9722	1271
F-test / Likelihood Ratio chi-square	55.29	8.9
Significance Level (Prob-Value)	0.000	0.000
R-squared	0.272	0.269
Residual Sum of Squares	53.564	9.468

Significance Level: *1%, **5%, ***10%

Note 1: Huber-White robust standard errors were used in the model.

Standard Errors were clustered at the household level.

Table 11: Gender Head Model - Education Marginal Budget Share and Elasticity

Type of Remittance Receipt	Average Budget Share	Marginal Budget Share	Elasticity	Variance (elasticity)	t-statistics*	Prob-value
Male Headed Households						
International Remittances	0.067	0.091	1.355	0.006	4.583	0.000
Internal Remittances	0.039	0.069	1.789	0.01	7.890	0.000
Both Remittances	0.053	0.087	1.649	0.056	2.743	0.006
No Remittances	0.055	0.088	1.605	0.001	19.132	0.000
Female Headed Households						
International Remittances	0.089	0.141	1.582	0.024	3.757	0.000
Internal Remittances	0.034	0.071	2.085	0.039	5.494	0.000
Both Remittances	0.042	0.050	1.200	0.669	0.245	0.000
No Remittances	0.052	0.094	1.787	0.020	5.565	0.807

Type of Remittance Receipt	Average PC Education Expenditure	Marginal Budget Share	Elasticity	Variance (elasticity)	t-statistics*	Prob-value
Male Headed Households						
International Remittances	155.017	na	1.178	0.026	1.104	0.270
Internal Remittances	58.127	na	2.284	0.123	3.661	0.000
Both Remittances	87.997	na	2.229	0.246	2.478	0.013
No Remittances	101.008	na	1.876	0.023	5.776	0.000
Female Headed Households						
International Remittances	280.8849	na	1.242	0.125	0.684	0.000
Internal Remittances	60.62245	na	2.068	0.114	3.163	0.000
Both Remittances	128.23	na	1.191	2.123	0.131	0.000
No Remittances	101.597	na	1.817	0.135	2.224	0.000

*Note: t-test undertaken here tests for the assumption of unity of elasticity (H0: elasticity=1)

To calculate the t statistic, the variance (or standard deviation) of the elasticity needs to be calculated. This can be derived from equations

This can be written as:

$$\text{Var (elasticity)} = (\text{Var}(b1) + \text{Var}(b4) + 2\text{Cov}(b1b4)) / (\text{ABS})^2$$

$$\text{Var (elasticity)} = (1/\text{ABS})^2 * \text{Var}(b1)$$

with ABS: average budget share of the relevant remittance receipt sub-sample

b1: estimated coefficient for the covariate log per capita total expenditure

b4: estimated coefficient for the relevant remittance interactive covariate R*LogtotpcExp

$$\text{t-statistic} = (\text{elasticity} - 1) / \text{Standard Error}(\text{elasticity})$$

Chapter 3: The Impact of the 2006 War on Education Attendance in Lebanon

3.1 Introduction

Armed conflicts around the world have always generated detrimental effects on household welfare and imposed severe costs on domestic economies and local communities. Indeed wars kill and injure millions of people every year and destroy infrastructure, services, assets and livelihood, displace populations, break social cohesion, institutions and norms and create fear and distrust (Justino 2009). Wars create long term instabilities, expose vulnerabilities of the society and consequently alter household behaviors and influence their decision making process, especially when it comes to human capital formation. The objective of this study is to examine the micro-economic impact of armed conflicts on education attendance in Lebanon and to understand the linkages between the nature of the damage sustained and education decisions made by individuals and households in the aftermath of such a conflict. This chapter tries to investigate whether education attendance is influenced by the nature of the damage incurred. It goes towards showing that physical losses sustained and displacement are not necessarily deterring factors for school enrolment, particularly in middle income countries like Lebanon, which has strong access to donor financing during the recovery period. The chapter tries to highlight other deterring effects of wars on human capital, mainly emerging as a result of loss in employment or income and the idea of uncertainty that such losses create especially on the short run⁹⁰.

The model used in this chapter is an augmented human capital model with education attendance as outcome. The chapter capitalizes on the 2007 Living Conditions Survey to examine the implications of damages sustained during the 2006 war with Israel on education attendance of Lebanese youth. The study confines the definition of youth as being individuals aged [15-22] years. This age group is very much susceptible to quit the

⁹⁰ By estimating a human capital model, the chapter will show that the negative impact of the war on Lebanon is only statistically significant for damages related to household loss of employment and income rather than physical damages, human casualties or displacement.

schooling system in the face of external shocks such as violent conflicts, and either access the labor force or migrate.

One of the main contributions of this study is that it captures the implications of war on human capital formation – education in particular – from a wider perspective than that seen to date. Unlike other general reports examining armed conflict implications such as Shemyakina (2006) in Tajikistan, this study goes beyond physical losses and human casualties. The study indeed defines several types of conflict effects - which the chapter refers to all along as damages - ranging from physical losses, human casualties and displacement to losses incurred on income and employment of different members of the household. By resorting to this wide spectrum of damage definition, the chapter aims at increasing the understanding of the impact of an armed conflict on household welfare especially education. This chapter is therefore an empirical study that examines these channels of impact through which different types of damages sustained could have different implications on the human capital formation of the youth of a country in the aftermath of a devastating armed conflict. The focus of the study is on empirically examining such an impact from a micro level perspective through shedding the light on the education attendance of damaged versus non-damaged individuals. Moreover and to the author's best knowledge, the chapter is the first academic study that examines in specific the question of the impact of the 2006 war on educational outcomes in Lebanon.

The study is also one of the very few empirical studies in the literature that looks at a short but devastating armed conflict between two different countries. This is opposed to the more common analysis of civil wars, such as Justino and Verwimp (2006) in the Rwandan case, and analysis of implications on education outcomes over the long run (decade or more), like Bundervoet and Verwimp (2005) did in Burundi. As a result of data specificities, this study manages to depict the short term implications of the armed conflict on education and therefore captures the early behavior patterns of households towards human capital in the aftermath of the war. The study resorts to a wide array of controls for socio-economic conditions, household characteristics and intra-household decision making in order to isolate and capture the impact of the identified damage categories on the individuals' education attendance.

The policy implications from understanding this short term behavior are important, especially from a policy design perspective. Understanding which type of damage has the largest influence over household education decisions, enables the recognition of the most efficient and immediate intervention programs that governments or other entities could undertake to minimize the implications of a war on schooling outcomes. This therefore enables policy makers to evaluate the success or failure of policy interventions in the aftermath of a war. From this perspective, and benefiting from data available less than one year after the cease fire, the study is able to determine the various ways through which the 2006 war has influenced education in Lebanon and therefore opens the door for further research on the validity of both government and donors' interventions, and thus could be thought of as a case study to be considered to evaluate the educational implication of other conflict in the world.

The remainder of the chapter is divided into seven sections. Section 2 is a literature review that examines the recent empirical work on the impact of armed conflicts on household welfare. Section 3 discusses the channels of impact of armed conflicts specifically on educational outcomes. Section 4 details the events of the Lebanese Israeli war in 2006 and describes the extent of the damages suffered by Lebanon. Section 5 describes the Lebanon 2007 Living Conditions Survey, the data source utilized in this study. This part of the chapter also defines the damage variables and schooling outcomes used in the empirical model and explains the main limitations of the dataset. Section 6 reports both the main characteristics and the education profile of the Lebanese youth by damage status incurred during the war. Section 7 examines the education attendance model and the impact exerted by each damage category identified in this study. The section first describes the identification strategy adopted and the empirical model under scrutiny, and then discusses the empirical findings from the education attendance model with a particular focus on the impact of the damage covariates discussed earlier. Section 8 concludes.

3.2 - Literature Review

With increased availability of micro level data and surveys in post-conflict countries, researchers have recently started an in depth examination of the relationship

between armed conflicts and household welfare beyond broad macroeconomic analysis. Data availability has pushed for the expansion of the stream of economic literature on armed conflicts and wars. Such expansion benefited from the increasing evidence-based work that examined a wide set of issues related to the implications of wars and violence on the wellbeing of individuals and households. In this section, the study highlights the various transmission mechanisms linking wars and armed combats to household welfare, behavior and decision making process. In a review of the literature on the impact of armed civil conflicts on household welfare and policy responses, Justino (2009) specifies that household welfare is affected by a multitude of factors as a result of wars and that it is often difficult to isolate the impact of one specific shock. The review goes further to affirm that the magnitude of this impact is very much linked to the households' pre-conflict characteristics and endowments. These endowments could be in the form of assets, income or human capital. It should be noted that it is these characteristics and endowments that will determine the coping strategies and mechanisms that households will resort to during and after the conflict. Having said the above, the literature characterizes the impact of armed conflicts into direct and indirect effects. This section follows such characterization and therefore discusses in a first instance the direct impact of armed combats on household welfare; before presenting the indirect effects and channels in a second instance.

The literature on the direct impact of armed combats on household welfare has mainly focused on three areas of research: changes in household composition arising from death of members, destruction of physical assets, and displacement of households during wars. Looking at changes that occurred to household composition, empirical studies have examined thoroughly the most visible impact of wars on households' wellbeing and that is the loss of human lives and injuries sustained by different family members. Dewhurst (1998) and Woodward (1995) examine conflicts from El Salvador, Kenya, Rwanda and the Balkans to emphasize the fact that armed conflicts do not solely claim the lives of young men – often fighters – who are of working age and potentially at the prime of their productivity. Wars and the violence they generate kill civilians and combatants alike especially from vulnerable groups such as women, children and the elderly. The death of household members, who could be active in the labor force, entails that the family will forgo earning opportunities and therefore exposes the household to risks of slipping into

poverty. Justino and Verwimp (2006) use the Rwandan civil war to argue that the death of labor active members pushes vulnerable households, mostly those with widows, orphans and disabled, into severe forms of persistent poverty especially when they are not replaced by other members. The magnitude of the impact becomes larger with the presence of injured and disabled individuals as households may draw on their savings to secure the costs of medical bills or treatment. From a human capital perspective, households may decide to withdraw some of their members out of school and send them to the labor market. Such decision will have long term implications on household welfare through lower income returns as a result of a lack of education. This is what Justino (2009) describes as a depletion of human capital stock for future generations. These long term implications have also been discussed in the work of Ghobarah et al (2003), Alderman et al (2004) and De Walque (2006). Bozzoli et al (2011) establishes a causality relationship between those long term implications and individuals' expectations for economic recovery following wars; he goes even further and links negative expectations to the intensity and past occurrence of the violent conflict. Recent literature on conflicts has also been interested in the health consequences and their relationship to changing household composition. Empirical evidence is focusing on the correlation between armed conflicts, mortality rates and health complications through channels such as spread of diseases and malnutrition. Examples can be given from Guha-Sapir and Degome (2006) and Roberts et al (2003) who examined determinants of mortality rates in conflict areas in Darfur and the Democratic Republic of Congo. This stream of the literature links with research in the medical field on epidemiology as a tool to assess health implications and on the relation between conflicts and the spread of different types of diseases such as HIV-AIDS and others (Grein et al 2003).

Asset destruction is another direct channel through which armed combats reduce household welfare. Often during wars, houses, land, machinery, livestock, vehicles and other belonging and productive assets are partially or completely destroyed. These damages incurred usually reduce the overall wealth of households and could potentially have implications on the ability of these families to recover and restore the economic and social welfare levels they enjoyed prior to the conflict. Again research in this area is mostly empirical and focused on quantifying the impact coming out of the destruction in assets.

This can be seen in works such as Shemyakina (2006) who examined dwelling and livelihoods damages in Tajikistan, Gonzalez and Lopez (2007) who looked at the destruction in farm assets and implications on farm operations in Columbia, and Bundervoet (2006) who observed livestock and crop choices in the conflict of Burundi.

On another note, Justino (2009) refers to the impact of displacement on household poverty, productivity levels and labor. In her review of the literature, Justino (2009) distinguishes between types of displacement mainly asylum seekers, forced migrants and refugees. The review argues that understanding the nature of displacement that occurs enables to identify the type of impact it will have on households; a view shared by Ibanez and Velez (2008) who differentiate between preventive and reactive displacement when estimating welfare losses from the civil conflicts in Columbia. According to Justino (2009), asylum seekers and forced migrants are mostly young and economically active household members. This implies that households from origin communities will lose on economic opportunities and on income. This effect is accentuated since these are the individuals mostly targeted for forced recruitment into armies and armed militias (Czaika and Kis-Kato 2007). Consequently this increases their odds to die, sustain injuries or lose labor market skills and reduce human capital (through less education). On the other hand, refugees tend to be women and children. This also entails implications on decreasing the productivity of the receiving communities' domestic economies and larger costs to accommodate such inflow of people. Forced displacement is associated with patterns of welfare fragility and high socio-economic vulnerability (Justino 2009), with high reintegration costs mainly in terms of productivity (Kondylis 2005) or in terms of change in social habits at the household decision making level (Clark 2007) as new household dynamics are introduced by the displaced after the conflict. Forced displacement has therefore negative welfare implications on both recipient and origin communities, and on the displaced individuals and families themselves. Ibanez and Velez (2008) use the percentage of net present value of rural aggregate consumption to quantify such welfare loss, and have found it to be substantial, at an average of 37 percent. The magnitude of the loss was found to increase with poverty levels and was linked to the ability of households to mitigate the impact of the conflict. More importantly, Ibanez and Velez (2008) highlight that the economic burden of displacement had lasting implications.

In addition to the direct effects discussed above, economic literature talks about some indirect ways in which armed combats could alter the wellbeing of households and individuals. Justino (2009) explains that armed conflicts do affect the environment in which households live in and institutions with which they interact. The review of Justino (2009) sheds light on the destruction of governmental institutions, change in social networks, and damages to exchange and employment markets. These changes could negatively impact the welfare of households and implies more difficult post-conflict coping mechanisms. Political and governmental institutions are typically the first type of establishments that deteriorate in armed combats especially in the case of civil conflicts and wars characterized by long time spans. Wars impact the ability of governments to provide services such as education and health, and cater for public goods especially rule of law and individuals' rights. The work of King and Zheng (2001) goes further to conclude that armed conflicts often lead to different forms of governance failure. Such failure is strongly correlated with lack of capacity to manage the economy and maintain some sort of socio-economic stability. McBride et al (2011) illustrates how the likelihood of peace agreement is dependent on state capacity, and how the probability of war decreases significantly with investments in institutions and governance building. Additionally governments at war tend to reallocate resources from education, health and other social spending towards military expenditure and warfare (Lai and Thyne 2007). On another note, governance failures are often linked to collapses in the social fabric. Wars especially armed civil conflicts could lead to a deterioration in social relations between different communities, different households and even within family members themselves. Woolcock (1998) and Putnam (2000) emphasize the breakdown of social capital and social cohesion as a result of conflicts and the implications this collapse has on interaction between people. This has negative implications on access to employment, access to credit, or even tensions and violence. In an extreme case of the collapse in the social fabric, Pinchotti and Verwimp (2007) discuss the magnitude and atrocity of the genocide in Rwanda. On another note, the literature has examined the impact of wars on household's ability to trade (purchase and sell goods) or what Justino (2009) calls exchange and on employment. To analyze the mechanisms of such impact the literature has relied traditionally on household farm models such as Singh et al (1986). Without dwelling on these types of models the

literature shows that limited access to markets, as result of destruction of infrastructure for example, and the increase in input prices will raise transaction costs for households that are involved in exchange activities. Such costs negatively impact the ability of households to respond to price shocks and therefore to sustain their trading activity. The same dynamics also applies to employment markets where increases in prices mean less ability for firms to expand. Hence, firms will resort to decreasing wages or lay-off employees. This comes with significant social implications such as rises in the levels of unemployment, violence, or exclusion of certain communities. Examining relationship between growth and wars, Collier Hoeffler and Soderbom (2003) argued that lower economic growth resulting from armed conflicts could hinder post-war recovery and revive the conflict. Consequently, countries that experienced wars, especially civil wars, are more prone to engage in further conflicts in the future. This has fuelled the literature on poverty to investigate the long term implications of wars on poverty and inequality measures. Summarizing empirical works such as Lokshin and Ravallion (2000), Jalan and Ravallion (2004) in rural China, Alderman, Hoddinot and Kinsey (2004) in Zimbabwe's 1970 civil war, and Bundervoet and Verwimp (2005) in Burundian civil war of 1993; Justino (2009) concludes that wars increase the vulnerability of households and individuals to face shocks and potentially trap them in long-lasting poverty.

This section has highlighted the existing economic literature and recent empirical findings that examined the transmission mechanisms from armed conflicts to household welfare⁹¹ especially from a micro level perspective. Indeed the literature has divided these linkages between direct effects such as physical harm to members of the household, destruction of assets and livelihood, or displacement from one hand; and indirect effects related to social and political capital as well as market dynamics. Listing the numerous linkages between armed conflicts and household welfare, the chapter turns to focus its scope. The study argues that in order to determine the proper channels of impact, any empirical work on conflict must first define welfare and second determine the type of damages sustained by the household as a result of such conflict. As observed previously, the literature has defined household welfare in many ways. In this study welfare is measured by human capital, and therefore the implications of the armed conflict, in this

⁹¹ These mechanisms are what the study refers to as channels of impact in all along the chapter.

case the 2006 war on Lebanon, will be depicted on education attendance. Since the study is interested in looking at micro level implications, macroeconomic factors such as economic growth will not be dwelt upon despite their importance. From this perspective, the chapter moves to examine the different impact channels through which armed combats affect schooling and education decisions taken by households.

3.3 - Armed Conflicts and Channels of Impact on Education

To understand and quantify the impact of armed conflicts on education, one needs to investigate the channels through which these conflicts may affect the schooling of individuals. As the literature shows, these channels are numerous as the nature of wars is usually different from one country to another. Therefore by understanding the nature and characteristics of the armed conflict under scrutiny, a researcher could devise a set of possible impact channels which will then be tested empirically as this study shows in the subsequent sections. Our aim here is to highlight the relationship between armed conflicts and education from an aggregate level on one hand; and between armed conflicts and household schooling choices and decisions on the other. The literature groups these channels in various ways. For example, De Groot and Goskel (2009) group these impact mechanisms into two categories: the impact through the supply side of education and the impact through the demand side for education. This section resorts though to a more detailed classification of the channels of impact, and follows primarily the grouping adopted by Shemyakina (2006). The chapter identifies four broad categories for the impact of wars on education: returns to education, schooling infrastructure damage, the fear factor and the income factor.

The first channel through which armed conflicts affect schooling of individuals is through the rate of return on education. Wars and hostilities may decrease the expected returns from accessing school or obtaining further education; and armed conflicts may have socio-economic repercussions that could change the lifestyle of the population or certain groups of the population⁹². On one hand, this usually comes as a result of the

⁹² Marouche (2008) has examined the drivers behind the decline in post conflict education returns. In an empirical study on Cambodia, Marouche (2008) argues that returns to education are altered in post conflict

destruction of the overall infrastructure of the country and deterioration in the growth of sectors that require high skilled labor input. Consequently, employment prospects and job opportunities become more and more limited for people with higher education especially at university levels. On the other hand, the conflict could also induce societal changes that dictate regimes or systems of governance that are not friendly for acquiring human capital at least for certain groups of the population. Shemyakina (2006) gives the example of the accession of Taliban to power in Afghanistan, after a war against the Soviets followed by a civil war, and who imposed a strict conservative regime where women were prevented from working and therefore this lowered the incentives for acquiring education. Both cases indicate that wars may induce lower returns on education, which in itself could influence household decisions to stop attending school on a permanent or temporary basis. Looking from a broader optimal investment choice perspective, Blattman and Miguel (2010) argue that contrary to the neoclassical model where capital stock goes back to its steady state level once fighting stops, political and economic uncertainty may decrease expected returns to capital post conflict. This comes as a result of the destruction of institutions, social fabric, technologies and infrastructure; leading to an increase in relative risk, and a shortening of investment horizons. As a result, investment levels drop and the cost of capital rises significantly⁹³. Since households are generally rational and forward looking (Shemyakina 2006), their resources could therefore be reallocated away from investments with lower returns and longer time span and therefore away from human capital.

The second channel of impact is linked to damaged education infrastructure and drop in teacher's availability. As Glewwe (2002) frames it, the availability and quality of school facilities have been associated with student attendance and achievement. Hostilities and armed conflicts often target education facilities resulting in physical destruction of schools, universities and equipments. Recurrent violence could also prevent educational staff from going to work. In this case the supply side of education is directly affected with depletion in the stock of schools available to accommodate students; ultimately pushing some of these students to take the decision of dropping out. This is often the case when

countries as a result of a decline in the health of individuals, drop in the education quality, increase in migration, and most of all as a result of the destruction of the physical capital.

⁹³ Collier (1999) also supports this hypothesis and argues that adverse effects of uncertainty on cost of capital are empirically persistent.

costs of education increase as a result to shortages in supply. Such increase in costs could be due to individuals having to shift from public to private education, or increase in traveling costs as students have to access schools in areas and regions that were not affected by the conflict. Moreover displacement of individuals and communities can also have implications. Schools, often public ones, may serve as temporary shelters for refugees and displaced families during wars; or even as quarters for armed parties and soldiers. This may cause a rundown in the educational facilities along with damage to equipment. In a study on barriers of education for internally displaced individuals, Mooney and French (2005) argue that the above phenomena prevents students of hosting regions or communities from using these facilities on a regular basis; consequently pushing them to travel long distances to schools located elsewhere. The alternative is often to stop attending classes on a temporary basis before leading to a complete drop out of the schooling system. Rebuilding and rehabilitating the education infrastructure following armed conflicts could be costly for governments and have direct implication on equity between different groups of the population within the same country. If schooling facilities⁹⁴ are not restored in an adequate period of time, some communities may fall behind the rest of the country in their educational attainment. This could potentially cause a regional or community level slowdown in economic activity and growth, deepening of poverty, civil unrest and large population movements both across the country and outside the country (internal and external migration).

The third channel under scrutiny is what the study calls the fear factor resulting from armed conflicts and its impact on household behavior. This is mainly linked to the fact that wars provoke fear from recurrence of violence, uncertainty in terms of the security situation, and increase the perception of the overall risk in the country. Chamarbagwala and Rubian (2008) imply that such fear factor often drives households to hide their children away from public areas, such as schools and universities, or even relocate to regions that are less affected by violence. This argument holds in countries where post-conflict violence against civilians rises tremendously as a result of lack of authority and fragile governments, where police forces are unable to maintain law and order which consequently falls under the hands of militias and armed gangs. In an analysis on the

⁹⁴ This is considered as a shock to the supply side of education.

motives of violence against civilians, Azam and Hoeffler (2002) argue that violence against the population is used as a military tactic to increase control. Incidences such as torture, abduction and targeted killings are often widespread in conflict-affected areas, therefore contributing further to the fear factor. This study goes further to argue that this perception of risk and fear that alters households' decisions, more specifically decisions related to human capital investments, also exists in less severe circumstances even without the occurrence of the above events. Despite the presence of a well functioning policing system, the idea itself, of the recurrence of the armed conflict, does contribute to the fear factor and the increase in uncertainty. Therefore this may influence families' decision to send their children to school especially girls in the case of societies where women are vulnerable. This usually comes in the context of short but recurrent conflicts⁹⁵ with implications on political stability as in the case of Lebanon, the country under scrutiny in this chapter⁹⁶.

The fourth channel through which armed conflicts affect schooling of individuals is through the income factor. Armed conflicts often reduce income resources available to households pushing them to reconsider their budgets. Wars are conducive to income shocks (or decrease in income) on a household level pushing families to reallocate their limited resources and undertake budget cuts. The setback occurs when households decide to reduce spending on education and therefore withdraw all or some of their members from school⁹⁷. In this case a tradeoff will have to be made between members who will obtain an

⁹⁵ Lebanon and Israel have been in war since 1949. Hostilities between the two countries happened on a frequent and recurrent basis and for different periods of time ever since. The peak of these hostilities came after the Israeli invasion to Beirut in 1982 and during the Israeli occupation of the Southern parts of Lebanon until the year 2000. These hostilities came often in a context of political instability in Lebanon the latest being the political turbulences following the assassination of the ex prime minister Hariri in 2005 which preceded the war in 2006.

⁹⁶ The fear factor channel can also be extended to include the effect of exposure of children to armed conflicts and its implications on psychological health. Looking at psychological effects, the literature argues that psychological symptoms such as depression or anxiety are often common to children exposed directly to wars and conflicts and that these symptoms do stay long after the end of the war. The literature links these effects to poor schooling performance and to children dropping education prematurely as a consequence of their psychological health status. The literature highlights that the longevity and magnitude of the distress is positively correlated to the severity of the trauma suffered by children and therefore positively correlated to dropdown in school. The above literature is well documented in the work of Yule et al (2003) and Turner et al (2003) who undertake a further general discussion of psychological responses to violence in wars and armed conflicts.

⁹⁷ In their work on Indonesia, Thomas et al (2004) conclude that a reduction in real resources – as a result of an income shock; the 1998 financial crisis in Indonesia- decreased the investments in human capital

education, members who will not, and members who will have to access the labor market instead of attending school. A decision will have to be made on which education is favored, that of older members of the household which are close to graduation or that of younger ones especially as to complete basic education. This decision will be made as part of an overall household coping strategy, in response to an income shock induced by the war, which takes into account options such as labor market access for certain members and migration for other members. These decisions are very much dependant on intra-household linkages and characteristics, household demographics, and the bargaining power of various members of the household⁹⁸. For example, heads and members with largest contribution in terms of income are usually individuals with the largest weight in the household decision making process. Therefore the higher their own education the more they will value education and the higher they will try to invest in the human capital of other members of their families. As it will be highlighted in upcoming sections in this chapter, household characteristics and demographics will be taken into account and controlled for in the empirical model selected for this study. On another note, income shocks resulting from wars could impact education through frequency and quality of education. Indeed, households that suffered from a decrease in income as a result of war could decide to withdraw their children (or other members of the family) from the education system temporarily. Such a decision could be reversed once additional income sources are secured. Income constraints created by hostilities could also push households to jeopardize the quality of education. Families might opt to send their children to less expensive schools or universities with lower standards. This typically happens when children are taken out from private schools or universities and placed into public ones often offering lower quality of education. In summary, income shocks and income uncertainty resulting from wars

measured by both spending on education and school enrollment. The paper also shows that the impact of income shocks also reduces the share of household spending on education.

⁹⁸Many empirical papers in the literature have examined the relationship between household characteristics and education. Among them are Chernichovsky (1985) who examined the demographic and socioeconomic correlates of school enrollment and attendance in Botswana. Focus was made on the impact of household wealth, the child's economic role in the household and the child's gender on both schooling outcomes and schooling decisions taken. Also Al-Samarai and Peasgood (1998) highlight the impact of individual and household characteristics on school attendance and attainment in Tanzania, and argue that substantial intra-household differences exists on how these characteristics influence the education outcome of males and females. The work focuses on the education and economic status of the parents and the role these factor play in household decision making related to human capital.

adversely impact both quantity and quality of individual's education. It should be noted that economic literature had previously examined the impact of income shocks on household decisions related to human capital however it did so in times of peace. This was thoroughly discussed in the works of Jacoby and Skoufias (2004) and Thomas et al (2004) who examined the linkages between income, risk, financial markets and education in several developing countries such as India and Indonesia. The literature on conflict and impact of armed hostilities on education is fairly recent, mainly due to unavailability of post-war data, and therefore more empirical evidence needs to be examined.

As presented above, the channels through which armed conflicts and wars affect schooling of individuals are numerous and diversified. They account for: lower education returns that drive household investment decisions towards less human capital investment; societal change; supply shocks and infrastructure destruction; displacement of certain groups of the population; fear factor arising as a result of violence, uncertainty and political instability, all of which alter household behavior; psychological impact on children; and shocks to household income. Such diversity makes it imperative to investigate the impact of various conflicts on a case by case basis. Obviously all of the above channels cannot be activated simultaneously as a result of one conflict. Indeed some channels will be accentuated more than others. It should be noted that the type of damage incurred by households along with the characteristics of a conflict such as length, intensity, geographical distribution or spread, the nature of conflicting parties, and post-war government policy choices, all entail the establishment of different channels. Hence there is a need to examine further empirical evidence in the literature. Following the above perspective, the chapter thoroughly describes the characteristics of the 2006 Lebanese-Israeli war in the upcoming section. This enables the chapter to set the context in which the study tackles the issue of investigating the different channels of impact on education attendance in Lebanon.

3.4 – The Lebanese-Israeli War in 2006

This section describes briefly the context of the war that erupted between Israel and Lebanon in the summer of 2006. The section focuses mainly on the events and damages

that have occurred on the Lebanese side. It sheds light on the magnitude and gravity of this war; and looks quickly at the impact that the conflict exerted on the country's economy, political stability and future well-being, despite its shortness in terms of duration.

Following the kidnapping of two Israeli soldiers by Hezbollah fighters, Israel launched a war on Lebanon on July 12th 2006. The hostilities lasted for 34 days and ended on August 14th 2006 with the UN resolution number 1701 coming into action. The conflict, commonly known as the "July War", continued with an Israeli blockade of the Lebanese air and maritime spaces that lasted till the 8th of September 2006. The fighting was mainly concentrated in Southern Lebanon and eastern parts of the Bekaa valley along with heavy shelling of the Southern suburb of the capital city Beirut. Israeli bombing also targeted, but with lesser frequency, other areas in Lebanon and focused mainly on Lebanese economic and physical infrastructure especially roads and bridges. Nearly 1 million Lebanese, a quarter of the population, were displaced in the height of the fighting. The displaced fled the conflict areas to other regions in the country, especially Beirut, or to neighboring countries such as Syria and Cyprus. These countries later constituted the base from which an estimated 200,000 Lebanese, mostly young and educated, relocated to different countries in a significant phenomenon of youth migration. This brain drain is expected to have significant implications on the productivity and growth prospects of the country. The toll of the July war was heavy on Lebanon with losses incurred in human lives, physical capital, housing and infrastructure, environment, and economic growth. Nearly 1,200 individuals were killed and 4,400 were injured, mostly civilians⁹⁹. Israeli bombings targeted civilian dwellings, schools, bridges, roads, airport runways, ports, factories, businesses, water networks, fuel tanks and military installations. A complete list of the damage toll in all sectors along with information on post-war reconstruction phase and official foreign grants and assistance received, are all well documented by the government of Lebanon and by international organizations such as the various United Nations Agencies, Human Rights Watch and the World Bank. Having said that, the government estimated the overall cost of the war's direct damage to be around US\$2.8 billion, equivalent to 12.5 percent of GDP, and a loss of output and income at US\$2.2 billion

⁹⁹"Fatal Strikes: Israel Indiscriminate Against Civilians in Lebanon", Human Rights Watch, Volume 18 No.3, August 2006.

(World Bank 2007). The 6 percent growth registered in the first half of 2006 was reversed and nearly flattened by the end of the year. According to official figures from the National Accounts of Lebanon, the real GDP only grew by a mere 0.7 percent during that year.

The physical infrastructure of the education sector in Lebanon endured significant damage during the July war. The Economic and Social Impact Assessment (ESIA) conducted by the World Bank following the hostilities and published in 2007, estimates that 209 public schools sustained some type of damage, be it partial or complete destruction. This number is equivalent to around 15 percent of total public schools in Lebanon. Furthermore, the assessment accounted for an additional 76 private schools which also suffered from the same fate. Damage to school infrastructure was not only limited to damage that occurred through bombings; around 700 public schools were utilized as temporary shelters to displaced families and individuals during the war. This lasted for 3 months after the cease-fire came into effect. The usage of these schools for sheltering purposes resulted in loss of furniture, equipment and learning resources; leading to large rehabilitation needs. The World Bank (2007) has estimated a minimum cost of US\$83 million for rehabilitation and recovery of infrastructure in the education sector.

Despite the short time horizon of the July war, the magnitude of the impact of this conflict may be observed for many years to come¹⁰⁰. This impact is not solely linked to the direct effects of a war which are usually translated in terms of destruction of dwellings, destruction of physical and economic infrastructure, forgone revenues, slowdown in economic and sectoral activities, and decline in growth; it can also be observed at a micro level through changes in the household decision making processes and changes in household behavior. Changes in household behavior are often the result of indirect type of effects that are created by the conflict. These indirect effects are implications associated with complementary phenomena created by wars in general such as political instability, which usually follows hostilities, perception of the risk surrounding the country, and migration which usually continues despite the cessation of military actions especially the type of migration related to the educated youth. This indirect effect becomes more

¹⁰⁰ Several papers in the literature have argued for a long lasting effect of armed conflicts. Knight et al (1996) have estimated that civil wars lead to a permanent income loss of around 2 percent of GDP on average. Collier (1999) argues that the destruction of physical, human and political capital impacts negatively the post-war recovery, lengthens its period and increases the probability of re-igniting the conflict. Ghobarah et al (2003) looks at deepening of chronic types of poverty following conflicts and the resulting poverty traps.

accentuated in the Lebanon case. This is especially due to the fact that the reconstruction phase in the country was well underway following substantial support from the Donor community, mostly Arab countries, coupled with a somewhat strong phase of economic recovery benefiting from significant capital inflows as a result of the international financial crisis¹⁰¹. One of the most important outcomes that is influenced by damages occurring through armed conflicts is the decision of households to send members of their families to school or university and therefore invest in human capital. Indeed following a war similar to the 2006 one in Lebanon, especially in the short run following the end of the hostilities, households may be rethinking the schooling of their children especially for individuals that are beyond compulsory education essentially at the higher education levels. Education choices will be linked to the type of damage sustained and the ability of the household to overcome it. The issue is tackled in this chapter through examining an empirical model that examines the determinants of education attendance in Lebanon, and observes closely the impact of various types of damages occurred in the 2006 war on school attendance. To achieve this objective, the chapter resorts to the 2007 Lebanon household survey which is described in the sections below.

3.5 - Data Description

3.5.1 - The Lebanon Living Conditions Survey

The data used for this chapter comes from a 2007 cross-sectional household survey entitled the “Lebanon Living Conditions Survey” (LCS). The survey was conducted by the Lebanese Central Administration of Statistics (CAS) with support from the Ministry of Social Affairs (MoSA), the United Nations Development Program (UNDP) and the International Labor Organization (ILO). The data was collected during the first quarter of 2007. The survey was conducted on a nationally representative sample of 6686 households from all 6 governorates or “mohafaza” of Lebanon. The sample gives information on 29519 individuals. The sampling design is based on primary sampling units that were selected on a probability proportional to size¹⁰² basis, and were drawn according to the 2004-2005 national Census of Buildings and Dwellings. The questionnaire is composed of

¹⁰¹ According to official National Accounts Data, real growth averaged 8.4 percent between 2007 and 2010.

¹⁰² The size of the Primary Sampling Unit is determined according to the number of primary residences including it.

13 modules: (i) Household member's individual characteristics; (ii) education status; (iii) economic activity; (iv) health, insurance and injuries sustained during the July 2006 war; (v) immigration plans; (vi) death that occurred during the war; (vii) dwelling characteristics; (viii) transport and vehicles ownership; (ix) water, sewages, energy and heating services and appliances; (x) losses incurred due to war; (xi) financial and in-kind transfers; (xii) total income; and (xiii) perception of household income. The 2007 LCS was initially designed as an update of the LCS conducted in 2004 by CAS itself, and supported by the same institutions; with both surveys incorporating to a certain extent similar modules with many similar questions. However the 2007 LCS was conducted almost 6 to 9 months following the July war in 2006. This meant changing the aim of the survey so that it examines the impact of this severe conflict on the living standards and conditions of the Lebanese population. The survey was intended to quantify the damage and to inform policy makers on pressing needs and therefore required actions that ought to be taken to alleviate the negative implications of the war on the lives and livelihoods of the population. From this perspective, the questionnaire asked many questions related to losses incurred on different levels: physical, human, changes in services delivery and changes in employment and income status of individuals and households. The questionnaire also asked households about their views regarding the efficiency and accuracy of government interventions following the war and methods to improve these interventions. Using these sets of questions, the chapter constructs different indicators for damages incurred. These indicators are used as dependant variables whose impact on individuals' education outcome is examined and quantified in the empirical model analyzed in this chapter. Details on the rationale and construction of the damage covariates are discussed in the following sub-sections.

3.5.2 - Defining Damage and Schooling Variables

The key variables of interest in this study are the different types of damages incurred by households and individuals during the 2006 war, and the variables reflecting schooling outcome. The study will first define the damage variables used and the rationale behind their usage before dwelling on schooling characteristics.

The 2007 living conditions survey for Lebanon offers several questions capturing the different types of damages incurred as a result of the 2006 July war. The questions are

spread over the 13 modules of the LCS questionnaire and enable the study to capture a diversified set of damage indicators. These damage variables reflect different dimensions and the nature of the harm inflicted on household welfare by the conflict. Different types of damage may influence household behavior in different ways. Therefore the impact of the damage variables on the schooling decisions of households is not necessarily homogenous across different types of damage, a hypothesis that is tested by the empirical model of the study. The study identifies three sets or categories of damage covariates. These are: physical damage, human damage and income damage. Table 1 lists the definition of all these variables. The first category referred to in the chapter as “physical damage” includes three damage variables: damages incurred on dwellings, on transportation vehicles and on properties or assets that generate income. More specifically, the questionnaire asks households whether their primary or secondary dwelling was hit during the war. The survey adds a list of options to determine the type of damage endured by the house, be it partial or full destruction. Using the above information, the study constructs a binary covariate reflecting whether a household sustained house damages (for primary and secondary dwelling) from any type (partial or full destruction). Additionally, the questionnaire goes further to ask about losses related to transportation vehicles that are used by households for private uses. The transport damage covariate utilized in this chapter accounts for both cars and motorcycles. As for the third “physical damage” variable, the study selects a binary covariate that reflects the full or partial household loss for any properties or assets that generate income. The questionnaire specifies a list of these properties: agricultural crops, equipment or tools, public transportation vehicles, and livelihood or enterprises from different sizes. Physical damages could potentially impact education outcomes through exacerbating the fear factor of households, and deepening income losses¹⁰³.

The second category of damage used in this chapter is “human damage”. Under this category, the study opts for two types of damage: households that have lost a member during the war, and households that were displaced from their original residency as a result of the war. The questionnaire asks about death casualties suffered in each family. This enables the study to construct the first covariate under this category.

¹⁰³ Refer to section 3.3 for a detailed description of the channels of impact of armed conflict on education.

Table 1: Definition of Damage Variables Examined

Damage Variables	Type of Covariate
I. Direct Damages	
<i>1.1 Physical Damages</i>	
1 Individual that sustained partial or full damages in its dwelling.	Binary
2 Individual in a household that sustained partial or full damages in properties or assets that generate income.	Binary
3 Individual in household that sustained partial or full damages in transport vehicle.	Binary
<i>1.2 Human Damages</i>	
4 Individual in a household that has a dead member as a result of the 2006 war.	Binary
5 Individual that was displaced during the war.	Binary
II. Indirect Damages	
6 Individual in a household that has members that suffered from loss in job or cut in income due to the war.	Binary
7 Individual in a household that has employed members who have lost their job or cut in wage due to war.	Binary
8 Individual in a household that has self-employed members who have lost their job or cut in wage due to war	Binary

Unfortunately the data in hand does not account for injuries sustained by any member of the household¹⁰⁴. This constitutes one of the limitations of the data. As for the displaced household covariate, the 2007 LCS dwells on a series of questions related to the displacement of families during the war. The survey provides further information on whether a household has left its primary residence to escape hostilities and if it did, the questionnaire captures the destination and the type of temporary residence it has taken refuge in. This enables the survey to differentiate between households who fled the country and those who remained within Lebanon. The LCS also identifies the type of shelter each of those families had sought refuge in; such as houses, apartments, public institutions or public spaces. The usage of “human damage” variables is also intended to capture the fear factor channel through which armed conflicts impact education. Indeed, death and displacement potentially raise the perception of risk and fear, pushing households to alter decisions related to human capital¹⁰⁵. Death could also impact education through loss of income particularly if the deceased was a working age adult, while displacement might

¹⁰⁴ The LCS questionnaire does ask for information regarding injured individuals. Unfortunately such data was not provided to the author by the owners of the survey the Central Administration of Statistics.

¹⁰⁵ Refer to sections 3.2 and 3.3 for a more detailed discussion.

decrease returns to education depending on the permanency of the displacement period, the integration of displaced in the hosting community, and the speed and extent of economic recovery in the home areas.

The third category of damage variables identified by the chapter is a set of variables related to loss in employment and loss of income. The study refers to them as “income damage” or “indirect damage”. These variables actually capture the income factor channel of the impact of war on education outcome and behavior as previously described in the chapter. To construct these variables, the study refers to the economic activity modules of the 2007 LCS. Under this module the questionnaire collects information on the economic activity of each individual of the household, on employment status, on type of employment and sector of employment. Questions are also expanded to take stock of any changes that occurred to economic activity as a consequence of the war. To capture the impact of the war more precisely, the questionnaires differentiates between employees and individuals who are self-employed including employers. Using the set of questions on changes in employment status and income for the first group, the study constructs a binary covariate called employee damage. This variable is defined as households that have at least one member who has suffered from termination of employment, reduction in the weekly hours of work, or reduction in salary of any size (the survey asks for the percentage cuts) after the war. The study also defines a self-employed damaged variable. To do so, the study examines the sub-module on self-employed individuals and employers. This sub-module asks questions related to the type of establishment run by the individual; changes in income, production and labor during and after the war; and constraints facing production such as credit, labor or infrastructure constraints following the hostilities. The chapter defines the binary variable self-employed damage as individuals from households that have at least one self-employed or employer member who went out of business or suffered from a decrease in income of any magnitude after the July 2006 war. Furthermore the chapter combines the two above variables, employee damage and self-employed damage, and constructs a third binary covariate which will be called income damage. Loss of income or employment can potentially impact education as they impose constraints on households’ budget which in severe cases could lead to the inability of covering children’s education costs. Such loss could also represent a source of uncertainty for households and potentially

push them to refrain from investing in longer term capital such as education. Unlike physical assets, which can sometimes be compensated directly by governments or other entities, no guarantees are usually given for households whether their members will be given jobs at the end of the conflict or whether they will be able to get back their pre-conflict income levels.

Overall the chapter has defined eight damage variables all of binary nature (refer to table 1 for a listing of those covariates). These variables capture the multiple aspects of the potential damage and harm created by armed conflicts on household welfare.

In this chapter, human capital is reflected through education outcomes. The main measure of education outcome in this research is current schooling attendance. This covariate is constructed from the 2007 LCS and is used as the dependant variable in the study's empirical model. The 2007 LCS has an education module under which the questionnaire offers education information for all individuals aged 3 and above. The questionnaire makes a distinction in the enrollment status of individuals at all levels and types of schooling institutions mainly schools, vocational training institutions and universities. The 2007 LCS asks household members whether they are currently enrolled in an academic institution, whether they have previously attended one or whether they have never attended any academic institution at all. The survey goes further to ask individuals, currently or previously enrolled, for the highest level of academic degree obtained. The survey also tries to collect information on the damages sustained by the schooling infrastructure and therefore asks students whether their respective schools have been targeted or destroyed during the war.

The target population in this study is youth, defined by individuals between 15 and 22 years of age. To justify the selection, it can be argued that no impact of the war will be depicted the education attendance of younger individuals. This comes as a result of either the strict application of compulsory education laws for children less than 12, or child protection laws and lower labor market returns for individuals aged [12-15]. Looking at details, the choice for investigating the age group [15-25] is justified by two assumptions. First, war will not affect school enrollment for young individuals aged less than 12. On one hand the compulsory education law in Lebanon, which guarantees free education till the age of 12 (basic education level), is strictly applied in Lebanon. This implies that very few

children less than the age of 12 do quit school to access the labor force. In support of this claim, the World Development Indicators (2009) indicate that the net enrollment rate in primary education is at 88 percent (with the gross enrollment at 101 percent). On the other hand the government, with significant support from donor countries and institutions, gave priority for education infrastructure during the reconstruction phase especially infrastructure related to basic and secondary education. While working on the construction and repairs of schools especially public ones, the government managed to deploy temporary pre-fabricated structures to be used as classrooms and reallocate students to other non-damaged schools in the same region, whenever it was feasible and if capacity allowed to. Therefore, even after the end of the conflict, education infrastructure supply was made available. Further details on the supply side of education after the July war and the impact it had on schooling attendance will be highlighted more thoroughly when discussing the empirical results. The second assumption builds on the idea that individuals in the age bracket [15-22] have the option between working and attending school. This is not the case for younger children in the family. In effect, work for younger individuals, especially those aged [12-15], is limited to the informal sector due to child protection laws. This significantly diminishes the returns for accessing the labor force at this age. It should be noted that the war occurred in July during summer break where kids from all age groups were not at school. Additionally, education infrastructure was re-built quickly. This implies that the study is observing post-conflict decisions among a group of individuals aged [15-22] that had a feasible alternative option of working¹⁰⁶. As a result, while controlling for various characteristics, this enables the study to examine the influence or impact of different damages incurred during the war in swaying one of the two choices (education vs. labor).

Having laid down the details on the usage of the 2007 LCS for identifying and constructing the variables related to the different types of war damages and education attendance, the chapter moves to highlight some of the shortcomings of the dataset.

3.5.3 - Shortcomings of the Data

The data presents four shortcomings that need to be addressed early on in the analysis. Firstly, the survey is only cross-sectional and does not follow the same group of

¹⁰⁶ An alternative option from going to school/university.

households across time, mainly before and after the crisis. Such panel structure would have been ideal to incorporate fixed effects that capture variation for within households across time and therefore deals with unobservable characteristics and selection issues.

Secondly, the 2007 LCS was conducted only six to nine months after the end of the armed conflict and was not followed by a later survey. Although this allows the study to analyze the short-term implications of exposure to war on education attendance, the lack of more recent surveys restricts the study from making inferences about the longer term or the cumulative impact of the war on education of young adults who were exposed to the conflict during their schooling years.

Thirdly, information on the primary sampling unit and geographical cohort was not released. The 2007 LCS only offers information on a caza level, the second largest administrative district in Lebanon. In total the country accounts for only 26 of such districts. Not having a sufficient level of geographical disaggregation prevents the study from using a difference in differences approach to examine whether sustaining any type of damage as a result of the war has affected the probability of school attendance. This is the case here since the disaggregation on a caza level entails too few observations to undertake such an approach. Additionally, the lack of data on geographical cohorts prevents from constructing pseudo panels with historical household surveys that might be available prior to 2006.

Finally, the lack of pre-conflict expenditure data is also one of the main shortcomings in this dataset. The absence of such information limits the ability to control for households wealth effects and pushes the study to use alternative proxies such as pre-conflict income or household ownership of certain assets. The chapter dwells further on this issue when discussing the empirical model's control variables, for now the study moves to examine some of the relevant features of the sample under scrutiny.

3.6 - Features of Lebanese Youth

3.6.1 - The Education Profile of Damaged Individuals vs. Non-Damaged Individuals

The chapter turns to compare the education profile between damaged individuals and their non-damaged counterparts. To depict any change in education behavior between the two

parties, the study opts in this section to examine the distribution of education attendance by age and by various damage statuses. To do so, this section resorts to the 2007 LCS and looks at summary statistics on the differences in enrollment rates between the various groups of damaged individuals, using the eight damage variables defined previously, and compares them to the non-damage ones. The sample selected for these statistics is individuals aged between 6 and 22. The choice stems from the fact that this age bracket corresponds to the typical schooling cycle from the primary school level all the way to the completion of a university undergraduate degree (or its equivalent in vocational education). In a complete schooling cycle in Lebanon, an individual enters primary school at the age of 6 and obtains a university degree (a bachelors or its equivalent) by the age of 22. This naturally assumes no conditions or factors that alter such a behavior. Damages incurred during the 2006 war are a factor that is potentially correlated with a change in education behavior and could disrupt this schooling pattern. This is what the overall study tries to demonstrate and for which summary statistics in this section tries to identify. Table 2 summarizes the above mentioned attendance statistics, while figures 1 to 9 plot the proportions of individuals attending school or university by age and the damage status sustained by their respective households. Table 2 indicates the existence of differences in the mean enrollment rates of individuals who suffered from damages in the 2006 war compared to those who did not suffer any. However, as the table highlights, these differences do not necessarily have the same sign and therefore suggest that the behavior patterns in terms of education choices may not be similar across the different damaged individuals. Indeed such variability suggests that the type of damage incurred might influence education choices in households in different manners. Some types of damages incurred could push individuals and households to opt for further education while damages of another nature might push them to leave the schooling system. This latter case, where damaged individuals have on average lower education enrollment rates compared to their non-damaged counterparts, appears to be more common as the majority of the damage categories selected seem to present such a trend. It should be noted though that the study has opted to test whether such a difference in attendance rates is statistically significant for all damage categories. For this purpose, the chapter conducts a difference in means test between the mean school enrolment rate of the sample of damaged individuals and the

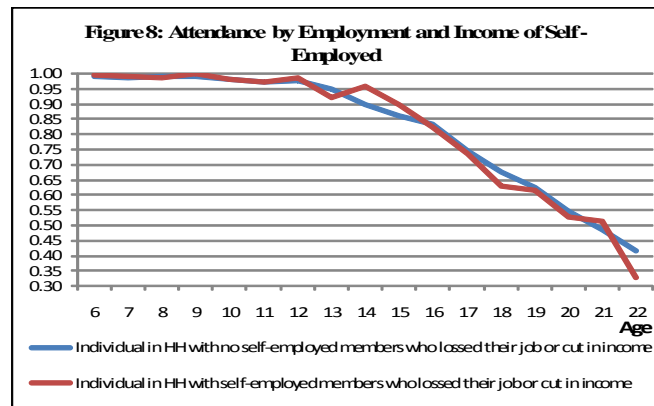
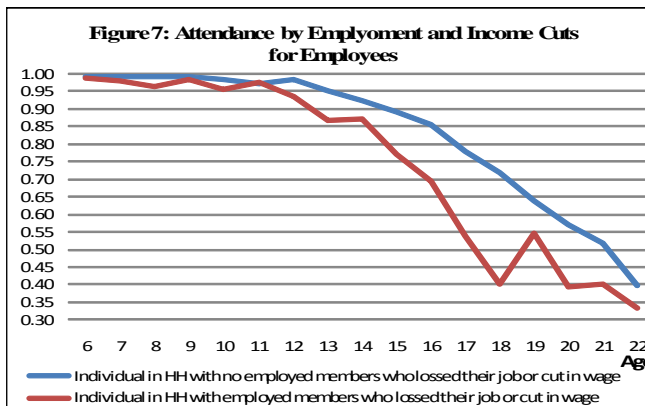
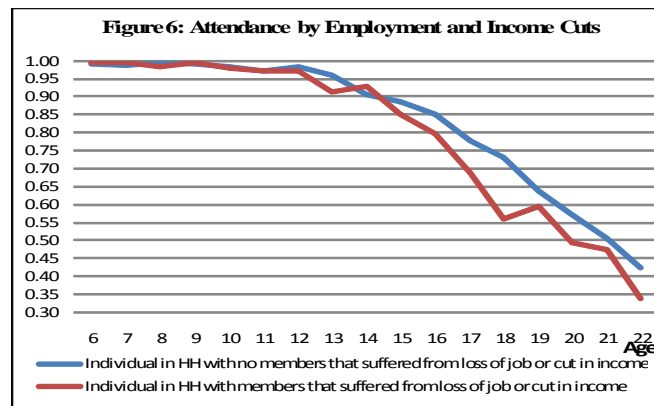
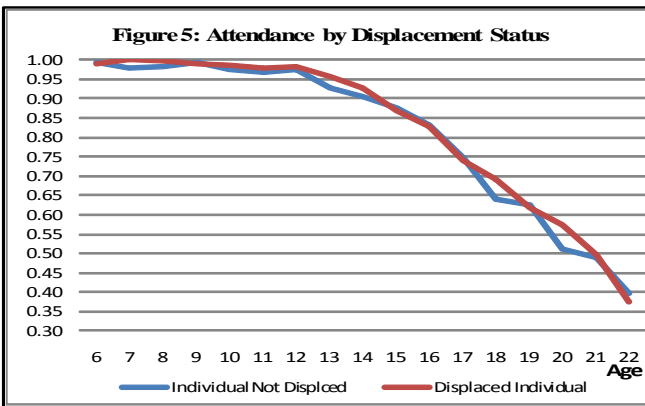
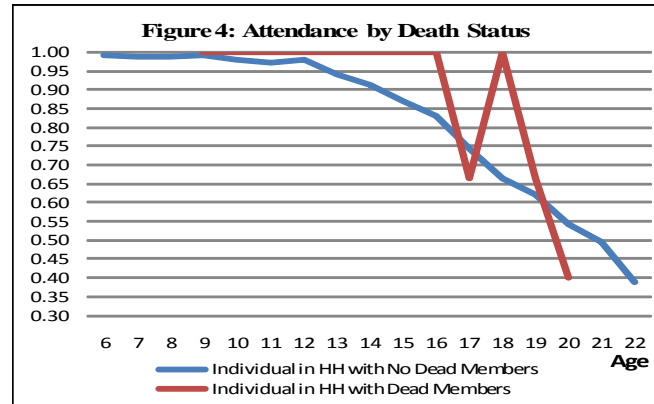
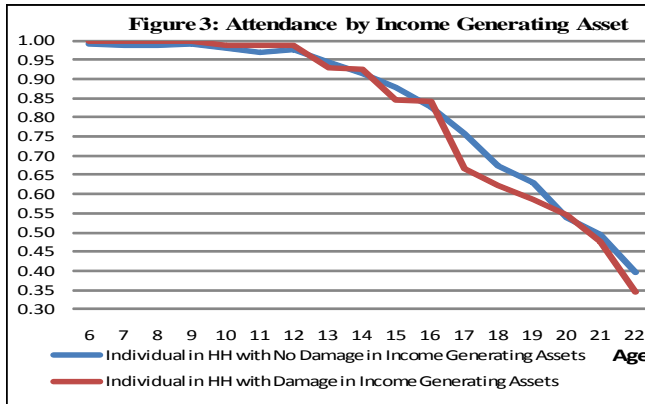
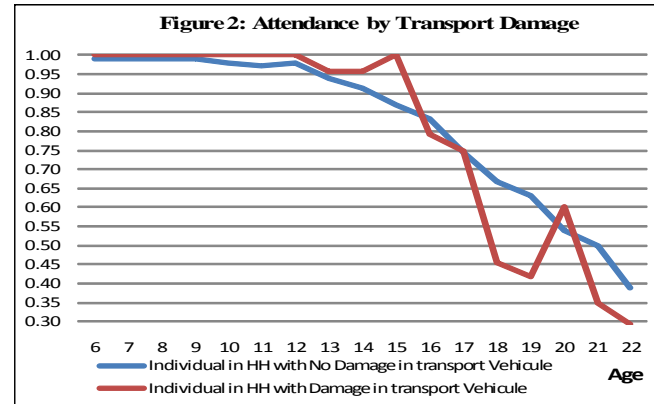
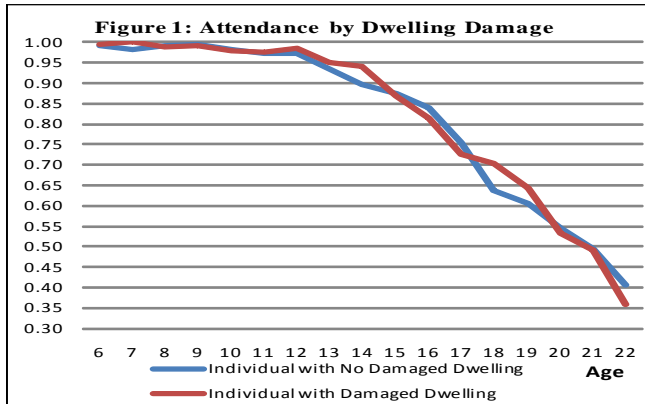
sample of non-damaged ones (the control group) for all eight damage categories. The results of the difference in means test are also highlighted in table 2. Results indicate that the difference in means is statistically significant for four damage categories when compared to their respective control group. These are: individuals in households that lost fully or partially any properties or assets used for generating income; displaced individuals; individuals in households that suffered from loss of job or cut in income due to war, and individuals in households that have employees who suffered from loss of job or cut in income due to war. These results hint to the existence of a potential impact for damages sustained during the 33 days war on school enrollment of young Lebanese. The differences in means in education attendance rates between damaged and non-damaged individuals, especially the statistically significant ones, indicate that households who were affected by the war could have altered in the short run their education decisions and investments in function of the damages they have sustained. Additionally, through examining the enrollment statistics over the various damage sub-groups, the results signal that the sign and potentially the magnitude of the impact of war damage on education attendance is very much linked to the nature of the damage incurred by individuals and households. According to table 2, loss of employment and reduction in income as a consequence of the war seem to influence education decisions negatively. Indeed individuals who come from households that have lost jobs, or who have suffered from income cuts or lost assets that generate additional revenues have lower enrolment averages compared to their non-damaged counterparts. It can be argued that individuals and households who have suffered from such damage might opt, under the pressure of an increasing income constraint, to reallocate their earnings away from human capital towards more urgent priorities such as food and shelter. Households might also choose to withdraw members from school and push them towards the labor market in an attempt to try and compensate for the loss in employment. On the other hand, the statistics show a more surprising result when examining the displaced individuals. According to table 2, displaced individuals have an average education attendance rate that is higher than that of the non-displaced ones. One possible interpretation could be due to the quick and substantive intervention of the government in repairing educational infrastructure, at the end of the war, in the hometowns of these displaced individuals and therefore facilitating their return.

Table 2: Education Attendance Statistics by Damage Status

Type of Damage	Attendance (Percentage)	Sample Size	Difference in Means Test		
			T-stat	Prob. Value	Degrees of Freedom
I. Direct Damages					
Individual with No Damaged Dwelling	81.3	4,646	-0.215	0.830	9568
Individual with Damaged Dwelling	81.5	3,142			
Individual in Household with No Damage in transport Vehicle	81.5	7,531	0.968	0.333	9568
Individual in Household with Damage in transport Vehicle	79.3	257			
Individual in Household with No Damage in Income Generating Assets	81.8	6,572	2.489	0.013	9568
Individual in Household with Damage in Income Generating Assets	79.1	1,216			
Individual in Household with No Dead Members	81.4	7,766	0.382	0.702	9568
Individual in Household with Dead Members	78.6	22			
Individual Not Displaced	80.5	4,097	-2.3366	0.020	9568
Individual Displaced	82.4	3,691			
II. Indirect Damages					
Individual in Household that has no members that suffered from loss of job or cut in income due to war	83.2	4,858	5.862	0.000	9568
Individual in Household that has members that suffered from loss of job or cut in income due to war	78.5	2,930			
Individual in Household that has no employed members who lost their job or cut in wage due to war	83.3	8,116	11.658	0.000	9568
Individual in Household that has employed members who lost their job or cut in wage due to war	70.5	1,454			
Individual in Household that has no self-employed members who lost their job or cut in wage due to war	81.6	6,724	1.0372	0.2997	9568
Individual in Household that has self-employed members who lost their job or cut in wage due to war	80.7	2,846			

The age dimension seems to tell an interesting story when examining figures 1 to 8. These figures plot the proportions of individuals attending school or university by age and the damage status of their respective households. The graphs show that a gap in attendance rate between damaged and non-damaged individuals begins to appear at the age of 15 and above. Prior to the age of 15, graphs indicate that such gap is quasi inexistent and that

attendance rates are so high that they are very close to 100 percent for both samples (damaged and non-damaged). The schooling attendance starts to decline more sharply past the age of 15; a further indication that the impact of the war on schooling is most likely perceived when examining individuals from this particular age category. As highlighted previously, the result is potentially justified by the strict application of compulsory primary education in Lebanon and the low returns to labor for young children aged less than 15 especially that the access to employment and labor market for this age group is illegal and hard to achieve. Therefore, households that suffered losses or sustained damages, as a result of the conflict, are most likely to consider keeping young members of the family in school especially that these individuals are most likely in primary and intermediary school levels and do not have any labor market skills. These graphs are indicative and constitute further evidence on the validity of the choice made by the study to consider the sample of individuals aged [15-22] for its empirical model. On the other hand, the results from the mean testing in table 2 are firmed up when examining closely figures 1 to 8. The gap appears to be more pronounced when looking at the damage categories identified previously in the section: individuals in households that lost fully or partially any properties or assets used for generating income, displaced individuals, individuals in households that suffered from loss of job or cut in income due to war, and individuals in households that have employees who suffered from loss of job or cut in income due to war. This is in addition to the gap observed between the sample of individuals coming from households with destroyed transport vehicles and the control group. It should be noted that the trend of the gap set by the damaged and non damaged curves are in line with the sign of the difference in means calculated in table 2, suggesting more consistency in the results obtained so far and similar interpretations as offered above.



Preliminary results signal that damages incurred during the 2006 war are impacting education enrollment in Lebanon. Looking at the statistics from various sub-samples, the magnitude and sign of such impact, whether to attend school/university or not, is largely influenced by the nature of the damage sustained. Nevertheless the study is cautious at this stage to draw conclusions as further empirical testing is needed. The linkage between damages incurred and education cannot be established by looking solely at distributional differences between damaged and non-damaged individuals. This causal relationship can be attributed to other features, some of them hidden or unknown, which are not reflected in the above figures. Therefore questions of controlling for these features and the possible endogeneity between war damage indicators and education decisions are two issues to be addressed. Prior to discussing the econometric model and identification strategy, the chapter looks briefly at some features of the damage status as to highlight the issue of the exogeneity of the 2006 conflict.

3.6.2 - Summary of the Main Characteristics by Damage Status

Using the 2007 LCS, the study examines distributional differences in terms of socio-economic, regional and some household characteristics between damaged and non-damaged individuals aged [6-22]. The aim behind these summary statistics is to show that the conflict in Lebanon is pretty much exogenous and had implications on the youth population as a whole, be it in direct or indirect ways. To achieve this objective, the study calculates summary statistics for a set of socio-economic and regional characteristics for both sub-samples. These statistics are presented in tables 3A/3B/3C and take into account the eight damage categories identified in the previous section. Differences in characteristics depicted between damaged individuals and the non-damaged control group help in examining any visible socio-economic patterns among the two sub-samples and sets potential causality or consequence relationships. Such relationships will be accounted for and affirmed when the study models the impact of the armed conflict's damages on education attendance. The study has tested for differences in means in an attempt to examine the statistical significance for such divergence. This section examines the distributional differences by wealth status first before tackling the regional dimension, followed by a brief description of household characteristics.

The war was experienced fairly randomly across the population in terms of socio-income characteristics that might be associated with human capital. In the absence of expenditure data, the study has opted to investigate information related to pre-war household income in order to determine the socio-economic or wealth background of the individuals that suffered from different types of damages compared to their non-damaged counterparts. The study uses the income brackets devised by the 2007 LCS to examine the distribution of damaged and non damaged individuals (refer to table 3A). Looking at the percentage distribution of individuals across the 12 identified brackets, no specific pattern can be depicted as to which sub-sample is wealthier (damaged vs. non-damaged). The means calculated do not show a consistent trend, being upward or downward, across all types of damage categories. Such outcome does not enable the study to determine whether those who sustained damages, be it physical or income related damages, come from poorer or wealthier families and backgrounds compared to non-damaged peers. From this perspective, such findings suggest that the damage incurred from the 2006 war was universal and that all Lebanese from different income and wealth classes suffered the consequences. Therefore the hostilities did not target any particular socio-income group making it an exogenous event from this standpoint.

Table 3A: Summary Statistics by Damage Status - Distribution by Income Status

(Monthly LBP 000)	<299	[300-399]	[400-499]	[500-599]	[600-699]	[700-799]	[800-899]	[900-999]	[1000-1099]	[1100-1399]	[1400-1999]	>2000
I. Direct Damages (Percentage)												
No Dwelling Damage	3.340	5.010	7.050	8.140	9.180	7.880	6.740	6.030	11.290	8.490	13.390	13.450
Dwelling Damage	1.470	4.380	7.730	8.950	13.550	9.060	7.990	6.280	12.160	8.100	10.370	9.940
No Transport Damage	2.620	4.840	7.420	8.440	11.070	8.350	7.170	6.060	11.410	8.350	12.210	12.070
Transport Damage	0.960	2.240	4.810	9.620	9.290	8.970	9.940	8.330	18.590	7.690	9.940	9.620
Income Asset Damage	2.690	5.050	7.520	8.170	11.190	8.770	7.140	5.980	10.740	8.880	12.500	11.370
No Income Asset Damage	1.910	3.200	6.400	10.070	10.070	6.330	7.900	6.940	16.340	5.510	10.210	15.110
No Death	2.570	4.750	7.330	8.450	11.030	8.390	7.280	6.150	11.610	8.330	12.100	12.010
Death	0.000	4.350	8.700	21.740	4.350	0.000	0.000	0.000	30.430	8.700	21.740	0.000
No Displaced	3.340	5.330	6.860	8.000	9.300	7.780	7.060	6.140	10.840	9.170	12.380	13.790
Displaced	1.710	4.120	7.840	9.010	12.880	9.010	7.490	6.130	12.550	7.400	11.850	10.000
II. Indirect Damages (Percentage)												
No Income of Job Cut	3.080	5.790	7.870	9.020	10.590	7.760	7.020	6.650	10.910	9.200	11.920	10.190
Income or Job Cut	1.730	3.090	6.480	7.630	11.680	9.340	7.660	5.320	12.840	6.940	12.460	14.830
No Employees with Income or Job Cut	2.490	4.980	7.290	8.550	11.380	8.150	7.180	6.010	11.800	8.530	11.920	11.700
Employees with Income or Job Cut	2.930	3.460	7.590	8.110	8.870	9.620	7.740	6.840	10.820	7.140	13.300	13.600
No Self Employed with Income or Job Cut	3.150	5.590	8.000	8.840	10.280	8.110	7.210	6.720	10.610	9.000	12.020	10.460
Self Employed with Income or Job Cut	1.140	2.730	5.730	7.630	12.750	8.990	7.400	4.740	14.160	6.720	12.370	15.640

The armed conflict had nevertheless a clear regional trend especially when it comes to physical and direct damages. Despite the fact that hostilities occurred over the entire Lebanese territory, the bombings and military operations were mainly concentrated in certain areas of the country. These regions are the districts of the South of Lebanon, Nabatiyeh, Parts of the Bekaa Valley and the Southern Suburbs of Beirut (which is part of the Mount Lebanon District). These regions are typically characterized by being strongholds of Hezbollah fighters and supporters. By looking at table 3B, it is noticeable that mean statistics for occurrence of direct damage, defined in the study as dwelling, transport, income generating assets, death and displacement, is much larger for those districts compared to the others with the difference being statistically significant. However the regional trend for direct damages is not upheld when examining loss of employment and income (the indirect damages). Statistics do not present sufficient evidence that the regions that suffered from intense hostilities were indeed regions that witnessed more lay-offs and reduction in business activity compared to other districts in the country. Therefore while direct damages appear to be regionally focuses, loss of employment and income is somehow universal across the country.

Table 3B: Summary Statistics by Damage Status - Regional Distribution

Type of Damage	Beirut	Mount Leb	North Leb	Bekaa	South Leb	Nabatieh	Total
I. Direct Damages (Percentage)							
No Dwelling Damage	10.2	25.5	27.9	22.1	11.7	2.6	100
Dwelling Damage	3.0	23.9	2.0	9.5	35.4	26.2	100
No Transport Damage	7.4	25.3	18.0	17.4	20.4	11.4	100
Transport Damage	3.1	10.8	1.9	5.9	45.7	32.7	100
Income Asset Damage	7.9	28.2	19.9	17.4	18.5	8.1	100
No Income Asset Damage	3.8	7.4	5.1	15.4	35.3	32.9	100
No Death	7.3	24.9	17.5	17.1	21.3	12.0	100
Death	0.0	10.7	0.0	14.3	10.7	64.3	100
No Displaced	8.8	13.7	31.4	24.9	16.4	4.8	100
Displaced	5.5	37.5	1.7	8.2	26.7	20.5	100
II. Indirect Damages (Percentage)							
No Income of Job Cut	6.7	22.6	19.6	16.0	21.7	13.3	100
Income or Job Cut	8.1	28.3	14.3	18.6	20.5	10.2	100
No Employees with Income or Job Cut	6.7	23.4	18.5	17.4	21.5	12.6	100
Employees with Income or Job Cut	10.5	32.9	12.1	15.3	19.9	9.4	100
No Self Employed with Income or Job Cut	7.2	24.5	19.0	15.6	21.3	12.4	100
Self Employed with Income or Job Cut	7.5	25.7	13.8	20.4	21.1	11.4	100

Looking at the distributional differences of some individual and household characteristics (table 3C), the statistics indicate that some differences exist in household demographics between those damaged and non-damaged. However no consistent patterns exist across the various damage indicators. Examining parents' education, differences appear to be statistically significant among the indirect damage sub-samples. Among other factors one possible interpretation of such outcome is that firms under distress, as a result of severe post-war slowdown in economic activity, tend to lay off unskilled workers with less productive capacities. This situation becomes more accentuated in service oriented economies like Lebanon where the demand for labor favors high skilled workers, while blue collar jobs are dominated by immigrant labor. Since education attainment could reflect acquired skills, the results obtained can signal that parents with lower education and therefore lower productivity were more prone to losing their jobs and getting fired following the end of the 2006 war compared to parents with higher education.

Table 3C: Summary Statistics by Damage Status - Household Composition and Parent's Education

Type of Damage	Age	HH Size	Number of children less than 5 in HH	Number of adults in HH	Number of elderly in HH	Father education	Mother education
II. Direct Damages							
Individual with No Damaged Dwelling	14.158	6.348	0.433	3.343	0.109	4.159	4.203
Individual with Damaged Dwelling	14.295	6.287	0.382	3.336	0.114	4.162	4.241
<i>Difference in Means Test (Prob Value)</i>	0.171	0.137	0.000	0.836	0.514	0.943	0.313
Individual in Household with No Damage in transport Vehicle	14.208	6.322	0.413	3.340	0.111	4.152	4.206
Individual in Household with Damage in transport Vehicle	14.364	6.377	0.395	3.349	0.096	4.389	4.568
<i>Difference in Means Test (Prob Value)</i>	0.563	0.627	0.640	0.921	0.447	0.027	0.001
Individual in Household with No Damage in Income Generating Assets	14.145	6.272	0.422	3.290	0.108	4.162	4.250
Individual in Household with Damage in Income Generating Assets	14.571	6.593	0.363	3.604	0.124	4.151	4.051
<i>Difference in Means Test (Prob Value)</i>	0.001	0.000	0.002	0.000	0.124	0.831	0.000
Individual in Household with No Dead Members	14.209	6.320	0.413	3.338	0.111	4.164	4.220
Individual in Household with Dead Members	15.607	7.607	0.321	4.250	0.000	2.821	3.643
<i>Difference in Means Test (Prob Value)</i>	0.122	0.001	0.480	0.002	0.104	0.000	0.096
Individual Not Displaced	14.283	6.490	0.423	3.425	0.124	4.155	4.174
Individual Displaced	14.134	6.135	0.400	3.244	0.096	4.166	4.269
<i>Difference in Means Test (Prob Value)</i>	0.130	0.000	0.096	0.000	0.000	0.776	0.011
II. Indirect Damages							
Individual in Household that has no members that suffered from loss of job or cut in income due to war	14.124	6.175	0.425	3.213	0.111	4.276	4.302
Individual in Household that has members that suffered from loss of job or cut in income due to war	14.352	6.556	0.393	3.539	0.111	3.980	4.087
<i>Difference in Means Test (Prob Value)</i>	0.023	0.033	0.022	0.000	0.963	0.000	0.000
Individual in Household that has no employed members who lost their job or cut in wage due to war	14.105	6.267	0.427	3.261	0.107	4.252	4.295
Individual in Household that has employed members who lost their job or cut in wage due to war	14.814	6.640	0.329	3.783	0.131	3.649	3.789
<i>Difference in Means Test (Prob Value)</i>	0.000	0.000	0.000	0.000	0.022	0.000	0.000
Individual in Household that has no self-employed members who lost their job or cut in wage due to war	14.176	6.216	0.416	3.263	0.111	4.184	4.228
Individual in Household that has self-employed members who lost their job or cut in wage due to war	14.301	6.578	0.403	3.523	0.109	4.104	4.196
<i>Difference in Means Test (Prob Value)</i>	0.243	0.000	0.393	0.000	0.807	0.060	0.442

Summary statistics indicate that there is a regional pattern for the conflict and that the damages sustained, in particular the direct ones, are higher in districts where the fighting and bombing was concentrated. This is accounted for in the empirical model, described in the next section, by resorting to a regional control variable that depicts the occurrence of military interventions.

We argue that conflict is largely exogenous to household behavior and characteristics in this context because the conflict in question is an inter-state conflict, not a civil war. It is unlikely that Israeli action would be determined by household decisions surrounding schooling decisions or by household characteristics, observed or not. In reality, the overall economy of Lebanon suffered. The suffering was accentuated as a result of the country's one month total siege following the cessation of military action, pushing firms across the country to downsize their operations and lay-off some of their employees. All of the above implies that much of the damages, from any type, were sustained by the overall population. This dismisses claims of potential endogeneity of the damage variables with education attendance.

The linkage between the rate of education returns and armed conflicts is potentially another source of endogeneity. This can occur as a result of reverse causality. The literature on conflict points to the fact that education returns start dropping significantly as wars intensify¹⁰⁷, lengthen, and spread across larger geographical areas. In such cases, economic activity deteriorates and unemployment surges. As peace and recovery prospects weaken, education returns decline further; pushing students to drop out of schools and university. This creates a vicious cycle that feeds the conflict. Indeed, as education returns keeps declining, uneducated populations and mainly uneducated youth will engage further in armed activities and will therefore be exploited to prolong the war and inflict more damages. Hence the reverse causality that potentially leads to endogeneity. This is less likely to occur though in the case of the Lebanese conflict in hand. Indeed, the literature puts the linkage between education returns and conflicts in a context of civil wars and domestic violence and not in a context of a border conflict. Also the duration of the conflict presented in this chapter makes such linkage weaker. Hence, this is an additional

¹⁰⁷ Refer to the works such as Marouche (2008), Shemyakina (2006), and the literature review of Justino (2009).

argument to dismiss the existence of potential endogeneity between education and the damage variables in the empirical model.

3.7 - Attendance Model and Damage Impact

3.7.1 - Identification Strategy and Description of Covariates Used

The study uses an augmented human capital model and specifies school attendance as the outcome measure for the model. As mentioned previously, this model will focus mainly on examining the impact of different types of damage incurred during the 2006 war on school attendance. To do so, the study resorts to a probit model which takes the following form:

$$Ed^*_{ij} = \alpha_0 + \alpha_1 H_{ij} + \alpha_2 Pa_{ij} + \alpha_3 He_j + \alpha_4 D_{ijq} + \alpha_5 I_j + u_{ij} \quad (1)$$

In equation (1) Ed^*_{ij} captures the propensity for education attendance by the i^{th} individual in the j^{th} household and is a latent dependant variable. The dichotomous variable that provides the observable counterpart to this latent dependant variable is Ed_{ij} and takes the form of a binary variable for whether individual i from household j is currently enrolled in school or university. This is indeed a dichotomous observed variable as opposed to the unobserved decision function expressed in equation (1) above. On the right-hand side of the equation, H_{ij} is a vector of household composition and gender of the individual, Pa_i is a vector capturing the level of education of both parents in the household, He_j is a vector reflecting the economic activity of the head of the household, I_j is the logarithm of pre-war household income used to control for wealth status, and D_{ij} is a binary covariate capturing the individual i who is member of a household j that has suffered from the one specific type of damage q during the 2006 war. The eight different damage covariates, defined earlier, are not used simultaneously in the empirical model, but are introduced one at a time in equation (1). Doing so enables the study to examine the impact of each type of damage separately and therefore capture the various features of the impact of the 2006 July war on education attendance in Lebanon. The term u_{ij} represents the error term that is

standard normally distributed. By using different damage variables, the human capital model is augmented beyond traditional models used in the literature. The probit model under scrutiny is more formally written in the following way:

$$\Pr(Ed_{ij} = 1 | H_{ij}, Pa_{ij}, He_j, D_{ijq}, I_j) = \Phi(\alpha_0 + \alpha_0 + \alpha_1 H_{ij} + \alpha_2 Pa_{ij} + \alpha_3 He_j + \alpha_4 D_{ijq} + \alpha_5 I_j + u_{ij}) \quad (2)$$

where: $Ed_{ij} = 1$ if $Ed_{ij}^* > 0$, and $Ed_{ij} = 0$ otherwise, and $\Phi(.)$ is the cumulative distribution function operator for the standard normal distribution. As indicated previously, damages incurred in the 2006 war are potentially expected to have a stronger impact for individual attendance in higher education levels¹⁰⁸. This is particularly the case since Lebanon is an upper middle income country that applies strict compulsory primary education laws. Hence the probit model described in equations (1) and (2) allows the effect exerted by damages incurred on school and university attendance for youth, defined here by the sample of individuals aged [15-22], to be obtained.

Looking at equation (2), the human capital model for school attendance specified in this study is augmented using various sets of vectors of independent variables. The broadness in the nature of these covariates enables the research to better isolate the impact of war damages on schooling attendance and therefore control for other factors. From this perspective, four vectors of control variables have been selected. The vector H_{ij} is composed of covariates reflecting the dependency ratio (i.e. the share of children aged less than 12 and elderly individuals aged above 65) and the number of adults in each household. Education choices are often a collective decision in the family with spending allocations including those on human capital directly linked to the needs of the family and its members. This stems from the model introduced by Becker (1975), which assumes that households maximize their utility subject to budget constraints and that the maximized utility value could be observed from household choices; an assumption which is endorsed by this study's empirical model. Under this framework, household composition becomes an influential factor that affects school attendance directly and therefore should be

¹⁰⁸ Refer to figures 1 to 9 where the gap between individuals of damaged households appears to be more accentuated than their non-damaged counterparts for the individuals aged 15 to 22 years; an age group that under ceteris paribus conditions corresponds to secondary education and university (refer to section 3.6.1 for more detailed explanation).

controlled for. Household composition also controls for the competition over resources as further income is allocated to more vulnerable members such as children less than 12 years of age, where education is mandatory, or elderly who need more medical and personal attention. Vector H_{ij} also controls for the gender of the individual in question. The study argues that under household budget constraints, the choices for enrollment of members aged [15-22] years are dependent on the gender of the individual in question as males and females have different returns from education.

Controlling for parental education (vector Pa_{ij}) enables the study to control for network, influence and even wealth effects; and could also be used to proxy unobserved ability of the child. From this perspective, the research has constructed covariates reflecting education attainment, more precisely the highest education degree successfully completed, for both the father and the mother in each household. The study argues that it is expected that parents with higher education influence positively their children's schooling, regardless of the damage status incurred. Furthermore, mothers' and fathers' education status might play different roles. The work of Thomas (1990, 1994) indicate that educated mothers have increased bargaining power in the household and therefore exert influence over the allocation of resources towards children and their human capital more than their husbands usually do. In addition, maternal education could also proxy the wealth background of households especially if female education is perceived as a luxury commodity. Furthermore, Holmes (2003) argues that a parent's educational background also serves as a predictor of the parents' market earnings potential that could be invested in the children's schooling. On another note and looking at father's educational background, human capital and labor earning models, Al Samarrai and Reilly (2008) argue that highly educated fathers can exploit informal network to secure better paid jobs for their children. The data available in the 2007 LCS does not allow for controlling for the ability of individuals. This constitutes a shortcoming of the dataset since a failure to control for innate ability might bias estimates upward. Indeed, ability is assumed to be positively correlated with the level of education. This being said, the only information available in this survey to proxy innate ability in this study is parental schooling background as captured by a mother's and father's highest acquired education degree. Such a proxy has

previously been used in the literature, such as that mentioned in the Al Samarrai and Reilly (2008) paper.

The third vector of control covariates (vector He_j) contains the economic activity status of the household head. More precisely, this controls for whether the household head is unemployed, inactive, has a seasonable job, and whether or not the head is a public sector employee. The rationale behind controlling for the head of household stems from the fact that the head is often the individual whose weight in household decisions is the highest. Therefore the allocation of resources towards different items, including investment in human capital along with other decisions related to education, can depend on the characteristics of the family head, especially his economic activity status. Indeed the family income is positively correlated to the income of the head of the household and therefore whether the latter is unemployed or not. The impact of such employment status becomes more accentuated when family income is further constrained or in situations such as armed conflicts or post-conflict times, as in the case of this study. Additionally, the model controls for whether the head is a female. As economic literature argues, females with larger weight in family decisions will resort to choices that favor further human capital formation for family members when compared to their men counterparts.

The fourth vector of covariates (vector I_j) controls for the wealth status of households. Education behavior is largely affected by the wealth status of households. Wealthier families have usually sufficient means to send their children to school unlike their poorer counterparts. Therefore, it is imperative to control for the positive correlation between wealth status and education outcome. In the absence of data collected on expenditure, the study uses pre-war household income as a measure to proxy wealth. Despite the issues of non-reporting and potential cyclicity, income measures remain a better indicator for wealth when compared to household asset ownership, especially that the 2007 LCS does not provide information on pre-war status of those assets. Post-conflict asset ownership becomes more cyclical than pre-conflict household income, and highly correlated with the damage indicators especially those related to physical damage. Therefore, they are not used in this empirical model to control for wealth. Instead the log of per capita household pre-war income is used. Additionally, by resorting to pre-conflict income information, the study opts to avoid a potential endogeneity problem between education attendance from

one hand and the suggested wealth proxy from the other. Indeed, endogeneity may arise as unobserved characteristics can affect the current status of income (post-conflict household income) and consequently impact the ability or willingness of households to send their children to school or university. If this occurs, similarly to a problem of omitted variables, the empirical model could yield a biased estimate for the household income covariate's coefficient. Having described the control covariates, the chapter moves to discuss the empirical findings.

3.7.2 - Empirical Results

To depict the impact of the 2006 war damages on education attendance of youth in Lebanon, the human capital model of equations (1) and (2) is estimated via a probit estimation technique on two sub-samples separately: individuals aged [15-17] and individuals aged [18-22]. These age brackets correspond to individuals that under normal circumstances should be at high school and university level respectively. The divide is adopted as it is believed that the impact may differ between age categories due to factors related to returns on education at different schooling levels, and accessibility to the labor market. As noted previously, the study identifies eight damage variables which it classifies as direct and indirect. The empirical model is estimated taking into account each damage variable separately. The empirical findings of the education attendance model over the two age categories and for each damage variable are presented in tables 4 and 5. These findings are thoroughly discussed below.

Although the estimated coefficients for damage variables appear to be negative across all the identified damage categories and for the two age groups [15-17] and [18-24], they are not all statistically significant. Looking first at the direct damages - dwelling, assets, transport vehicles, death and displacement – the negative impact becomes less apparent as no statistically significant coefficients are estimated for all of the five specifications. Such empirical findings are interesting as they suggest that, controlling for all other factors, physical damages incurred and temporary displacement that occurred throughout the 2006 conflict did not influence a household's decision to send their members to schools or universities once the schooling system resumed¹⁰⁹. This might seem

¹⁰⁹ As mentioned previously, the war occurred during school summer break and no official decision was taken to delay the academic year.

in conflict with some other empirical work in the literature. However, it could be interpreted through looking at the findings from two separate perspectives. First the analysis is conducted over the short term, around six months after the end of the conflict, and therefore any impact will probably not be depicted in such a short time span. A household that have sustained direct damages will most likely refrain from taking decisions that have future implications on family members, such as no enrollment in schooling, until there is further clarity on the socio-economic and political prospects and on the status of any future recurrence of the conflict. The second perspective would be the reassurance received by individuals and households regarding compensation of their losses. Individuals that suffered from physical damages were compensated after the war especially those with dwelling damages. Many pledges were made shortly after the cease fire by the government, political parties, civil society and the donor community to assist those who have incurred direct damages. The quickness and firmness of these pledges might have reassured concerned households over the receipt of compensation pushing them to maintain the enrollment of their members in the schooling system at least for the first academic year that followed the conflict. Additionally, the government, with significant support from donors, has been very vigilant in avoiding any shortage on the supply side of education, especially in the origin areas of the displaced. Indeed, the government was quick to utilize alternative government buildings, set up temporary classroom structures to replace the depleted stock of schools, and redirect students towards other unaffected public schools within the same geographical areas. The successful measures were able to absorb the large majority of the returning students within the first academic year after the war. This is potentially responsible for the observed statistical insignificance of the coefficient of the displaced covariate.

On the other hand, the impact of indirect damages (loss of employment or income for both employees and the self employed) on education attendance seems to be statistically significant. Results from tables 4 and 5 reveal a negative correlation between loss of income or employment as a result of the 2006 war and education attendance consistent across all age groups and for both employees and the self-employed. However, as tables 4 and 5 highlight, these results are statistically significant for the employees' category rather than the self-employed. Calculated marginal effects reveal that an individual aged [15-17]

coming from a household with at least one employed member who has suffered from loss of job or cut in wage due to the war will have on average 13.2 percentage points less probability of attending school, keeping all other factors constant. The average decrease in attendance probability for a similar individual aged [18-24] is estimated at 9.8 percentage point, *ceteris paribus*. Loss of employment and income puts further pressure on household budget constraints pushing these households to reduce their investments in human capital and therefore force some members to drop out of the schooling system. The magnitude of the coefficients estimated indicates that individuals aged [18-24], who are of university age, are more prone to be the first to drop out from the educational system and access the labor force rather than members of younger age. Additionally, the uncertainty factor generated by cuts in wages or employment has a detrimental effect on education attendance. Losing an income stream will push households to be more risk averse and direct their spending away from education. It should be noted that the difference in statistical significance observed between employees and self employed is most probably due to wealth factors and the speed of recuperation. Households with self employed individuals are wealthier on average than households with employees and could therefore sustain same living standards, including human capital formation, by counting on potentially larger savings. Following armed conflicts, labor markets for the employed become usually more inelastic with wages and employment taking some time to recuperate to pre-conflict levels; while the self-employed individuals are more prone to resume work faster or find opportunities abroad using some of their capital in areas with higher returns. Linking both sets of empirical findings, the study suggests that the channel of impact of the 2006 war on the education of young Lebanese came mainly through the losses in wages and employment (indirect channel) rather than through direct effects such as physical losses, displacement or even death in family members. Such results have important policy implications in terms of designing government policy interventions in the aftermath of an armed conflict or a war. The Lebanese empirical case shows that in the short run - in the first year following the conflict - households' decision making process especially that related to human capital formation, is very much linked to the idea of certainty in income streams and job prospects rather than the losses in property or direct damages. In a country that has been frequently in armed conflicts and where donors - especially Arabs in this case

- have always stepped in to compensate physical damages, individuals are more concerned about meeting their immediate needs through conserving their jobs and their income streams. By doing so, they seek to maintain pre-conflict welfare or consumption levels as much as possible, which could mean reprioritizing decisions away from education especially at higher levels and for older members. From this perspective government interventions should aim at mitigating uncertainty through different program such as targeted cash programs or employment schemes for nationals, especially in the reconstruction phase. Most importantly and in addition to relief and reconstruction work, the government should design a more macro growth strategy that enables fast tracking of economic activity recovery and therefore tackling issues of employment creation so as to mitigate the impact of the war. The debate over the type of post-conflict policy measures to be adopted is very live in economic literature and no consensuses have been reached. However, and to better design such policies, it is imperative to examine the impact of the conflict on households and individuals from a micro perspective so as to determine the correct channels of this impact. Understanding these channels becomes therefore essential to design more effective macro policies.

Table 4: Probit Analysis for the Impact of Damages on Education Attendance [15-17]

Education Attendance	IV - Probit (Direct Damages)					Probit (Indirect Damages)		
	1	2	3	4	5	6	7	8
Individual is a Female	0.346 *	0.340 *	0.339 *	0.339 *	0.343 *	0.346 *	0.346 *	0.338 *
Dependency Ratio	0.802	0.785	0.768	0.770	0.762	0.741	0.741	0.721
Number of adults in Household	0.065	0.066	0.066	0.065	0.065	0.072	0.072	0.061
Father education	0.125 *	0.123 *	0.122 *	0.123 *	0.124 *	0.109 *	0.109 *	0.124 *
Mother education	0.210 *	0.207 *	0.207 *	0.208 *	0.209 *	0.208 *	0.208 *	0.206 *
Female Head of Household	0.192	0.182	0.189	0.187	0.199	0.035	0.035	0.210
Unemployed and Inactive Head	0.134	0.128	0.124	0.123	0.130	0.299	0.299 ***	0.118
Household Head with seasonal job	-0.211	-0.192	-0.228	-0.229	-0.236	-0.248	-0.248	-0.249
Household Head in public sector	0.250 ***	0.253 ***	0.265	0.262 **	0.255 ***	0.203	0.203	0.293 **
Pre-War Household Per Capita Income	0.255 *	0.253 *	0.250 *	0.250 **	0.254 *	0.278 *	0.278 *	0.240 *
Individual with Damaged Dwelling	-0.151							
Individual in HH with Damage in Income Generating Assets		-0.089						
Individual in HH with Damage in transport Vehicle			-0.132					
Individual in HH with Dead Members				0.024				
Displaced Individual					-0.104			
Individual in HH that has individuals that suffered from loss of job or cut in income due to war						-0.128		
Individual in HH that has employed members who have lost their job or cut in wage due to war							-0.513 *	
Individual in HH that has self employed Members who have lost their job or cut in wage due to war								0.105
Constant	-2.440 *	-2.448 *	-2.442 *	-2.440 *	-2.435 *	-2.480 *	-2.456 *	-2.401 *
Number of Observations	1732	1732	1732	1732	1732	1732	1732	1732
Pseudo R2	0.175	0.174	0.170	0.174	0.175	0.175	0.189	0.174
Wald Chi-Square	224	219	224	220	219	224	242	221
Significance Level (Probability value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Log pseudolikelihood	-678	-679	-682	-679	-678	-678	-666	-678

Significance level: *1%, **5%, ***10%

Note 1: Huber-White robust standard errors were used in the model. Standard Errors were clustered at the household level.

Note 2: The model was estimated using population weights constructed by the Lebanese Central Administration of Statistics.

Note 3: Results of "death in household" should be considered with caution due to small cell size.

Only 8 individuals reported death in the household which is equivalent to 0.4 percent of the sample [15-17].

Note 4: Individuals in households that did not report any income were dropped from the analysis.

Statistics (available upon request) show that they are randomly distributed.

Table 5: Probit Analysis for the Impact of Damages on Education Attendance [18-22]

Education Attendance	IV - Probit (Direct Damages)					Probit (Indirect Damages)		
	1	2	3	4	5	6	7	8
Individual is a Female	0.344 *	0.345 *	0.344 *	0.345 *	0.344 *	0.346 *	0.344 *	0.345 *
Dependency Ratio	-0.403 *	-0.423 *	-0.438 *	-0.422 *	-0.422 *	-0.464 *	-0.480 *	-0.421 *
Number of adults in Household	-0.025 **	-0.024 ***	-0.023 ***	-0.024 ***	-0.024 **	-0.020 ***	-0.015 ***	-0.024 **
Father education	0.181 *	0.182 *	0.182 *	0.182 *	0.181 *	0.179 *	0.176 *	0.182 *
Mother education	0.081 *	0.080 *	0.082 *	0.080 *	0.081 *	0.081 *	0.083 *	0.080 *
Female Head of Household	0.692 **	0.695 **	0.700 **	0.696 **	0.694 **	0.663 **	0.628 **	0.697 *
Unemployed and Inactive Head	-0.119	-0.118	-0.116	-0.118	-0.118	-0.111	-0.049 *	-0.118
Household Head with seasonal job	0.043	0.055	0.065	0.051	0.050	0.062	0.047 *	0.050
Household Head in public sector	0.188 ***	0.183	0.180	0.184 ***	0.184 ***	0.144	0.153	0.186 ***
Pre-War Household Per Capita Income	0.054 *	0.051 *	0.051 *	0.051 *	0.051 *	0.061 *	0.065 *	0.050 *
Individual with Damaged Dwelling	-0.057							
Individual in HH with Damage in Income Generating Assets		-0.011						
Individual in HH with Damage in transport Vehicle			-0.381					
Individual in HH with Dead Members				-0.152				
Displaced Individual					-0.011			
Individual in HH that has individuals that suffered from loss of job or cut in income due to war						-0.097		
Individual in HH that has employed members who have lost their job or cut in wage due to war							-0.245 **	
Individual in HH that has self employed Members who have lost their job or cut in wage due to war								0.006
Constant	-1.745 *	-1.721 *	-1.730 *	-1.721 *	-1.727 *	-1.745 *	-1.778 *	-1.720 *
Number of Observations	2621	2621	2621	2621	2621	2621	2621	2621
Pseudo R2	0.092	0.092	0.093	0.098	0.092	0.093	0.095	0.092
Wald Chi-Square	180	178	177	185	178	179	178	178
Significance Level (Probability value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Log pseudolikelihood	-1642	-1643	-1640	-1632	-1643	-1641	-1636	-1643

Significance level: * 1%, **5%, ***10%

Note 1: Huber-White robust standard errors were used in the model. Standard Errors were clustered at the household level.

Note 2: The model was estimated using population weights constructed by the Jordanian Department of Statistics.

Note 3: Results of "death in household" should be considered with caution due to small cell size.

Only 10 individuals reported death in the household which is equivalent to 0.35 percent of the sample [18-22].

Statistics (available upon request) show that they are randomly distributed.

Note 4: Individuals in households that did not report any income were dropped from the analysis.

Statistics (available upon request) show that they are randomly distributed.

Looking at the other determinants of school attendance defined in equations (1) and (2), empirical estimates suggest that household demographics along with parents' education level and the economic activity of the household head all have significant implications on the human capital model under scrutiny. Results highlighted in tables 4 and 5 suggest that

empirical findings for these control vectors are consistent across the eight damage indicators. For brevity, the chapter will not dwell extensively on all of these findings especially results that have already been interpreted in the previous chapters¹¹⁰.

One interesting result is the statistically significant positive coefficient depicted for gender of individuals across all sub-samples. Being a woman increases the probability of attending school in Lebanon, *ceteris paribus*. One possible explanation is related to gender and labor market access. Women in Lebanon have typically less access to the labor market or to migration compared to men and are therefore more prone to remain at school and try to obtain higher levels of education¹¹¹. Additionally, they tend to outperform men at all levels of schooling and hence are less likely to repeat classes or drop-out. In a post war context and under income constraints, households maximize returns by sending males to the labor market while keeping more able girls in school/university. The above findings are in line with education statistics for Lebanon where the ratio of female to male enrollment in 2007 for secondary and tertiary education was 112 and 120, respectively¹¹².

Estimated coefficients for the education level of both parents are positive and statistically significant across all damage categories. Educated parents have a better perception of the importance of acquiring an education and are therefore more prone to invest further in other members' human capital beyond compulsory education. Additionally, parents with higher education attainment are better positioned to provide an increased education quality especially that they have further capabilities to assist and supervise their children's schooling work.

By looking at the correlation between economic activity status of the household head and individual's education attendance, the study captures the linkage between income uncertainty, household risk perceptions and household education decisions. Keeping all other factors constant, having a household head that is unemployed, inactive or engaged solely in a seasonal economic activity reduces the probability of individuals from that household in attending school or university. This result reflects the importance of

¹¹⁰ Readers could refer to chapters 1 and 2 for a thorough discussion on the impact of parents' education, household demographics and wealth on education attendance as they are similar to the case of Lebanon (chapter 3).

¹¹¹ According to the World Bank World Development indicators 2011, female unemployment in Lebanon is estimated at 10.1 percent compared to 8.6 percent for males (2007 latest estimates).

¹¹² World Bank World Development Indicators 2011. Latest statistics are available for 2009 were the ratios were estimated at respectively 111 and 119.

observing the frequency of the household income stream and its level. In the case of an intermittent or uncertain income flow, as depicted in the empirical model through unemployment of the head or his engagement in a seasonal economic activity and therefore a seasonal income stream, households may refrain from investments in general including investments in human capital. This comes in favor of spending on more basic consumption or on increasing family savings if possible. However in the case of a more permanent flow of income, households are increasingly encouraged to invest in human capital, an investment whose returns are commonly reaped on the longer run. From this perspective, referring to the results of household heads who are public sector employees becomes noteworthy. Public sector employees are a group whose income is inelastic, less volatile and therefore less susceptible to shocks such as armed conflicts when compared to other groups of the society. Following the 2006 war in Lebanon, no wage cuts or dismissals were depicted among civil servants. The government continued paying the salaries and allowances of its employees on time despite the damages incurred to the economy and even during the period of the conflict itself. Hence having a household head who is a public sector employee increases the probability of attending schooling. This result is consistent across all damage categories and for both age brackets. Such outcome endorses previous result findings. Households that are less vulnerable to income shocks, especially those with certain income flows such as public sector employees, will be less affected by armed conflicts in terms of school enrolment of their members.

The level of income, in addition to its certainty, is also an important feature in human capital formation that should not be overlooked. The empirical estimates for the coefficients of per capita income indicate that the literature's commonly observed pattern is upheld with wealth being positively correlated to education attendance. Individuals from wealthier families are more prone to remain at school or university since typically wealthier households have a less constrained budget dedicated for investment in education than their poorer peers.

3.8 – Conclusion

The study has used the 2007 LCS in Lebanon to examine the impact of the damage sustained in the 2006 war on the education attendance of youth. The study resorted to an

augmented human capital model estimated via a probit estimation technique and looked at the implications of damage that originated from different sources. Eight damage variables were defined in total, each used separately as a regressor in the model, capturing in a well rounded way the losses that can be incurred during armed conflicts. These damage variables were grouped into two broad categories: direct damages reflecting physical losses, human casualties and displacement; and indirect damages capturing losses in income, wages and employment for different members of the household as a result of the war. The study investigated the assumption that the nature of the damage is correlated to both the extent and the way to which the damage affects education since different channels of such impact come into play. Moreover, the sample of interest in this study are youth defined as individuals from the age groupings [15-17] and [18-22]. Individuals at these age brackets, who are of high school or university age, are more prone to drop out of the schooling system as a result of external shocks, such as armed conflicts, and try accessing the labor market or migrate in support of damaged households. In contrast to younger members of households, higher labor returns and lower legal barriers for labor market entry or travel are observed for individuals aged [15-22] making it easier to dropout from the education system. The chapter focused on youth as the main driver of future economic growth. By observing the extent to which war was disruptive to human capital formation in the country particularly to this group of society, the study draws indirectly a picture of the potential long run implications of the 2006 war on growth and welfare of Lebanon, especially in a country whose human capital is considered as the main asset in the absence of natural resources.

Empirical findings suggest that the 2006 war had a short term impact on education attendance in Lebanon particularly for individuals whose household suffered from indirect damages related to wages and employment loss. Despite the fact that all damage categories indicated a negative effect on education attendance across both age groups; only indirect damages, in particular the variable capturing individuals in households with employees who suffered from loss in wages or employment, was the one where a statistically significant coefficient was observed. Moreover, the magnitude of the negative impact was more acute for individuals aged [18-22] compared to individuals aged [15-17]. These results reveal that physical damage, human casualties and displacement were not

apparently contributing factors to educational dropouts in the aftermath of the war. Households seem not to take these types of damage into consideration when deciding on the immediate education of their members following armed conflict. Such findings are mostly related to the idea that government compensation, political parties' assistance and donors' contributions have targeted extensively those households, especially those who sustained dwelling damages and those who were displaced. Immediately after the cease fire, a strong and credible signal was sent by all stakeholders (including political parties and donors) that funds will be allocated to compensate the physical and human losses of individuals and households. The public believed this message, which in its turn managed to reduce the negative implications on education with households deciding on maintaining their commitments to human capital accumulation. However, the same behavior is not upheld when examining individuals in households that sustained indirect damages. Wages and job cuts seem to be the main channel through which the 2006 war has negatively affected education attendance in Lebanon. Two factors are intertwined in this case. First, the additional constraints exerted by such type of damage on the household budget, and therefore the reallocation of spending away from education towards basic consumption. This is why the impact on the self-employed was statistically insignificant especially that those households are often wealthier with a higher probability to possess some capital that enables them to recover faster as compared to households with employees who suffered from income and employment cuts. Second, the uncertainty factor also negatively influences household decisions with respect to education. Employees are often risk-averse and more dependent on monthly salaries and therefore decisions taken by those households are more of a shorter term nature. Cuts sustained as a result of the war increase the feeling of uncertainty pushing those households to take short-sighted decisions and asking young members to drop out of the educational system and access the labor force be it domestically or abroad. Indeed, the mismatch between the short term nature of the decision making process for households with employees and the uncertainty created by loss of wages and employment as a result of the war translates into cuts on education, an investment considered as having a longer term return. This occurs even if economic recovery, which eventually creates employment and leads to recuperation in pre-crisis wage levels, is expected in the medium or long term.

Such findings have important policy implications especially in that government, political parties and donors seemed to have failed in providing reassurance for this category of damaged individuals and households. The results above open the door for policy discussion on the type of intervention measures to be adopted in the aftermath of a war. Results imply that targeting individuals and households with direct damages may not be the only measure to mitigate the negative impact of the war especially on education. The government needs to have a holistic view with the main policy objectives set to resume economic activity and growth so as to alleviate the impact of the war on the population at large. Therefore, policy makers and other stakeholders should be careful in designing interventions at the end of a war, of course beside the immediate emergency relief type of operations, especially when it comes to cash transfers and in-kind support programs. Those programs might not necessarily meet their desired objectives due to several reasons including waste, corruption, inefficiencies, miss-targeting or simply that the community under scrutiny is in no need for such assistance. Therefore efforts should be redirected towards policy actions that focus on accelerating economic activity and employment. The government, with the support of donors, should think of interventions targeting the supply side of labor along the lines of employment programs or engaging locals in the reconstruction phase as to provide them with jobs and income streams. Measures aiming at enhancing the business environment and private sector led growth could also have some significant effects in terms of income and employment. Facilitating access to credit for the private sector, especially Small and Medium Enterprises (SMEs), following armed conflicts could be very helpful in supporting firm-level activities and investments and therefore limiting job cuttings and worker layoffs. Enhancing credit following wars is not an easy task and would require a combination of governmental support through guarantee or credit subsidies schemes, and a Central Bank monetary easing policy that is conducive to lowering interest rates without feeding inflationary pressures that could be harmful to the overall economy and the welfare of the population. Hence macroeconomic policies, both fiscal and monetary, also play a role in mitigating the impact of war. Addressing macroeconomic vulnerabilities following armed conflicts becomes very important to maintain investors' confidence and sustain levels of growth favorable to a faster recovery. Post-conflict policy discussion is a very extensive subject

that needs to be thought through meticulously, an issue which this study leaves for further exploration in potential future work. Understanding the nature of the damage sustained in wars and the channels through which it impact households, similar to what this study did, eliminates misconceptions surrounding the implications of direct versus indirect damages and provide policy-makers with tools to devise efficient recovery strategies with an utmost effect on the welfare of the population.

Conclusion

This thesis has examined the effect of migrant remittances and armed conflict on human capital formation of youth in respectively Jordan and Lebanon. These countries are two middle income countries from the Middle East. In both cases, results reveal statistically significant impacts on education attendance and attainment of youth.

The first essay shows that migrant remittances positively contribute to the human capital formation of Jordanian youth by increasing their probability of staying in the schooling system and enabling them to pursue higher levels of education such as university. These findings are in line with some of the recent literature that argued for a positive impact of migration and remittances on building human capital, works such as Calderon et al (2006) in Ecuador, Acosta (2006) in Salvador and Hanson and Woodruff (2007) in Mexico. The paper stands out however in arguing for the exogeneity of the remittances impact in the case of Jordan. Unlike works such as Lopez-Cordova (2005) and McKenzie and Rappoport (2006), the essay observed that remittances receipt was not endogenous despite using valid instruments. While the literature mostly focused on the effects of migration and remittance on little children and minors, this chapter found statistically significant impact of remittance receipt on the education outcomes of specifically individuals aged [18-24]. The essay went further and revealed the existence of some gender discrepancies. While the positive impact of remittances on education attainment was depicted across gender, this was not the case with education attendance. In this latter case, statistical significance was only found for young men. The essay has argued that this discrepancy might arise as a result of gender inequality and societal pressure exerted on women, such as the need for marriage, and that curtails young girls' education in developing countries with conservative societies.

Pushing the analysis further, chapter 2 examined the impact of remittances on household education expenditures. Estimates from the Working-Lesser model indicated that private inflows encouraged remittance-receiving households to increase their spending allocations on education goods and services. Contrary to the results obtained in works such as Perwais (1980) in Pakistan, Lopez and Seligson (1991) in El-Salvador and Glystos (1993) in Greece who argued that remittances only sustained consumption levels and did not generate future returns, the study has suggested that these flows were actually helping to

increase household investments, in this case investments in human capital. This resonates with the other stream of the migration literature that defends the view of remittances freeing up resources for households to increase investments rather than fueling mere consumption, with all the positive implications such investments have on long term growth of the overall economy. These arguments find support in the works of economists like Alderman (1996) in Pakistan, Adams (2005) in Guatemala, and Taylor and Mora (2006) in Mexico. Findings of chapter 2 however suggest that although remittances increased household budget allocations for education, it did so at a diminishing rate compared to non-receivers. Results were found to hold more precisely for remittances received domestically from inside Jordan. Looking from a gender perspective, the essay takes the analysis further and inspects the behavior of households with different gendered head towards education. Findings suggest that the increase in human capital investment as a result of remittances was only statistically significant for male headed households. This interesting result comes despite arguments' from the intra-household bargaining literature on male preferences for investments in physical assets. Remittances are indeed pushing male headed households in Jordan to invest in human capital.

Finally, by examining the implications of the 2006 war on Lebanon, the third essay concludes that armed conflicts had a negative impact on education attendance of youth in the short run. This impact is nevertheless linked to the type of damage sustained by households. While losses in income, wage and employment reduced education attendance, other types such as displacement or sustaining physical or human damages seem not to have any statistically significant impact on human capital formation. Such findings mainly reflect both income constraints and increase in level of uncertainty created by cuts in wages and employment and consequently the mismatch between the short term nature of decisions taken by households who sustained such damages, and choices of investment in education with much longer term returns. The negative implications of the war on education are very much aligned with the literature on conflict. Nevertheless unlike many empirical works that look mainly at the implication of armed conflicts of human casualties (Akresh and De Walque 2008), displacement (Mooney and Colleen 2005) or child soldiering (Blattman 2006) on human capital from a long term perspective many years after the end of the conflict; this essay observes the impact of several types of damages

including income and employment, and observes household behavior towards education over the short run nearly a year after the war ended.

Two commonalities emerge from the three essays. First the impact of remittances and armed conflicts seem to primarily affect the human capital of young adults, who are supposedly at higher educational levels, and not younger children. This is sustained by the empirical results of the three chapters that found statistically significant impact coefficients for individuals aged above 18 and not their [15-17] peers. This could be related to the fact that the countries in question are upper middle income countries. Indeed, the access to basic and intermediate education levels is not necessarily a major problem in middle income countries especially those with small geographical surface like Jordan and Lebanon. This comes as a result of a reasonably acceptable distribution of education infrastructure across the territory and strict enforcement of compulsory education laws especially at lower schooling levels. However when examining young adults, and consequently higher levels of education, the issue moves away from being a question of access and becomes a question of returns to education and quality of education. Hence households are faced with a choice between allowing young members to pursue higher levels of education, or sending them into the job market, be it the domestic or external one and therefore migrate. From this perspective, remittances or conflicts gain more relevance as they influence, through various channels of impact, household decisions and become a contributing factor in weighing one choice over the other. As we have seen in this thesis, these channels of impact can be negative such as the uncertainty created by income and employment losses in times of armed conflicts or the effect of migration network that lower traveling costs and therefore stimulates the young to quit school and migrate. Or they can be positive such as the role of migration in changing household preference and consequently inciting them to acquire further education. In both cases, the thesis found that migrant remittances and armed conflicts have implications on human capital formation of youth in these countries and consequently on their longer term economic growth.

Second, the thesis reveals the vulnerability of household investments in education to income shocks and income variations in middle income countries. Indeed, remittance receipt positively affects education attendance and attainment as it alleviates income constraints, and shocks to income that arise through armed conflict (decrease in wage or

employment loss) also seem to affect education much more than other types of damage do. Moreover, such vulnerability was found to be very much driven by gender considerations. The household's decision to invest in male education was found to differ from the decision to invest in female human capital. The choice of investing in male education is probably linked to the access and earnings from the labor market. Since boys are expected to work in the aftermath of a potential conflict or are expected to migrate, the investment in their education is seen as more of a priority than girls. Females on the other hand have to overcome several community and societal pressures, such as marriage and domestic work expectations, which strongly influenced households' decision to invest in their education. The situation is also exacerbated when the returns from education investment in females education is considered lower than males'. This opens the door for policy discussions on designing government interventions on lowering the barriers to entry into the labor market for both genders equally; and considering thoroughly gender differentials that arise in coping strategies as a result of shocks, especially income related ones, that affect human capital.

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