

# The Role of International Migration in Poverty Alleviation

*Evidence from Bangladesh*

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*Evidence from Bangladesh*

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# Abstract

The movement of labor resources from one country to another continues to occur in the global world of today through international migration as workers embark upon overseas journeys looking for better employment opportunities, or simply employment. The positive spillovers from such international migration in the migrant countries have been frequently discussed in migration literature. This study has attempted to add to the existing vault of related research on the possible effects of international migration in the origin countries by investigating its role in the alleviation of poverty. Using the South Asian developing nation of Bangladesh as its empirical setting, this study is the first to employ a logit regression model followed by a quantile regression model on the data from a survey of 1205 households in 2013. The estimation calculations were performed in STATA/SE (v15.1). The objective was to assess if international migration and remittances are reducing poverty in the country, and if so, at which levels in the income chain these effects are more or less significant in magnitude.

From the logit regression results, after attempting to solve for endogeneity using an instrumental variable, it was found that international migration has reduced poverty by odds ratios of 12% by increasing household per capita income. Similarly, receiving remittances from abroad has also mitigated poverty by odds ratios of 9%. Using a quantile regression on per capita income with an instrumental variable, it was found that the largest amount of per capita income gains was enjoyed by the richest households in the income quantiles. This finding implies that although international migration and remittances had a poverty reducing effect, the overall prevalence of such an effect in the economy was small as the poorer households which were closer to the poverty line were not having the biggest income gains.

I sincerely hope that interested readers and other researchers find the results of this study useful and would encourage more research with different tactics for the construction of a concrete conclusion.

Keywords: international migration, remittances, poverty, logit regression, quantile regression, instrumental variable



# Preface

Writing this thesis has been one of the biggest challenges of my life that I have enjoyed working with. In addition to being a profound learning experience, it has been a rewarding journey.

I would like to express my heartiest gratitude to my supervisor professor, Gaute Torsvik, for his immense patience and his valuable guidance to me in the writing process. It has been an absolute privilege to learn from his excellent mentorship and supervision.

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I highly appreciate and welcome any suggestions and rectifications of errors.

Oslo, 13 May 2019

Syed Arif



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# 1 Introduction

## 1.1 Overview

In the recent world of economics, international migration has become one of the most discussed phenomena. With globalization at its peak, labor migration from poorer nations to the richer ones continues to make its significant mark all over the world. According to the International Migration Report by the United Nations (2017), the number of international migrants globally totaled to 258 million in 2017. Some of these migrants are seeking refuge from war and famine; others are pursuing a better paying occupation abroad in a developed country to escape the tight, competitive, and in some cases of severely low-paying job market in their homelands. A majority of these migrant workers after employment abroad send a share of their earnings back to their families in their home countries mainly driven by altruistic motives. This also happens to be the most direct and positive after-effect of international migration. As of 2017, the total amount of remittance earnings received by households all over the world was US\$ 580 billion (The World Bank, 2017)<sup>1</sup>.

According to Adams and Page (2005) such remittance income from international migration contributes significantly to the development of the poorer migrating nations in Asia, Africa, Latin America, and the Middle East. De Haas (2007) also states remittances from international migration to be a potential source of development finance for the underprivileged countries. This notion is supported by the fact that in 2017 the total remittances received worldwide surpassed the total official aid received by developing countries of US\$ 163 billion (The World Bank, 2017). From macro perspective, remittance earnings entering the home economy reduces the balance of payment deficit and helps to facilitate foreign investment. From micro perspective, remittances through international migration are used by the migrants' families to increase consumption, investment in assets, and allocation for savings and loan repayments (Ahmad, 2014). With such positive spillover effects of international migration in the labor-exporting countries, it is of no doubt that

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<sup>1</sup> This total number of remittances received only includes remittance earnings reported through formal channels. As a result, the understated real amount including both formal and informal channels is expected to be much higher.

experts believe the potential welfare from international migration to be the answer to the desperate far cry of economic development in the extreme poor, migrating countries.

Therefore, it is of imperative importance for government authorities and stakeholders to understand how international migration can contribute towards solving the economic problems of the developing world. This study has attempted to analyze this crucial role that international migration can play in the alleviation of one particular economic problem: poverty. I focused on poverty for two reasons. First, rather than concentrating on many economic struggles such as poverty, unemployment, and inequality all together like previous studies on international migration did, poverty is prioritized because it is the most severe crisis in the poor countries of the world. As of 2018, the total headcount of people living in extreme poverty was estimated to be around 595 million (World Poverty Clock, 2018) . Second, after the remitted money from international migration goes directly to the poverty-stricken families in the origin countries, it is mostly utilized for food and other necessary consumption to escape poverty. Thus, there is a direct and positive effect of international remittances through overseas migration towards poverty mitigation, and this occurs through the increase of the left-behind households' income. Therefore, a formally established research question that this study aimed to answer is: "How do international migration and remittances affect the economic conditions of the migrant families in terms of income and poverty?"

## 1.2 Theoretical Discussion

### 1.2.1 Possible Effects of International Migration and Remittances on Poverty

At first glance, it may seem obvious that the remittances from international migration increase income and reduce poverty of the migrant household. That is, there is a definite and predetermined positive effect of international migration on local households. However, a deeper analytical insight would reveal that this is not always true. In fact, international migration can have both positive *and* negative impacts on the families in origin countries.

The way these positive and negative effects from international migration could manifest on household income is understood better using the following proposed model. Suppose that the income generated in household  $j$  by member  $i$  if he/she is in home country is  $y_i(l_i, k_j)$ . That

is, member  $i$ 's income  $y_i$  is generated using his/her labor supply  $l_i$ , and the capital  $k_j$  which is shared by household  $j$ . Assume for simplicity that all members are homogenous and equal in work capacity and ability. Then, the following two types of household income equations should hold:

$$Y_j = ny(l, k) \quad (\text{NM})$$

$$Y_j^M = (n - 1)y(l, k) + R - C \quad (\text{M})$$

Equation (NM) represents household  $j$  with no international migrant, and the total income  $Y_j$  equals total number of members present in household in home country  $n$  times income  $y(l, k)$  generated by each member of the household. Equation (M) represents household  $j$  with one international migrant abroad, and the total income  $Y_j^M$  equals total number of members present in household at home with one member missing as migrant  $(n - 1)$  times income  $y(l, k)$  generated by each member of the household.  $R$  is the remittance money sent by migrant member from abroad that is added to the income  $Y_j^M$  of migrant household.  $C$  is the cost the migrant household has to continue to bear in financing the migration process, such as repayment of migration loan, and therefore causes a loss in income  $Y_j^M$ .

The variables in Equation (M) are the possible channels through which international migration can impact migrant household income. For example, if the remittances from abroad  $R$  are higher than the repayment cost of migration  $C$ , then a positive income effect is generated. On the other hand, if household member reduces labor supply  $l$  caused (or “spoiled”) by receiving foreign remittances,  $y(l, k)$  will fall. If this reduction is greater than the remittances received, then the net income effect will actually be negative.

The following is a detailed discussion on the possible positive and negative effects on household income from international migration in relation to the model present above.

## The Positive Effects

The most apparent and direct positive impact of international migration on households stems from remittance earnings from abroad,  $R$ , which generates a positive income effect in Equation (M). Migrant households can save this “extra” income for future negative shocks. Or they can invest in working assets or small enterprises, such as rural households buying a farming tractor or starting a poultry farm with the remittance money. This will increase capital capacity,  $k$ , and in turn  $y(l, k)$  in Equation (M), which will increase total household income. Households can also spend  $R$  directly in the consumption of necessity goods such as food, clothing, housing, and medical. In both cases, the remittance money from abroad would create the pathway out of poverty for the migrant families. Taylor, et al. (1996) builds on this notion, stating that not only remittance earnings boost household income, it nullifies financial constraints that households face, insures them against negative economic shocks and natural disasters, and can be substituted as capital to invest in business enterprises. Having a migrant abroad also improves the credit-standing of local households and allows them to purchase necessary goods such as food on credit (Hagen-Zanker, et al., 2014).

Apart from remittances, another channel through which international migration can positively impact households is through the transfer of technical knowledge. This knowledge travels from the modernized and sophisticated societies in the richer countries to the underprivileged ones in the poorer economies via the migrant (McKenzie & Sasin, 2007). This effect is channeled through  $k$  in Equation (M) by increasing household capital potential as such knowledge helps households to invest in better productive and saving technologies and hence lift them out of poverty. The knowledge from abroad via the migrant is not only limited to technical, but can be in the domain of human capital development as well, such as health awareness and educational enrollment (McKenzie & Sasin, 2007), which would later increase earning potential at home by operating through  $l$  (Equation (M)).

The positives of international migration and remittances which reduce the potentiality to poverty stretch beyond migrant households to community levels as well. Migrant families tend to contribute to the financing of social welfare and services through donations (Siddiqui, 2012) and to the development of community infrastructure such as schools and roads with the remittance money as “capital from abroad” (de Haas, 2007). There is also the creation of considerable money multiplying effect in the society that helps both migrant and non-migrant households. For example, Pham and Hill (2008) found that remittances in Vietnam induced a

higher demand for local products and resulted in the creation of jobs in construction and transportation. The receipt of international remittances had enabled households to invest behind water pumps and irrigation in the barren Moroccan deserts and start new farms (de Haas, 2006). These findings imply that productive investments made by migrant households can lead to the employment of both migrant and non-migrant households. In this way, the positive effects of international migration improve the chances against poverty not only for the migrant households but for the non-migrant households in the community as well. However, such community-wide effects from remittances would contaminate the estimates of measuring marginal effects between remittance recipient and non-recipient households, since the control group of non-recipient households are also affected by the treatment of receiving remittances. A naïve comparison of remittance effects between the two types of households would therefore result in a lower bound of the estimates if the community effects are not considered in the measurement strategies. As it is more realistic to assume that these community effects will exist, I acknowledge this as one of the limitations of this study as such effects are not captured in the estimation.

### **The Negative and Inept Effects**

A majority of international migrants come from poorer households who are already under bad financial conditions, and hence they have to finance their migratory expenses through loans. Often, these loans are so high relative to the households' income that the repayment with interest takes up considerable amount of time and resources by the migrant households (Hagen-Zanker, et al., 2014). In such a scenario, international migration is further drowning a poor household deeper into poverty, which the household had hoped to migrate out of. In Equation (M), this will cause  $C$  to be so high that the net income effect of migrant household will end up being negative. This situation is worsened if the migrants working abroad fail or choose not to remit, and therefore result in zero value of  $R$  (Equation (M)). In fact, de la Briere, Sandoulet, de Janvry, and Lambert (2002) found that only 50 per cent of total migrants from the Dominican Republic remitted back from abroad to their families. Therefore, not all migrant households will always benefit from remittances and poverty mitigating impacts.

According to Adams Jr. (2011), local households may reduce their labor supply and increase their reservation wages to be in employment since they can have remittance money without bothering to work. This will reduce  $l$  in  $y(l, k)$  in Equation (M). If this reduction is greater

than the remittances received  $R$ , then the net income effect will be negative. Kim (2007) in a study in Jamaica found that there is a negative relationship between labor participation and international migration and remittances. Thus, if households optimally or negatively adjust their leisure time against remittance income, there will be no benefits or could be adverse effects from international migration or remittances on poverty. This is especially true if the household is already poor, and will therefore continue to remain poor or become poorer. Another possible harmful impact of international migration on households is if the most educated member decides to go and work abroad. Then, from Equation (M), there is a loss in labor  $l$  as the household will be deprived of the productive capacity and knowledge of this “intelligent” member and can in turn result in higher chances of being in poverty. This has a detrimental effect in the community as well if this migrant was or could have been a crucial service provider, such as a doctor (de Haas, 2007). Although it has been argued that there could also be the possibility of “brain gain” through the increased knowledge of returned migrants, Hagen-Zanker (2015) explains that this is only possible if the returned migrants are skilled enough to apply this gain in knowledge. Again, such community effects are not captured in the estimation of this study and is considered to be a limitation.

In some cases, the impacts of international migration on poverty status of migrant households may fail to occur despite the channels of transmission of such effects being active. For example, remittance earners at home may not always invest in business enterprises in their neighborhood areas if there is a lack of infrastructure and agricultural resources that are necessary and crucial conditions for the investment to thrive (de Haas, 2007). If the remittance earners are living in the Mexican desert, then they have very little motivation of starting a crop production farm due to lack of fertile land. In Equation (M), this will result in the unavailing of positive impact on household capital potentiality  $k$ . Therefore, remittances from international migration will not have a significant impact on the earning potential of households by failing to increase  $y(l, k)$ . Another issue with remittances is that due to the costly nature of migration, it is usually the richer households who have the ability to successfully migrate and remit back to their families. Yet, it is the poorer and rural households who are much more vulnerable to poverty and have lower economic resources to migrate. Therefore, if there is a higher possibility of remittances being received by the richer households than the poorer ones, poverty reducing impacts from international migration will be very little in the economy. Distribution of international migration and remittances along the income pyramid plays a vital part in this argument (Hagen-Zanker, 2015).

The overall summary of this part of the theoretical discussion suggests that the effects of international migration and remittances on income and poverty can either be positive, negative, or ineffectual subject to other factors. Hence, the direction of the effects of international migration on poverty are not predetermined and makes it an interesting question to be examined under the microscope of empirics.

## 1.2.2 Motivation for Migration

### The General Microeconomic Theory

To understand the underlying microeconomic concept of what drives international labor movement from poorer region to richer parts of the world, I refer to the works of Todaro (Todaro, 1969) and Harris and Todaro (Harris & Todaro, 1970). According to the authors, the primary reason workers fly overseas for employment is to take advantage of the higher expected wages abroad in the developed countries than what is offered or expected in the poorer and inefficient labor markets at home. The authors further explain that this wage differential will tend to reduce and equate over time. This happens as wages fall in the destination countries due to immigration of workers and would rise simultaneously in the home economies from a shortage of available workers.

In more recent literature, Munshi (2016) proposed the following model to explain the general theory for international migration. He first defined two levels of education: low (L) and high (H). Workers with low education would be employed in low-skilled jobs whereas workers with high education would be employed in high-skilled jobs. Then he defines the wages at origin countries (O) as  $W_e^O$ , and wages at the destination countries (D) of migration as  $W_e^D$ , where  $e \in \{L, H\}$ . Therefore, a worker will decide to migrate if the following inequality holds  $W_e^D - c \geq W_e^O$ , where  $c$  represents the cost of migration. That is, a worker will go for international migration if the wages abroad minus the cost of migration are at least higher than the wages at his/her home country. Rearranging the inequality as  $W_e^D - W_e^O \geq c$  implies that the wage differentials between the origin and destination countries should be high enough to at least cover the cost of migration in order to motivate a household member to migrate.

In another literature, Mansoor and Quillin (2006) summarizes the motivational factors of migration into two classes: push factors and pull factors, but provides no further theoretical explanation on them. I will now expand upon the discussion upon of these categorical factors.

## **The Push Factors of Migration**

Push factors of migration, which occur in the home countries, can be described as the reasons which “push” household members into embarking on international migration. With this in mind, the most common economic push factor of international migration is poverty. Households which suffer from poverty will be motivated to send one of its members overseas in the hopes of creating a better income source and improve their income status. Stemming from poverty, the next push factor is unemployment. Households are usually poor due to lack of employment opportunities in their communities. And those poor households which have employment, they may not earn enough wages to overcome poverty. Prevailing unemployment conditions and low wages will therefore nudge households to undergo international migration and capitalize on better paying employment opportunities abroad. High fertility rates, which are usually common in the rural areas of poor countries, can also induce households to send one of its many members abroad. The loss in productive capacity can be shared by the left-behind family members which are high in numbers. At community level, the lack of basic education and health care services can force households to look for better facilities abroad through international migration. However, this factor usually becomes relevant only in addition to other push factors.

Another significant push factor of international migration is political instability at home countries which compels its population to take refuge in other nations. These political instability issues can be from lesser ones of human rights abuses, ethnic discrimination, and corruption, to more serious ones such as weak governance and armed conflicts. Although refugee migrants usually end up contributing to the host economies in low-end jobs, their main motivation for migration is to seek personal safety rather than income opportunities.

## **The Pull Factors of Migration**

Pull factors of migration, which occur in the destination countries, can be defined as the reasons which “pull” or tempt members of the poorer nations into immigrating to richer economies. As described earlier, the prospect of earning higher wages is the most common pull factor of international migration. This results in the chances of improving the living standards of both the migrant and his/her family members at home. Ambitious international migrants also go abroad for career advancement and professional development.

Some countries act as a safe harbor for those international migrants who otherwise face risk from insecurity and political danger in their home nations due to conflicts and political corruption. These safe countries encourage refugees and asylum seekers towards international migration for those in need of shelter and political freedom. Some household members also undertake international migration to join their migrant families abroad.

It can be seen from this part of the theoretical discussion that the push and pull factors of international migration work hand-in-hand. For example, the push factor of poverty at home is met by the pull factor of higher wages and employment openings abroad. The push factor of conflict at home countries is balanced by the pull factor of safety and political asylum in host countries, and so on.

### **Network Induced Migration**

Munshi (2016) highlights the presence of migration network abroad as another motivational source for migration of workers from home countries. According to the author, migration networks in destination countries tend to develop more around blue-collared workers as higher education is not a necessary requirement for the jobs. This makes it easier to get hired as low educated workers than as white-collared workers. The large influx of low-skilled workers for such categories of jobs can also be explained by the fact that the production processes usually requires workers in teams rather than in individually. The author further explains that the formation of this kind of migration network which socially connects the foreign workers abroad overcomes the information and enforcement constraints that are associated with team production. This network can then motivate left-behind household members in home countries to follow suit by providing them with necessary information, such as migration costs and the process of getting work overseas. Munshi (2003) in a study of Mexican migrants in the US labor market found that the probability of a Mexican worker getting employed abroad with higher wages is directly proportional to the exogenous size of his associated migrant network.

### **1.2.3 Motivation for Remittance**

Adams Jr. (2011) explains that although international migration is necessary prior to sending remittances, it is not always the case that the migrant will remit. According to Straubhaar and Vădean (2006), the determinants of remittance include the migrants' level of savings and

income, the duration the migrants have stayed and worked abroad, social ties back home, and social ties at the migrants' destination countries. The existing literature classifies the motivations (or willingness to remit factors) as follows:

### **Altruistic Factor**

This is perhaps the most common motivation for international migrants to remit part of their income back home. In an altruistic model, the migrants feel the need to take care of those left-behind and enjoy a sense of utility or satisfaction in contributing to the wellbeing of their family members (Straubhaar & Vădean, 2006). The authors further explain that the altruistic model has several assumptions. Such as, the amount of money remitted should be directly proportional to the level of the migrants' income and inversely related to the level of household income. For example, if a migrant's income abroad increases, then he/she can remit a higher amount in turn. Conversely, if household members at home are already performing better in terms of income, then the migrant may remit a lower amount. And lastly, the amount of remittance will gradually decrease as social ties between the migrant and his family deteriorates over time. The conclusions of the study of de la Briere et al. (2002) are a testament to the presence of the altruistic factor as one of the reasons for migrants to remit. In that study, the authors found that female migrants from the Dominican Republic to the United States remit more money back home when their parents are ill, and only male migrants who are the singular migrants from their households follow the same.

### **Self-interest Factor**

Another possible factor for international migrants willing to remit is to fulfill their own self-interested goals. Assuming that future inheritance from parents are conditioned on present positive behavior towards them by their children, international migrants may simply be remitting money to satisfy this condition in the hopes of obtaining bequests from their parents in the future. It could also be that the migrants are sending money to be spent by their family members in order to take care of their left-behind assets. Third, migrants with intention to return to their home countries may currently be investing in property and financial assets to augment social and financial security upon their homecoming. Empirically, while the remittance from Greek migrants in Germany were much higher (Glytsos, 1988; Glytsos,

1993), international migrants in Canada, which mainly experiences permanent migration, spent very little on remittances (DeVoretz, 2004).

### **Insurance Factor**

A third factor which works in lieu with altruistic motive is to insure households at home against negative income shocks. When migrant households face a sudden and unexpected loss in income, such as due to a bad harvest or natural calamity, migrants from abroad send back money from their earned income. This is to help their family members cope up with this abrupt income decline. Migrants can also remit the money to their households back home prior to any negative income shock as a safety precaution, which they can capitalize on if they face any unexpected income loss. Migrant household members engaged in business enterprises can also insure against negative profits by diversifying their investments into other ventures with the help of this remittance money. Yang and Choi (2007) in a study in the Philippines found that around 60 per cent of the loss in income of migrant households were survived by international remittances.

From this part of the theoretical discussion, it can be conjectured that the motivational factors to remit are in many cases intertwined with each other. For example, the insurance factor to protect home households against sudden loss in economic wealth is driven by the altruistic motive of taking care of those left-behind.

It could also be concluded that the motivation factors to migrate and remit work in a complex ecosystem with each other. For example, the altruistic motive to provide for family can push able household members into migration who are then “pulled” by the prospects of higher wages and better living standards in the developed countries.

## **1.3 Empirical Setting of the Study**

Several previous studies have attempted to associate the link between international migration, remittances, and poverty. For example, Adams and Page (2005) used a collective of 71 developing countries in a macroeconomic approach and concluded that international migration and remittances expressively diminish the level, depth, and brutality of poverty in the developing nations. But even poor countries differ considerably among themselves in terms of economic structure and performance. What works in one country may not

successfully bear the fruits of positive results in other. Therefore, it is important to study them separately under the microscope of empirics. With this belief, the scope of the empirical methodology of this paper is confined to only one particular developing country: Bangladesh. A small, economically underprivileged nation in the South-Asia and surrounded by her bigger neighbor India, Bangladesh qualifies as the perfect setting to empirically test out this concept because of its economic characteristics. Despite being classified as a lower-middle income country, Bangladesh continues to emerge as one of the fast-growing economies with a remarkably consistent GDP growth of over 5% for the last 10 years (The World Bank, 2017). It is believed that this growth is supported by the remitted earnings from the massive amount of workers Bangladesh regularly exports through international migration to the developed parts of the world. In 2018, around 734 thousand Bangladeshi workers employed overseas have sent back a total of around US\$ 15 billion (BMET, 2018). Yet, despite such promising economic growth poverty still continues to plague Bangladesh and hinder human capital development. The naïve idea of “trickle down” economics of a significant GDP growth has worked to some extent but failed to eradicate poverty completely in Bangladesh. World Poverty Clock (2018) reports that as of 2018, around 15 million people in Bangladesh still live under extreme poverty. A nation cannot have sustainable economic development to progress forward dragging massive poverty count on its heels because there will be a high dependency ratio and not enough savings in the economy to be invested later as capital.

There is a major lack of effective policies with nation-wide assistance at the microeconomic household level to overcome the poverty problem in Bangladesh. The country is stuck in a limbo with inadequate fiscal resources from the government and a high dependency on primitive economic activities such as agriculture. But even in such a case, it is argued by experts that Bangladesh’s poverty misfortune has greatly benefited from the godsend effects of international migration and inflow of remittance earnings over the recent years. However, not many attempts have been made in the context of Bangladesh to examine how overseas migration and remittances have reduced poverty. The most relevant case study of Bangladesh to investigate this relationship between international remittances and poverty was done by Raihan, Khondker, Sugiyarto, & Jha (2009) at household level. Although their results imply positive effects on poverty from remittances, that research utilized an older dataset from 2005. Bangladesh economy has undergone massive economic changes in the last 10 years. Therefore, it is empirically interesting and useful policy-wise to reinvestigate the causal effect of international migration on poverty using an updated dataset. Another issue with their

methodology was the fact that the authors did not address the potential endogeneity problems in their model. This study has attempted to do so by utilizing an instrumental variable approach in the methodologies.

### **1.3.1 Bangladesh Economic Overview**

In this section, a review of Bangladesh's recent economic performance is presented in terms of international migration and poverty levels in the last decade. This would help to understand the trends of the variables of interest over time and how they are correlated with each other.

#### **GDP**

Figure 1 displays the trend of GDP of Bangladesh over the last 10 years as reported (The World Bank, 2017) (Bangladesh Bureau of Statistics (BBS), 2018). The values are in billions in current USD. It can be observed that Bangladesh overall had a positive GDP growth in the last 10 years. Between 2009 and 2011, the GDP growth was positive, but it slowed down between 2011 and 2012 possibly due to the political unrest and violence in the nation caused by the trials and judicial execution of war criminals (BBC News, 2012). The GDP growth increased steadily upwards again between 2012 and 2017. The positive growth decreased again after 2017 just before the national elections.

#### **Poverty**

Figure 2 displays the changes in poverty head count ratio in percentage at national poverty lines in Bangladesh over year (The World Bank, 2016). It can be observed that Bangladesh has had a steady decline in poverty over time. In 2000, the poverty head count ratio was 48.9%, but the poverty head count ratio almost halved to 24.3% in 2016. Despite the decrease in numbers, the absolute value of 24.3% of the country's population living under poverty is still an alarming figure considering Bangladesh's massive population.

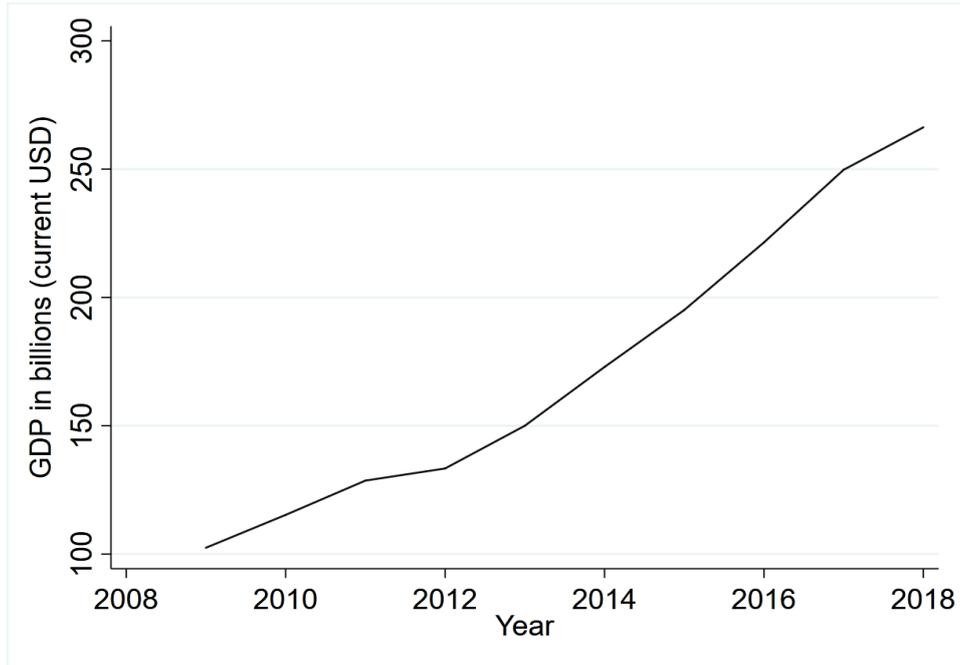


Figure 1: GDP in billions (current USD) over years

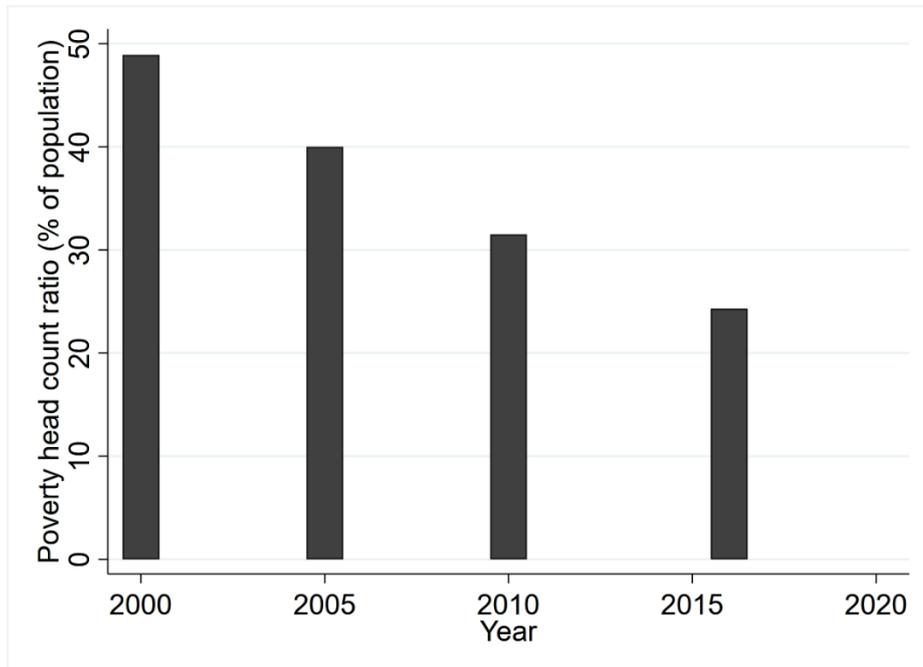


Figure 2: Poverty head count ratio (% of population) over years

### International Migration

Figure 3 summarizes the total number of international migrants (in thousands) from Bangladesh in the last decade classified by their skillset (BMET, 2018). It can be observed that overall the outflux of international migrants from Bangladesh has been high in numbers in the recent years, but the pattern has not been consistent. The lowest total was recorded to be just below 400,000 in 2010 while the highest total was in 2017 crossing 1 million. Category-wise, it seems that skilled and less-skilled migrants in numbers has dominated other categories of migrants, such as semi-skilled and professionals.

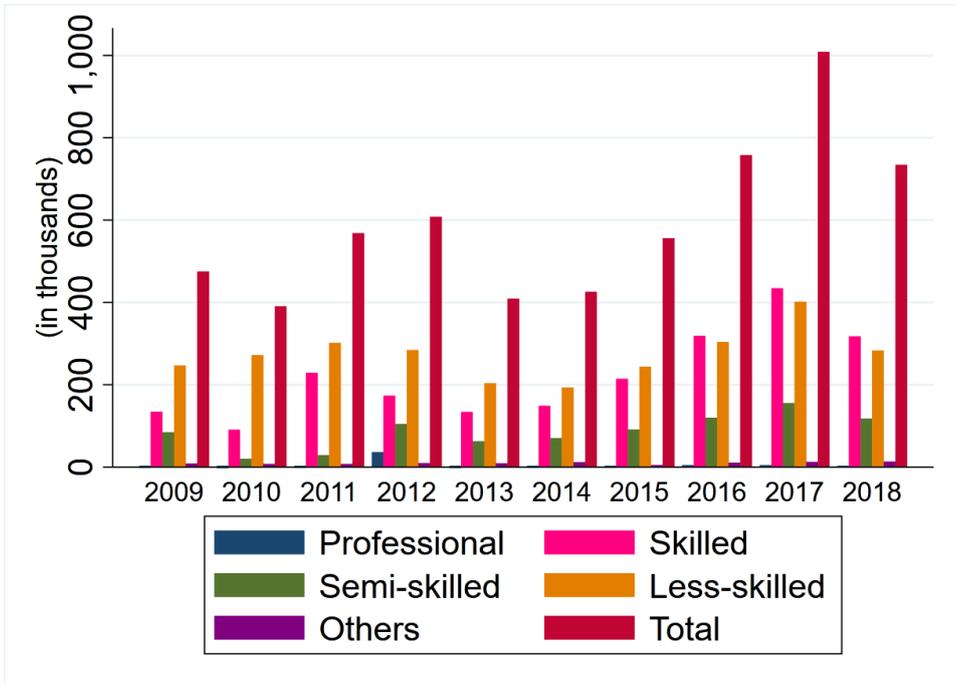


Figure 3: History of international migration (in thousands) categorized by skill of migrants over years

### Remittances and Development Assistance

Figure 4 depicts the total amount of remittances and net official development assistance received in millions in current USD (The World Bank, 2017) (BMET, 2018). It can be observed that the influx of total remittances in the Bangladesh economy has dominated the amount of development assistance received by significant margins in recent years. The country also has maintained its remittance earnings at a steady level with minor

inconsistencies. The lowest total of remittances was in 2009 with around USD 11,000 million and the highest total of remittances was in 2018 with around USD 15,500 million. On the other hand, total development assistance received was highest in 2017 with only around USD 3700 million. This implies a possible large-scale dependency of the Bangladesh economy on foreign remittances over aid assistance in terms of earning or receiving money from other countries.

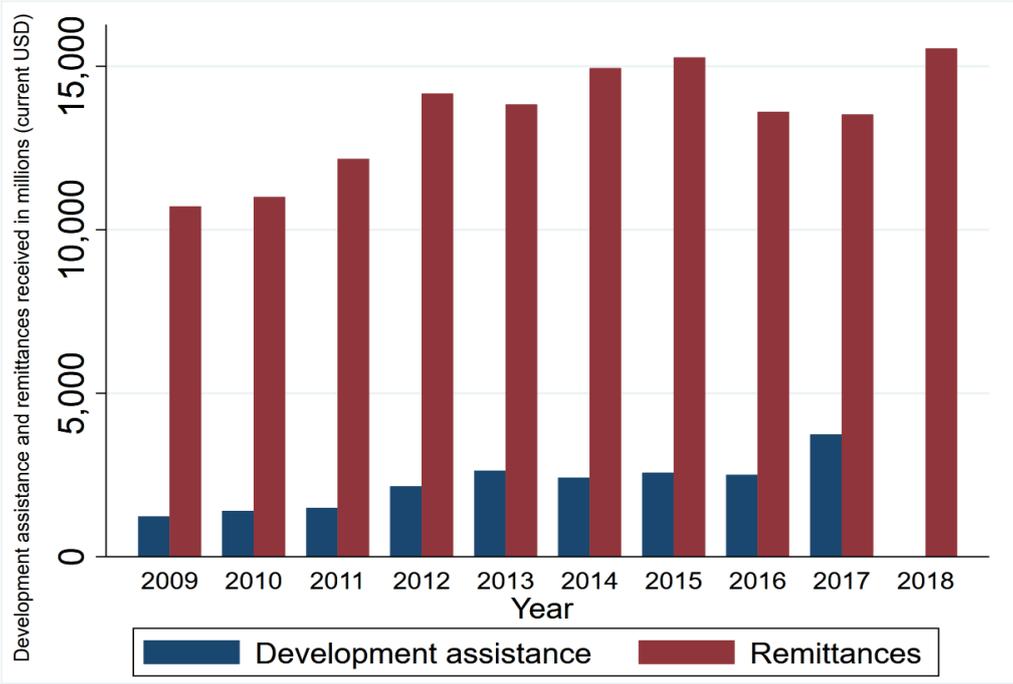


Figure 4: Remittances and net official development assistance received in millions (current USD)

### 1.4 Contribution of the Study

This paper contributes to the platform of existing related literature on international migration and remittances by being the first to investigate the causal impact of both the occurrences separately on poverty in Bangladesh. The study used two econometric models on a newer dataset, and has attempted to reduce endogeneity bias. First, a logit model with control variables is utilized to calculate probability estimates of being poor due to income gains from international migration, and for receiving remittances. The model is supported by an instrumental variable approach in an attempt overcome the possible taints of endogeneity:

selection, omitted variables, and reverse causality. Then, an instrumental variable quantile regression (IVQR) model is used to examine where the income gains from international migration and remittances exist at different income levels of households. The second model also uses an instrumental variable approach to try to overcome the possible endogeneity problems. This dual methodological strategy of using two separate but complementary econometric approaches on a newer household level dataset will hopefully yield detailed and informative estimates. The results may enable government agencies and other stakeholders to design effective policies so that the maximum benefits of international migration and remittances, if any, are realized with minimal costs.

## **1.5 Summary of Empirical Findings**

To establish how international migration is helping to reduce poverty in Bangladesh, this study used two empirical models along with an instrumental variable to try to bypass potential endogeneity problems. First, a logit regression model was used, from which it was found that after possibly controlling for endogeneity, international migration reduces poverty by odds ratios of 12% and receiving remittances from abroad mitigates poverty by odds ratios of 9%. Second, a quantile regression (QR) model was utilized to examine which income group of households were experiencing the highest and lowest of income gains from international migration and remittances. The results suggest that after using an instrumental variable to attempt to solve for endogeneity, in both cases of international migration and remittances, the poorest gained the most amongst the non-rich groups but the richest migrant households had the overall largest income gains compared to other income groups. Therefore, although the overall poverty probabilities were mitigated from income gains via international migration and remittances, the poorest households who were the closest to the poverty line were having a much lesser positive effect compared to the richest.

## 2 Literature Review

A plethora of research has been undertaken to examine how international migration of labor from poor countries to developed ones affect the poverty numbers in the origin countries. This has been done at both country and at household level. The overall consensus of this literature is tilted more towards the favor of a negative causal link between overseas migration and poverty. In the global context of international migration and poverty, the most frequently cited paper is titled “Do International Migration and Remittances Reduce Poverty in Developing Countries?”, in which Adams Jr. and Page (2005) examined the effects of both international migration and international remittances separately on the poverty levels of 71 developing migrant countries using cross-country data. The authors employed a basic growth-poverty model as highlighted by Ravallion (1997), and Ravallion and Chen (1997). In this model, poverty is defined as a function of per capita income and income inequality. They utilized OLS regressions with different poverty measures as dependent variables and international migration or international remittances as explanatory variable with controls. In an attempt to correct for possible endogeneity and selection problems in the model, the authors used three instrumental variables: geographical distance from origin countries to migrant destination countries, percentage of population who has secondary education, and government stability. After performing their analyses, the authors concluded that on an average every 10% increase of international migrants as a share of country’s population resulted result in a 2.1% decline in poverty head-count, while on an average every 10% increase in per capita remittances received through official channels reduced poverty head-count by 3.5% in the developing parts of the globe. The authors also found that the impact of remittances was slightly larger when poverty was measured in poverty gap and squared poverty gap. Le Goff (2010) used the same growth-poverty model and a panel dataset of 65 developing countries for the period of 1980-2005 to find an analogous impact of overseas remittances significantly reducing poverty in the origin countries. However, Azam and Haseeb (2016) attempted a similar global approach to examine the impact of international remittances on poverty, but they used 39 countries belonging to different income tiers (lower middle, upper middle, and high). The study used a panel fully modified OLS on data from 1990-2014 to find that although foreign remittances reduced poverty, the effect was only statistically significant for upper middle-income countries. Adams Jr. and Page (2003) also reasoned something similar after examining the impact of international migration and

remittances on poverty in 74 developing countries. The authors explained that this was possibly true as most migrants were from middle-income countries and thus could overcome the financial constraints of international migration and move beyond borders.

Using the growth-poverty model and a cross-country approach with a smaller focus, Gupta, Pattilio, and Wagh (2009) investigated the effects of international remittances on poverty in 24 countries of sub-Saharan Africa. The authors also attempted to purge their model of biasness by utilizing a three-stage least squares estimation. Their final results supported the notion that remittance earnings can have a significant poverty-mitigating effect in poor migrant countries in Africa. This conclusion was supported by that of Anyanwu and Erhijakpor (2010), who also used the growth poverty model and an instrumental variable approach to settle that a 10% increase in official international remittances as a share of GDP lowered the number of people in poverty in Africa by 2.9% on an average. Concerning Asia, Imai, Malaeb, and Bresciani (2016) used three panel data analysis techniques on a cross-country dataset of 21 Asian countries covering 1980-2014. They found that after solving for possible endogeneity remittance earnings reduce poverty significantly in both rural and national levels. However, in the context of Latin America, Acosta, Calderón, Fajnzylber, and Lopez (2008) performed cross-country panel analysis on 11 developing countries from the region and found that although there was a poverty reducing effect from international migration, the overall magnitude of this impact was very small or negligible. Moreover, the authors concluded that countries such as Mexico and Paraguay which have a large chunk of their migrants from poorer households experienced greater poverty-impacts. These poorer households still managed the migration costs due to the strong established migration networks in the destination countries.

In terms of individual economies which is more relevant to this study, Roth and Tiberti (2017) used a propensity score matching approach to examine the effects of both domestic and foreign migration on poverty indices in Cambodia by utilizing a socio-economic dataset at household level. The authors found that both local and international migration reduced the poverty head-count numbers by 3-7 percentage points. Lokshin, Bontch-Osmolovski, and Glinskaya (2007) used a household panel survey dataset to study and measure the impact of domestic and international migration on poverty in Nepal. After instrumenting for possible endogeneity and selection issues in their model using lagged variables, the authors found that from 1995 to 2004, 20% of the poverty reduction in Nepal was due to migration and

remittances, with international migration charging from the front. In regards to this, using two rounds of panel survey of household data (1996 and 2004) and a fixed effects model to try to minimize endogeneity, Acharya and Leon-Gonzalez (2013) used a micro-simulation approach to find that remittances in Nepal decreased poverty head-count by a range of 2.3% and 3.3% in the first round of the survey and 4.6% and 7.6% in the second round. However, Thapa and Acharya (2017) exploited the 2010/2011 household survey dataset of households with propensity score matching to reduce selection bias in estimates and examined household expenditure patterns of remittance earnings households in Nepal. Their findings imply that international remittances nudge receiving households to spend significantly more on health and durable goods rather than on food, which is the first element of basic human needs in poverty alleviation.

In the context of Indonesia, another Asian country, Adams Jr. and Cuecuecha (2010) applied a panel analysis on data from Indonesian Family Life Survey for the periods of 2000 and 2007. To try to instrument for endogeneity and selection, the authors used a three-stage estimation strategy. In the first stage, they used nested logit instruments to analyze the probability of households receiving remittances, Dubin and McFadden model (Dubin & McFadden, 1984). In the second stage they tried to correct for selection in household expenditures with and without remittances. And in the third stage they measured fixed effects and undifferentiated selection terms. After comparing households which received remittances in 2007 with counterfactuals, the authors found that there is a 26.7 percent reduction in poverty head-count in Indonesia from remittances. Contradictory to the findings of Thapa and Acharya (2017) in the context of Nepal as discussed earlier, Adams Jr. and Cuecuecha (2010) found that remittance earning households in Indonesia tend to spend more of their marginal gains in income on food rather than investment goods such as housing or durables. The authors explained this finding with the notion that most remittance earning households in Indonesia are poorer than other types of households and thus they tend to spend a majority of their remittance induced income on consumption goods.

The authors also analyzed the impact of internal and international remittances on the poverty and inequality in Ghana, which is in Africa (Adams Jr. & Cuecuecha, 2013). Taking advantage of national living standard survey for 2005/2006, they used a multinomial probit model to try to reduce selection and reverse causality bias and calculated the probabilities of households being poor against households receiving domestic or international remittances.

The authors found that on an average, households receiving international remittances have a 97% lower chances of being poor. The authors explained this high magnitude with the plausibility that international remittances in Ghana account for about 3.5% larger than local remittances. Complementing this, Gyimah-Brempong and Asiedu (2011) used the same survey dataset to investigate the impact of remittances on poverty in Ghana. But they extended their dataset to include pseudo-panel data, and their model to utilize a bivariate probit and GMM pseudo-panel approach to try to minimize bias from endogeneity. The authors also arrived at a similar conclusion, that all things equal, international remittance earnings yield a significantly negative effect on chances of households being poor in Ghana. Looking at another African country of Ethiopia, Beyene (2014) used a household survey dataset of 2004 and counterfactual estimations to find that there was a 17% reduction in poverty for the overall sample. This finding is parallel to that of Bang, Mitra, and Wunnava (2018), who used an instrumental variable quantile regression on a migration household survey in Nigeria to find that remittance earning households have a higher consumption capacity than non-remittance receiving households, and thus the welfare from international remittances should be expanded to overcome problems of poverty and inequality in Nigeria. However, using a similar methodology on a migration household survey of 2009, Bang, Mitra, and Wunnava concluded that in case of Kenya (2016) international remittances tend to reduce poverty more for poorer households than well-off ones, but the costly nature of migration itself is barring underprivileged workers from enjoying this effect. This finding complements that of the study performed in the setting of South Africa which is a relatively richer African nation, in which an instrumental analysis was used on a panel dataset of national income in 2008 and 2010 (Biyase, 2014). The author finds a statistically significant negative effect of remittances on poverty-headcount, but the magnitude of this effect was only 0.03%. This fuels more thought to the belief that international remittances impact most on the poverty status of lower income tier households and lesser on the wealthier ones.

In the instance of Latin American nations, Adams Jr. (2004) investigated the impact of local and international remittances on poverty and investment in Guatemala. The author used a multinomial logit model to attempt to overcome selection and endogenous bias. After performing analysis on a national household survey dataset of 2000, the author found that both internal and international remittances significantly reduced the level and severity of poverty in Guatemala. Adams Jr., along with three other experts, analyzed the same hypothesis in the case of rural Mexico using household data (Taylor, Mora, Adams Jr., &

López-Feldman, 2005). They found that although international remittances had a significantly large and negative effect on poverty head-count numbers in the rural areas of Mexico, the impact of local remittances on poverty was negligible. Foreign remittances reigning supreme over local ones in Mexico could be explained by the low travel cost to its rich neighbor USA, which is the most popular choice for Mexican international migrants. However, contradictory to notion, López-Córdova, Tokman R., and Verhoogen (2005) used a 2SLS methodology on a Mexican household census dataset from 2000 and found that remittances did not make a significant impact on extreme poverty. The author justified this finding, saying that this could be due to migration being overly costly for extremely poor households such that only households already closer to or above the poverty line were able to migrate.

However, not much research has been undertaken to examine the causal impact of international migration on poverty in the case of Bangladesh, which is the empirical setting of this study. Wadood and Hossain (2017) in the recent used propensity score matching to attempt to overcome self-selection issues on household level dataset of 2010 and examined cases of welfare impacts from both foreign and domestic remittances. The authors found that for the isolated case of international remittances, recipient households experience lesser poverty severity than non-recipient households. Using similar propensity score matching econometric technique on household level dataset of 2005, Khan (2008) found that poverty in Bangladesh reduced by 18% with help of foreign remittances. Using primary survey data and a comparison approach between migrant and non-migrant households, Mahmood and Siddiqui (2014) found that poverty was lowered by international migration, and for migrating households which failed to overcome poverty, the severity and depth of it was at least pacified. On the other hand, Hatemi-J and Uddin (2014) used a macroeconomic approach of Autoregressive Distributed Lag Modelling method on panel dataset of relevant variables from 1976 to 2010 and found that there was a significant poverty mitigating effect from international remittances in Bangladesh, both in short and long-term. Khondker and Raihan (2015) used an advanced estimating method of Computable General Equilibrium to assess the impact of foreign remittances on poverty using household level dataset of 2005. They found that there was a significant impact of international remittances on poverty head-count ratio in Bangladesh from the year 2000 to 2005. Using a hybrid approach of both macroeconomic (Computable General Equilibrium Analysis) and microeconomic (Logit Probability Model) analysis on household dataset of 2005, Raihan et al. (2009) found that for the duration of 2000-2005 macro poverty headcount reduced by 1.7 out of 9% points in addition to

probability of being poor at household level decreasing by 5.9% from international remittances in Bangladesh.

Although, in overall, the existing literature covering the impact of international migration on poverty seems to show that both international migration and remittances reduce poverty, the specific conclusions of previous papers differ, agree, and extend each other considerably. For example, stretching on the conclusions of Adams Jr. and Page (2005), Azam and Hasseb (2016) further concluded that although international remittances seemed to reduce poverty from a macroeconomic viewpoint, the effect is significantly concentrated only for upper income echelon nations. Both Acharya and Leon-Gonzalez (2013) and Taylor et al. (2005) found strong foreign remittance effects on poverty levels for nations situated beside richer ones (India and USA), showing that geographic position of the migrant and destination countries matter significantly. On the other hand, while Adams Jr. and Cuecuecha (2010) found that migrant households in Indonesia tend to spend their marginal income more on food, Thapa and Acharya (2017) concluded that remittance earning families in Nepal were spending more on health and durables and significantly lesser on food. Such differing yet approving deductions imply that even if international migration may supposedly have negative impacts on poverty, the effects may vary considerably from country to country due to economic characteristics and thus begets the need to examine the hypothesis by individual countries. Another notable observation is that the previous research executed in the setting of Bangladesh focused on poverty impact from only one of the key channels of migration abroad: remittances. This study has attempted to take an inclusive approach of both conduits of welfare from international migration and remittances on poverty. A number of previous studies in the literature have also attempted to keep their results free from the endogeneity biases. For a detailed discussion on how endogeneity can be a measurement challenge in estimating the effects of international migration and remittances on poverty at household levels, I would request the reader to refer to Section: “4.5.1 The Endogeneity Problem” of this paper.

# 3 Data

## 3.1 Source

This study used the cross-sectional micro dataset of the household survey conducted in Bangladesh by the Migrating Out of Poverty (MOOP) Research Program Consortium for 2013 (MOOP, 2013). The research program focuses on the association between internal, regional, and international migration, and poverty, and relies on comparable household level data from Ghana, Indonesia, Bangladesh, Ethiopia, and Zimbabwe between 2013 and 2015. Along with Ghana and Indonesia, the first round of household survey was carried in Bangladesh for the year 2013.

The dataset, its user guide, and the questionnaires can be freely downloaded from:

“<http://migratingoutofpoverty.dfid.gov.uk/themes/migration-data/bangladeshquant>”

As the dataset was constructed by a research program whose sole focus is only on migration and poverty, it is rich on important migration and remittance data on migrant households and their migrant members, such as, reasons for migrating, total cost bore for recent migration, method of financing of recent migration, occupation of migrants, total remittances received, frequency of receipt of remittances, channels of remittance, how the remittance money was utilized, etc. which make the case for informative descriptive analysis. It also contains fundamental household information, such as age, education in years, sex, marital status, etc. of all household members which are common to both migrant and non-migrant households and qualify as useful control variables. The survey uses the same questionnaire for both migrant and non-migrant households which makes it much easier to estimate the marginal effects of migration between the migrant and non-migrant households.

The dataset also has a qualitative informational data section based on interviews dedicated to households' perception of change in quality of life. Both types of households are asked to compare their living conditions at present with five years ago. Only migrant households are asked to compare their living conditions between before and after migration. This allows an in-depth insight into the previous and current situation of migrant and non-migrant households in terms of improvement or deterioration of well-being. However, any reported changes in quality of life over time by migrant households does not necessarily mean that

international migration and remittances are behind such changes as causal impacts. For example, if there is a fall in the quality of life of a migrant household, it could mean that a loss of labor supply through migration of a household member has caused this decrease in household well-being. On other hand, it could also be that the household's standard of living was going down over time from the past, which was why they sent a migrant abroad in the hopes of increasing their income in the first place. Although the information from such interviews do not necessarily imply causality, they still can complement the results from the empirical analysis. I have presented a detailed summary of the findings from this particular interview section in the "Results" chapter.

The survey was conducted across 6 districts of Bangladesh: Chittagong, Chapai Nawabgang, Tangail, Satkhira, Barisal and Gaibandha, with an average of 200 randomly sampled households per district. In total, 1205 households (with 6104 household members) were interviewed with 905 having both domestic and international migrant households, and 300 non-migrant households. The entire dataset with total observations is used for analysis. The primary unit of observation is "household", which is represented by a unique household identification number (HHID) ranging from 1 to 1205. Total household income is calculated from employment, self-employment, agriculture, trade and business, rent, government benefits, payments/benefits from religious/charity/NGO organizations, international remittances, domestic remittances, money sent by relatives, fishing, poultry, and other sources.

## **3.2 Sampling Methodology**

The methodology of the sampling procedure involved the implementation of stratified and systematic random sampling techniques. First, through rapid screening survey (RSS) all the migrant households were categorized under different strata according to their migrant characteristics (such as domestic or foreign). Then, from the ones listed through RSS, stratified random sampling was utilized to identify the required number of households for detailed interviews. The same procedure was repeated for non-migrant households. Once the required numbers were identified, in-depth interviews were carried out to obtain household data. This methodology of random sampling makes the dataset a representative one.

### **3.3 Limitations**

Although the dataset is full of important variables related to migration and remittances, there might be unobservable factors that affect poverty and migratory decisions. Pre-migration data on migrant households are missing. This could have helped the empirical foundation of the study by enabling to establish a stronger set of counterfactuals in terms of factors affecting migration and remittances decisions and status. Out of the total 64 districts of Bangladesh, the dataset covered only 6 with 1205 households which is much smaller than the national scale. This makes the external validity of this study vulnerable even inside Bangladesh on a broader scale.

Another limitation of this dataset is that it comprises of information from the year 2013, which is almost 6 years ago from now. Bangladesh has a rapidly developing economy. Although due to its detailed nature the dataset makes a viable case for carrying out an empirical study, empirical results based on 2013 may not reflect the recent accurate picture of international migration and poverty status of Bangladesh in the current year of 2019. Between 2013 and the end of 2017, Bangladesh has seen an increase in GDP by around US\$ 101 billion (The World Bank, 2017), a reduction in poverty head-count ratio by around 8.8% (The World Bank, 2016), an increase in international employment by around 600,000 (BMET, 2018), and an increase in international remittances by around US\$ 306 million (BMET, 2018).

### **3.4 Descriptive Statistics**

#### **3.4.1 Summary Statistics**

In this section, the sample summary statistics of the variables of interest are presented with “household” as the primary unit of observation. As the definition of “household” is unclear in the user guide of the MOOP dataset, I assume it to be as: a social unit which is composed of members living in the same residence or dwelling and sharing social and economic resources with each other. All monetary figures are in BDT.

## Definition of Variables

Poverty is coded as 1 if the household's monthly per capita income is below the nationally defined poverty line<sup>2</sup>, and 0 otherwise. Migration is coded as 1 if households have at least one member currently working internationally in another country and have been away from household for at least 3 months in the last 10 years, and 0 otherwise. Remittances is coded as 1 if household has received remittances money from abroad in the last 12 months, and 0 otherwise. Monthly remittances are the amount of remittances migrant households received per month. Monthly income is the amount of household income per month which is calculated from different income sources, including international remittances. Monthly per capita income is calculated as monthly income divided by the total number of household members.  $\ln(\text{monthly per capita income})$  is the natural logarithm of monthly per capita income which will be used in the empirical analysis. Remittances as a share of income is defined in % as the portion of monthly remittances income in total monthly income. Household size reports the total number of members per household. Dependency ratio in % reports the portion of dependents in the family supported by the working age members<sup>3</sup>. Education represents the education in years completed by the head of household. Age represents the age in years of head of household. Male is coded as 1 if the head of household is male, and 0 otherwise. Married is coded as 1 if the head of household is married, and 0 otherwise. Religion is coded as 1 if the head of household is a Muslim, and 0 otherwise. Urban is coded as 1 if the household's district is an urban one, and 0 otherwise. Non-income landownership is coded as 1 if the household owns any land as an asset that does not generate any income, and 0 otherwise. This variable will be used as an instrumental variable in the empirical analysis.

## Summary Statistics

From Table 1, it can be observed that of the total of 1205 households, 38% are poor. 31% have at least one member working abroad, but only 24% receive foreign remittances with a monthly average of BDT 36,927.81. This shows that not every migrant remit. Average monthly income of total sampled households is BDT 31,107.52, with BDT 5,674.79 as

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<sup>2</sup> As the nationally defined upper poverty line for the year 2013 was not reportedly available, I assumed it to be an average between the one defined for 2010 and the one defined for 2016 by (Bangladesh, 2016). That is, the nationally defined upper poverty line for the year 2013 is assumed to be:  $\frac{1485+1862}{2} = 1673$

<sup>3</sup> Dependency Ratio is calculated as:  $\frac{(\text{No. of members aged below 15})+(\text{No. of members aged above 64})}{(\text{No. of members aged between 15 and 64})} \times 100$

average monthly per capita income. Migrant households on an average have 58% of their total monthly income as international remittances. Households on an average have around 5 members with a dependency ratio of around 50%. The average characteristics of household heads are as follows: they are around 47 years old with around 4 years of education, of which 82% are male and 93% are married, and 94% are Muslims. Around 50% of the sampled households are located in urban districts and 96% of them are the owners of non-income generating land.

Table 1: Sample summary statistics

<b>Variables</b>	<b>Mean</b>	<b>Standard Deviation</b>
Poverty	0.383	0.486
Migration	0.310	0.463
Remittances	0.241	0.428
Monthly remittances by migrant households	36,927.81	353462
Monthly income	31,107.52	210273.5
Monthly per capita income	5,674.79	24362.17
ln (monthly per capita income)	7.772	1.112
Remittances as a share of income in % by migrant households	58.204	38.019
Household Size	5.066	1.952
Dependency Ratio in %	50.032	46.816
Education	3.912	4.5742
Age	46.528	13.684
Male	0.818	0.386
Married	0.927	0.260
Religion	0.941	0.236
Urban	0.498	0.500
Non-income land ownership	0.959	0.200

### **3.4.2 Other Sample Statistics and Distributions**

In this section, I present other informative statistics and distributions from the sample which are important for the analysis and offer a deeper understanding of the associated variables of research question.

From Table 2, it can be seen that from the total of 461 poor households living below the poverty line, only 64 of them have experienced international migration whereas the rest 397 do not have anyone in the household working abroad. Compared to non-poor households, this difference in numbers between migrant and non-migrant households is smaller (124 vs 333). Migrant households also seem to enjoy a higher average monthly and per capita income than households with no international migrants.

Table 2: Distribution of poverty and income by migrant and non-migrant households

	<b>Households with international migration</b>	<b>Households with no international migration</b>	<b>Total</b>
Poor	64	397	461
Non-poor	310	434	744
Average monthly income	48,891.17	23,103.81	31,107.52
Average monthly per capita income	7,405.88	4,895.70	5,674.79

From Table 3, it can be seen that from the total of 461 poor households under the poverty line, only 30 of them earn remittances from abroad while the rest 431 do not earn any remittances. Compared to richer households, this difference in numbers between remittance earning households and non-remittance earning households is smaller (224 vs 401). Remittance earning households also seem to have a higher average monthly and per capita income than non-recipient households.

Table 3: Distribution of poverty and income by remittance recipient and non-recipient households

	<b>Households with remittances</b>	<b>Households with no remittances</b>	<b>Total</b>
Poor	30	431	461
Non-poor	260	484	744
Average monthly income	57,460.98	22,755.06	31,107.52
Average monthly per capita income	8,449.528	4,795.368	5,674.79

Table 4 and Table 5 display the results of the Foster-Greer-Thorbecke (FGT) poverty indices (Foster, Greer, & Thorbecke, 1984) for households with and without international migration, and households with and without remittances respectively. The mechanism uses difference between income and defined poverty line as weights to calculate poverty count, average poverty gap as poverty depth, and average squared poverty gap as severity of poverty.

From Table 4, 38.26% of total sampled households are under poverty. The average poverty gap is 15.78% and the average squared poverty gap of 8.81%. The average poverty gap implies that the poor households on an average need an increase in income by at least 15.78% to reach the poverty line. The average squared poverty gap value shows that the income inequality amongst the poor is 8.81% on an average.

Categorizing the indices under migrant and non-migrant households, only 17.11% households with international migration are living in poverty. On an average, they require to overcome an income difference of 7.60% and share a poverty severity of 4.88%. On the other hand, the

number of households living under the poverty line with no international migration are a staggering 47.77%. They also have a higher average poverty gap than migrant households of 19.31%, and share a higher severity of poverty and income inequality of 10.58%.

Table 4: The FGT measures of poverty in % by international migration status

	<b>Households with international migration</b>	<b>Households with no international migration</b>	<b>Total</b>
Headcount %	17.11	47.77	38.26
Average Poverty Gap %	7.60	19.31	15.78
Average Squared Poverty Gap %	4.88	10.58	8.81

From Table 5, only 10.35% households with international remittances are living in poverty. On an average, they require to overcome an income difference of 4.01% and share a poverty severity of 2.40%. On the other hand, the number of households living under the poverty line with no international remittances are a staggering 47.10%. They also have a higher average poverty gap than migrant households of 19.52%, and share a higher severity of poverty and income inequality of 10.84%.

Table 5: The FGT measures of poverty in % by remittance receiving status

	<b>Households with remittances</b>	<b>Households with no remittances</b>	<b>Total</b>
Headcount %	10.35	47.10	38.26
Average Poverty Gap %	4.01	19.52	15.78
Average Squared Poverty Gap %	2.40	10.84	8.81

Overall, the FGT indices for the sampled households summarize that when compared to non-migrant and non-recipient of remittances households, poor households with international migration and remittances are much lower in total number, need to overcome their poverty status by increasing their income by a smaller amount, and suffer from a lower income inequality. This distributional statistic gives more weight to the possibility of positive impacts that international migration and remittances can have on the poverty situation of households.

Table 6 shows the combined distribution of international migration and remittances recipient households. It can be observed that out of total 374 international migrant households, 290 receive remittances (77.54%) while the rest 84 do not (22.46%). This shows that although international migration and remittances go hand-in-hand, it is not always the case that every migrant *will* remit. A reluctance to remit can be possibly explained by a lack of altruistic and investment motives, or by unfavorable economic and income factors abroad where the

migrant is located. Those who do remit can probably be primarily driven by strong altruistic and self-interest motives. On the other hand, 831 households with no international migration from the total of 1205 receive no remittances from abroad.

Table 6: Distribution of international migration and remittances recipients by households

	Households with remittances	Households with no remittances	Total
Households with international migration	290	84	374
Households with no international migration	0	831	831
<b>Total</b>	290	915	1205

Table 7 highlights the most common reasons for international migration according to the interviewed households. Around 60% of the migrants went abroad seeking work or better paying work opportunities while 29% went directly for work. Only around 4% went abroad as part of job transfer and another 1% for study or training purposes. The rest reported other reasons, such as following newly married spouse abroad and fall in profits from agriculture. This implies that the primary reason households usually migrate internationally is for better employment and higher wages which can lead to gain in better productive knowledge and higher remittances that will eventually reduce poverty conditions back home.

Table 7: Reasons for international migration

Reasons	Percentage
Seek work or seek better work	59.95
Work purposes	29.11
Job transfer	3.80
Study/Training	1.27
Others	5.87
<b>Total</b>	<b>100</b>

Table 8 summarizes the primary methods of financing migration utilized by international migrants in their most recent migration. The average cost of migration in the sample is BDT 266,223.20 (US\$ 3154.74). It seems that around 38% of total migrants were financially supported by their family, while around 16% borrowed from money lenders. Around 11% borrowed from immediate family while another 11% sold assets to finance the cost. 10% utilized family savings while around 5% again borrowed from extended family. Only 1.5% paid for the migration costs using their own savings. This shows that international migration can possibly be very costly for migrants to bear alone and they will need external sources of financing other than their own savings. This makes the households more vulnerable to future

loss of income, especially if this huge cost is financed by borrowing (such as from other family members or money lenders) and left-behind households have to repay the loan with interest.

Table 8: Methods of financing most recent international migration

<b>Methods</b>	<b>Percentage</b>
Received financial support from family	37.75
Borrowed from money lender	16.24
Borrowed from immediate family	10.55
Sale of assets	10.55
Family savings	10.34
Borrowed from extended family	5.27
Personal savings	1.48
Others	7.28
<b>Total</b>	<b>100</b>

Table 9 highlights the countries of destination of international migrants in the sample. It appears that UAE, KSA (Kingdom of Saudi Arabia), and Malaysia are the top three countries of migration followed by India, Oman, Singapore, and Kuwait. It is interesting to see India in the list as it is not a developed country unlike the others in the list, but this can be possibly explained by the country's immediate neighboring position and excellent diplomatic relations it has with Bangladesh. This makes the migration process less costly and easier to follow through of Bangladeshi migrants going to India. Overall, with four most emigrated countries in the region, it seems that the Middle East is the most preferred destination by the international migrants from Bangladesh.

Table 9: Countries of migration

<b>Countries</b>	<b>Percentage</b>
UAE	25.90
KSA	18.02
Malaysia	15.99
India	13.51
Oman	8.33
Singapore	5.86
Kuwait	3.38
Others	9.01
<b>Total</b>	<b>100</b>

Table 10 summarizes the types of recent occupation of international migrants in the sample. It can be observed that manual labor jobs such as construction work, production, and domestic tasks, rank at the top while professional positions such as medical service and teaching composes of only 5% of the total type of occupation. This implies that workers from

Bangladesh mainly go for lesser skilled or unskilled jobs primarily due to their lack of education and training, and also because these jobs are more available more in numbers than the jobs in other categories, especially in the Middle East.

Table 10: Migrants' occupation

<b>Type of occupation</b>	<b>Percentage</b>
Skilled construction workers	18.90
Domestic workers	13.59
Production staff (textiles/electronics)	10.83
Unskilled construction workers	10.19
Informal sector	8.49
Technician and professionals (doctors/nurses/teachers)	5.10
Others	32.9
<b>Total</b>	<b>100</b>

Table 11 depicts how often international migrants in the sample remit money from abroad to their families back home in Bangladesh. It seems that around 41% of total migrant households receive remittances every month, while 30% receive every two months, and 11% receive every three months. 9% of the migrant households receive remittances on a weekly basis. Around 2% of migrant households only receive remittances if requested, in special occasions, and in emergencies. The high frequency of remittance on monthly bases implies strong possible altruistic motives and family ties of international migrants from Bangladesh. This may improve poverty situation of local households by accumulating or spending regular income gain from remittances.

Table 11: Frequency of remittances

<b>How often remittances are sent by migrants abroad</b>	<b>Percentage</b>
Monthly	40.59
Every couple of months	30.20
Every three months	11.14
Weekly	8.66
Every six months	4.46
Fortnightly	1.49
Annually	1.49
Only if households request money	1.49
Only in special occasions and emergencies	0.50
<b>Total</b>	<b>100</b>

Table 12 shows how migrant households primarily used the remittances they received from members working abroad. Daily spending on food, clothing, drinks, and tobacco, rank at the top with around 88%. The rest of the remittance money was used to pay back migration and other loans, pay for education and medical expenses, and was invested in housing and savings

in banks. This shows that migrant households from Bangladesh mainly use international remittances for daily consumption of necessities such as food and clothing, but invests very small portions in house improvement and savings, and does not invest at all in trade and business enterprises such as small shops. Therefore, although migrant households are overcoming poverty through remittances financed expenditure in food and clothing, long-term self-sustainability is not achieved because of lack of investment of remittances money in income generating activities. This could also be true because of a lack of motivation to invest in the first place due to remittances crowding out household income and increasing labor participation prices.

Table 12: Use of remittances by migrant households

<b>Category of Expenditure</b>	<b>Percentage</b>
Everyday consumption (food/clothing/drinks/tobacco)	87.87
Pay back migration loans	4.46
Education	1.73
Medical	1.49
Housing	1.24
Pay back other loans	0.74
Savings and fixed deposits in banks	0.50
Others	1.97
<b>Total</b>	<b>100</b>

# 4 Empirical Approach

## 4.1 The Research Question Specification

To analyze how international migration is contributing to poverty mitigation in Bangladesh, the following broader and comprehensive empirical research question is proposed:

“Is international migration and remittances improving the economic conditions of households in Bangladesh in terms of poverty and income?”

I further broke down this question into smaller hypotheses to be examined individually. First, I investigated if international migration and remittances are increasing or reducing poverty status of households using a logit regression model. Then, I analyzed if international migration and remittances are improving or decreasing income of households along different quantiles of income group (poorest, middle income earners, or richest) using a quantile regression model. Previous studies have used both logit regression model and quantile regression model to estimate the effects of international migration and remittances on poverty and income levels. But those studies used such methodologies separately. This study is the first to use both methods as complementary approaches. The motivation behind this dual methodological approach is that while the logit regression model can conceivably yield the probability margin of being poor and non-poor, it is also interesting to see where in the income distribution the income gains from overseas migration and remittances are possibly more or less in amount. This is because if it is the richer households who are experiencing this income change, then the overall effects of international migration and remittances on poverty in the economy will be lower. On the other hand, if it is the poorer households who go through this income gain or loss, then the overall effects of international migration and remittances on poverty in the economy will be much higher as households at the bottom of the income chain are more susceptible to chances of poverty than better-off households.

## 4.2 Logit Regression Model Specification

### 4.2.1 Background

In order to estimate the effects of international migration and remittances on poverty in Bangladesh, I utilized a logit model<sup>4</sup>. This particular regression model has a non-linear relationship between the dependent and independent variables due to the dependent variable being a binary, and follows a cumulative logistic distribution function (Stock & Watson, 2015). This model is suited when the outcome variable is binary (1 or 0) and unlike linear probability models its predicted probability values are confined between 0 and 1 which makes making the interpretation more realistic.

### 4.2.2 The Specified Logit Regression Model

In this case, the dependent variable on the left-hand side of the logit regression equation is the poverty status of households, and the independent variable of interest on the right-hand side is international migration or remittances. More specifically, the following logit regression equation is analyzed:

$$Poverty_i = \alpha_i + \beta\mu_i + \gamma X_i + \epsilon_i \quad (1)$$

In Equation (1), “*Poverty<sub>i</sub>*” is a dummy variable which equals 1 if household *i* is poor from having its monthly per capita income below the nationally defined poverty line, and 0 otherwise. “ $\alpha_i$ ” is the constant term. “ $\mu_i$ ” is another dummy variable which equals 1 if (i) household *i* has at least one member currently working internationally in another country and have been away from household for at least 3 months in the last 10 years, and 0 otherwise, or if (ii) if household *i* has received remittances money from abroad in the last 12 months, and 0 otherwise. The exact specification of “ $\mu_i$ ” therefore depends on which particular source of effect on poverty the model is trying to estimate: the effect from international migration, or the effect from remittance earnings. “ $\beta$ ” is the coefficient of interest, and is interpreted as how

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<sup>4</sup> I decided to proceed with logit regression model over other non-linear regression model that also estimates probabilities. This is because it is easier to implement an instrumental variable in a logit regression model using statistical software packages.

much in odds ratios poverty probabilities are increasing or decreasing from international migration and remittances. “ $\epsilon_i$ ” is the idiosyncratic error term. “ $X_i$ ” covers all other variables for which are common to both types of households and might affect poverty status and migration and remittances decisions. “ $\gamma$ ” is the coefficient of control variables. These variables are controlled for to minimize endogeneity bias, and it is assumed that there exists very little or no correlation or multicollinearity between the control variables.

## 4.3 Quantile Regression Model Specification

### 4.3.1 Background

Figure 5 displays the kernel density estimate for monthly per capita income of households in the data. It can be observed that the distribution is non-symmetric and highly positively skewed. This yields the possibility that the marginal effects from international migration on income (assuming such effects exist) between migrant and non-migrant households will be different in size at different points in the income distribution. The same may also be true for the marginal income gains between recipient and non-recipient of remittances households. The previously defined logit model may estimate the probabilities of being poor from possible income changes caused by international migration and remittances over the entire income distribution. But it may not reveal the possible different sized income effects (hence different probability estimates) that occur at different levels of the income distribution. This begets the rationale to dissect the income distribution into different percentiles, or *quantiles*, and estimate the possible effects from migration and remittances on income (which in turn determines poverty) more closely and separately in each quantile.

The results from such estimation will help to answer the following: are the effects more or less severe in magnitude for the poorer households in the bottom quantiles when compared to the richer households in the top quantiles? Answering this question will cast a better understanding on the possible role international migration and remittances are playing in reducing poverty. For instance, if the poorer households are having the biggest positive effects (again, assuming such effects exist) from international migration and remittances compared to households in other quantiles, then the importance of such occurrences in overall poverty mitigation in the economy is vastly significant. On the other hand, if the most benefits

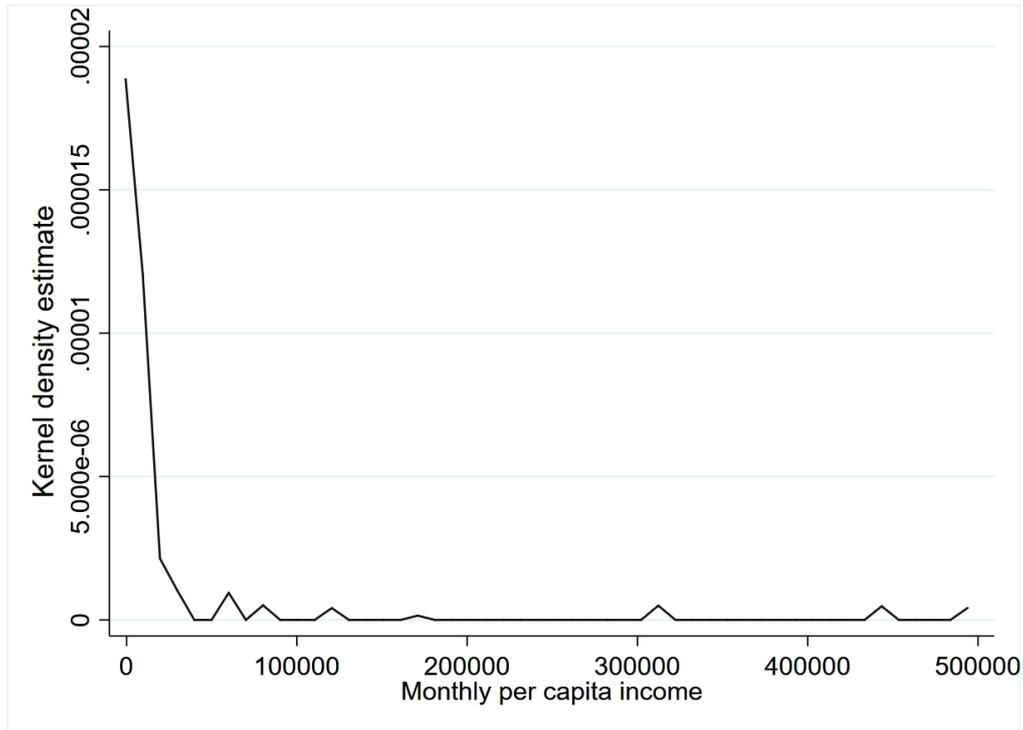


Figure 5: Kernel density estimate of monthly per capita income

from international migration and remittances are enjoyed by the richer households than the poorer ones down the income pyramid, then overall poverty mitigation effect in the economy is trivial in magnitude. This is because poorer households being closer to the poverty line are much more vulnerable to poverty probabilities than the richer ones for whom the poverty line is (almost) irrelevant.

To achieve this particular estimation, I utilized a quantile regression (QR) model which is based on the theoretical work of Koenker (2005)<sup>5</sup>. According to the author, quantile regressions are more of an extension to ordinary least squares (OLS) regressions. Traditional least squares regression results report the change in conditional mean of the dependent variable that is associated with a change in the independent variable. On the other hand, QR models estimate the associated change caused by the independent variable on a set of specified conditional quantiles of the dependent variable. This allows to measure causal impacts at different levels of analytical relationships between variables of interest and the results are more robust against outliers and skewness in the distribution of observations.

<sup>5</sup> I would request the reader to refer to (Koenker, 2005) for a detailed discussion on the theoretical foundation and application of quantile regression.

For the QR estimation in this study, I defined five quantiles in the income distribution as: 0.10 for the poor, 0.25 for the upper poor, 0.50 for the median earners, 0.75 for the rich, and 0.90 for the richest.

### 4.3.2 The Specified Quantile Regression Model

Since the QR model can be classified as a possible extension of the OLS model, the specification of the QR model is similar but estimated multiple times at each specified quantile. One of the fundamentals of a QR model is that the dependent variable has to be continuous. Therefore, in this case, the dependent variable on the left-hand side of the QR equation is the natural logarithm of monthly per capita income of households. I chose the logarithm function for ease of interpretation. The independent variable of interest on the right-hand side is international migration or remittances. More specifically, the following quantile regression equation is analyzed:

$$\ln(\text{Income\_per\_Capita})_i^Q = \alpha_i^Q + \beta \mu_i^Q + \gamma X_i^Q + \epsilon_i \quad (2)$$

In Equation (2), “ $\ln(\text{Income\_per\_Capita})_i$ ” is the natural logarithm of monthly per capita income of household  $i$ . “ $\alpha_i$ ” is the constant term. “ $\mu_i$ ” is a dummy variable which equals 1 if (i) household  $i$  has at least one member currently working internationally in another country and have been away from household for at least 3 months in the last 10 years, and 0 otherwise, or if (ii) if household  $i$  has received remittances money from abroad in the last 12 months, and 0 otherwise. The exact specification of “ $\mu_i$ ” therefore depends on which particular source of effect on poverty the model is trying to estimate: the effect from international migration, or the effect from remittance earnings. “ $Q$ ” is the specified quantile of interest. “ $\beta$ ” is the coefficient of interest, and it is interpreted as the factor (in %) by which migrant or remittances-recipient households are earning more or less in per capita than non-migrant or non-recipient of remittances households. “ $\epsilon_i$ ” is the idiosyncratic error term. “ $X_i$ ” covers all other variables for which are common to both types of households and might affect poverty status and migration and remittances decisions. “ $\gamma$ ” is the coefficient of control variables. Just like the logit model, these variables are controlled for in an attempt to minimize endogeneity, and it is assumed that there exists very little or no correlation or multicollinearity between the control variables.

## **4.4 Control Variables Specification**

In this section, I summarize in Table 13, the control variables and the rationale behind the inclusion of each variable: that is, how the control variables may affect international migration decisions, remit decisions, household income, and household poverty status. All the control variables are present in both the proposed models. For detailed information on how these variables are defined, please refer to Section: “3.4 Descriptive Statistics”.

Table 13: How the included control variables may affect the variables of interest

<b>Variables</b>	<b>Affects Intl. Migration</b>	<b>Affects Remittances</b>	<b>Affects Income and Poverty</b>
Household Size	Larger households will be more prone to send the “extra” member abroad, and vice versa	Larger households with more mouths to feed will be more dependent on remittances, and vice versa	Larger households will require more income to protect themselves from poverty, and vice versa
Dependency Ratio	Households with more dependents will be less tilted towards international migration due to having a feeling of responsibility to take care of the dependents, and vice-versa	Households with more dependents will be more reliant on remittances due to higher expenditures, and vice versa	Households with more dependents are more susceptible to poverty due to having higher number of non-working members, and vice versa
Education of Head of household	Highly educated household heads will be more favorable towards international migration because of ambition and societal respect, and vice versa	Highly educated household heads will be less dependent on remittances as they have better chances of supporting left-behind members financially, and vice versa	Highly educated household heads will earn higher wages and can better prevent poverty, and vice versa
Age of Head of household	Older household heads will be less favorable towards international migration as they will require other members to take care of them, and vice versa	Older household heads will be more dependent on remittances as they may not have the ability to work, and vice versa	Older household heads may produce a greater number of income earners and thus improve poverty situation, and vice versa
Male Head of household	Male household heads will be more inclined to international migration as they are less susceptible to gender based social biases than female household heads	Male household heads tend to have better income opportunities than female ones and may therefore not require remittances to sustain household	Male households usually have better paying employment opportunities than female ones and thus can improve poverty situation of households
Married Head of household	Married household heads will be more vulnerable to social ties with spouses than unmarried ones and may not be too keen on international migration	Married household heads have more chances of receiving remittances than unmarried ones due to altruistic motives from strong social ties	Married household heads can benefit from cooperative family arrangements than unmarried ones and have more available time and effort to pursue better income generating activities
Religion of Head of household	Muslim household heads will be less prone to international migration due to religion adherence than non-Muslim ones	Muslim household heads are usually better earners in the community than minority ones and may not require remittances	Muslim household heads will face less or no social stigma or religious prejudice and can have better earning jobs
Urban households	Urban households will be more favorable to international migration as they are more exposed to information	Urban households are usually better earners than rural ones and may not require remittances to survive	Urban households usually have better income prospects in the community than rural ones

## 4.5 Instrumental Variable (IV) Specification

### 4.5.1 The Endogeneity Problem

The main empirical challenge in estimating the effects of international migration and remittances on any outcome is the premise that the decision to migrate overseas and remit money is not random but chosen by migrants based on some factors which are usually not captured in household microdata surveys. As such, measuring the marginal effects of international migration and remittances between migrant and non-migrant households would also “pick up” the effects from such conditional factors if these variables are not controlled for. The proposed empirical models in the earlier sections are therefore bound to suffer from such methodological problems. The assumption that the control variables are non-correlating is also too naïve, as there may be unobservable factors influencing the observable explanatory variables simultaneously. Not solving for such issues in the econometric model would result in biased or incorrect estimates and thus may not capture the true effect of international migration and remittances on poverty and income.

As discussed extensively in the literature, this endogeneity problem present in the studies of international migration and remittances can be categorized into four main classes according to Adams Jr. (2011), McKenzie and Yang (2012), and McKenzie and Sasin (2007).

#### **Simultaneity**

There can be some variables which can influence both migration decision and income levels at the same time. Households can simultaneously decide to send one of its members abroad and engage in better productive activities at home resulting in higher income based on improvement in overall household health or higher household ambition. Often these variables are not quantified in household level surveys and are thus absent from econometric models. Estimating a naïve regression equation without the inclusion of such simultaneity causing variables would therefore include the effects of the omitted factors and result in over or understatement of the true effect.

## **Reverse Causality**

While it is assumed that international migration and remittances are the predictive variables for poverty and income, it could also be possible that poverty and income are predicting international migration and remittances decision of households. For example, a poorer household with lower income would be more induced to send one of its members overseas for better earning opportunities and send remittances back. Estimating the effect of international migration and remittances on poverty in such a case would therefore result in a positive relationship between the variables as higher or lower poverty predicts higher or lower probabilities of migration and remittances. Not solving for this would thus result in the wrong deductions if one is looking for the one-sided causal impact of international migration and remittances on poverty, not the other way around.

## **Selection Bias**

Similar to the simultaneity problem, households self-select into migration based on conditional factors. If these factors are not controlled in the regression models, then it is erroneous to conclude what would have happened to non-migrant households just by looking at the characteristics of outcome of migrant households. For example, when there is “positive selection”, households with better education and income are more willing to migrate. The opposite occurs when there is “negative selection”.

## **Omitted Variables**

Similar to selection bias, unmeasured or unobserved variables that affect both income and migration decisions can result in biased conclusions by including their own effects in the estimates, if not controlled for. However, it is quite difficult to quantify such factors in the first place and often are missing from household surveys. For example, ability of households can influence both migratory decisions and earning potentials at home. Household heads who are risk averse will be less willing to produce international migrants and have more labor participation to earn more at home and protect households against negative shocks. A bad harvest will result in a decline in income and will also motivate households to migrate seeking better earnings, etc. If these invisible variables are not controlled for in the model, then we could find indirect causal relationship between international migration or remittances and poverty/income through these invisible channels and draw the wrong conclusions.

## **4.5.2 Choosing from Available Methods in an Attempt to Minimize Endogeneity Bias**

Adams Jr. (2011) and McKenzie and Yang (2012) discussed six available solutions which have been used by previous studies in attempts to overcome the endogeneity problem in the empirical models of international migration and poverty. I shall now relate the discussion to the applicability of such solutions in the context of this study, and my chosen solution.

### **Randomized Policy Experiments**

This solution involves finding a governmental policy in the empirical setting of the study that encourages qualified migrants to embark international migration, but ends up randomly denying visas and work permits for a portion of eligible applicants. In this way, a “treatment group” is created from the successful migrants who end up migrating and a “control group” is created from the left-behind would-be migrants. As both the groups possess the same characteristics which qualified them as migrants, a comparison between them in terms of outcomes of interest (household income or poverty) could yield accurate estimates from the predictive variables of interest. Unfortunately, these kinds of policies are very rare to find, especially in the context of Bangladesh, and the latest study to take advantage of such a randomized policy experiment was done by Mckenzie et al. (2010) for the migrant lottery system of Tongans to New Zealand.

### **Natural Experiments**

Using natural experiments, such as changes in exchange rates for migrants affecting remittances or weather changes affecting income back home, one could analyze the causal impacts of these shocks by comparing the outcomes of interest before and after. Yang and Choi used rainfall shocks for crop yields, and the 1997 Asian financial crisis for exchange rates and remittances in the context of Philippines (Yang & Choi, 2007). The authors found that when there is a negative domestic income shocks, the amount of remittances increase to replace the income decline back home, and vice versa. Unfortunately, it is quite difficult to use such natural experiments in the context of Bangladesh due to lack of proper knowledge and data.

## **Panel Data**

By using the “first differences” technique on panel data for a sample of migrant and non-migrant households containing repeated observations on same households for at least more than one period, we could easily neutralize the taints of endogeneity, including unobserved time invariant covariates. Unfortunately, to the best of my knowledge, panel data on Bangladesh households containing income and migration information is yet to exist.

## **Propensity Score Matching**

This approach involves taking a migrant household, then reconstructing a “counterfactual” household that has not undertaken international migration but share identical characteristics which are gauged by assigning scores. Then, one could take the difference in outcome of interest between the matched households and estimate the marginal effects from international migration. Hassan and Jebin used propensity score matching techniques to compare between migrant and non-migrant households in Bangladesh to find that migrant households have higher consumption and expenditure (Hassan & Jebin, 2018). However, Adams Jr. (2011) argues that this method does not take the selection problem into account and thus may not yield the best results.

## **Ordinary Least Squares (OLS) with Sample Selection Procedure**

Adams Jr. (2011) explained that one could use the naïve OLS and simply regress the outcome of interest (such as poverty or income) on the predictive variable of interest (international migration or remittances) and the set of controls, and then use a sample selection procedure such as the two-stage Heckman model to correct for selection problems. Beyene (2014) used the Heckman model to overcome selection endogeneity when investigating the effects of international remittances on poverty and inequality in Ethiopia. However, as I am not experienced with this sample selection procedural approach, I chose not to proceed with this solution.

## **Instrumental Variable Approach as Proposed Method**

The most common and easy-to-utilize method used by previous studies to try to bypass the endogeneity problem in the studies of international migration on poverty is to implement an instrumental variable in the regression models. Adams Jr. (2011) explained that this particular

variable should be correlated with the explanatory variable but must not affect the outcome variable directly or through any channels other than the explanatory variable (the exclusion restriction condition). The advantage with this approach is that once such a variable satisfying the predefined condition is found, it is very easy to implement in the specified models and overcome all the endogeneity problems. The challenge, however, is to find such a variable in the first place. I chose to proceed with this particular solution to try to solve for the endogeneity issues in my proposed models for the ease of implementation. McKenzie et al. (2010) in their study found that amongst the non-experimental techniques compared to experimental ones, instrumental variable approach works best when measuring the impacts of migration on income, with only a 9% bias. This is another motivation of mine for selecting this method of solution to endogeneity. Then again, the exclusion restriction argument of my proposed instrument will always be open to contest.

### **4.5.3 Choosing from Available Instruments**

A number of previous studies investigating the effects of international migration and remittances on income have used different instruments to tackle the endogeneity problem in their specified econometric models. I shall now discuss the applicability of such instruments for the models and context in this study, and my proposed instrument.

#### **Distance**

McKenzie et al. (2010) used “distance” as an instrument for international migrants when examining the effects on outcomes of interest on Tongan migrants in New Zealand. The authors proposed that distance from migrant households to the New Zealand consulate in Tonga would act as a “cost to overcome” for households looking to migrate to New Zealand and will thus influence their migratory decisions. But this geographical distance in Tonga should have no impact on migrants’ earnings in New Zealand. Bang et al. (2018) used a similar exclusion restriction argument when implementing distance as an instrumental variable but upon examining the effects of remittances on household income instead in Nigeria. According to the authors, latitudinal distance from households to Lagos which serves as the point of international travel would affect household’s migration decisions through costs and time, but should have little or no impact on local income potential as Lagos is situated at the edge of Nigeria’s south-west border.

However, the exclusion restriction of distance from consulates or international airports to household locations may not hold in the context of Bangladesh. Tonga is a nation composed of two separate islands, and Nigeria has a land area of 923,768 sq. km (The World Factbook, 2019). Bangladesh on the other hand is a much smaller, single land nation, with a land area of only 148,460 sq. km (The World Factbook, 2019). Any economic changes in the capital city will easily affect at least the nearby districts. Therefore, distance from consulates which are located in the capital will be highly correlated with income potential of households as those who are closer or further from the capital city will have better or poorer income opportunities. This must also be true in the case of Nigeria. As this violates the exclusion restriction of distance as an instrument, I chose not to implement this in my models.

### **Mobile Phone Ownership**

Bang et al. (2018) also used “mobile phone ownership” as a second instrument in their analysis of effects from remittances on household income in Nigeria. The authors argued that mobile ownership would induce households to migrate and send remittances as mobile money transfers as remittances from abroad have become quite popular and easier to process. As ownership of mobile comes *after* the spending of household income, it should have no effect on income which is the variable of interest. Therefore, the exclusion restriction should hold. This however is a very strong assumption, as one could always utilize mobile phone technology to improve trade and business income.

Unfortunately, the information on mobile phone ownership is missing from the MOOP dataset utilized in this study, which is why I had to skip implementing this as an instrument in my empirical analyses.

### **Western Union Offices**

Amuedo-Dorantes and Pozo (2006a) used the number of Western Union offices present in a Mexican state to instrument for remittances. The exclusion restriction should hold as more or lesser number of Western Union offices in the area would induce positively or negatively induce migration decisions and remittances, but should have little or no impact on household income.

Unfortunately, historical information of exact number of Western Union offices in the sampled districts at the time of the household survey could not be discovered, which is why utilization of this instrument was not possible.

### **Non-Income Land Ownership as Chosen Instrument**

Bang et al. (2016) used non-agricultural land ownership as an instrument to solve for endogeneity when examining the effects of remittances on poverty and inequality in Kenya. The authors argued that households view non-agricultural lands as fixed assets to protect them against negative income shocks, and will be therefore be less motivated to send a member abroad for international employment to diversify household income sources. The authors strictly distinguish the land ownership from agricultural land ownership because the latter has income generating potential and will violate the exclusion restriction by directly influencing income which is the dependent variable of interest.

Following this approach, I chose non-income land ownership as my preferred instrument. Any land owned by households which is stored strictly as wealth and unlike agricultural and commercial land does not generate any household income should be a valid instrument. Households who own such land can then borrow against this land as collateral to finance migration. In this way, the ownership of non-income land positively determines migration decision. This will also in turn affect remittances. But since such land would not generate any income and is simply stored as wealth, household income is not affected through the ownership of this category of land. Therefore, since non-income land ownership affects migration decision by expanding migration financing sources, and since such land ownership has no direct or indirect impact on income other than through international migration or remittances, the exclusion restriction condition should hold.

Two possible arguments arise against this chosen instrument. First, it could be that only the relatively better off households are in possession of non-income lands as they have the available income to afford such lands. However, this may not necessarily be true. Land can also be inherited from parents as bequest, gifted as part of dowry in marriage, and "conquered" illegally due to lack of security (especially in the rural regions). The latter two are common occurrences in rural Bangladesh. Second, land owning households can borrow against their land and temporarily increase their income, which violates the exclusion

restriction. I assume this possibility to not to hold true in estimation, but acknowledge it as one of the limitations of this study.

Using the information from this study's MOOP dataset, the variable is coded as 1 if household owns any land *other than* agricultural and commercial land so that the exclusion restriction stays intact, and 0 otherwise. I utilized non-income land ownership as an instrumental variable in both the proposed logit model and quantile regression model.

### **First Stage Regression of Chosen Instrument**

To test the statistical predictive power of non-income land ownership on migration and remittances, I ran first stage regressions. For international migration, the associated coefficient of non-income land ownership is 0.23. The positive sign on the coefficient confirms the argument that non-income land ownership can positively influence migration by allowing households to borrow and finance migration. The F-statistic is 32.28 which is higher than the critical threshold of 10. This confirms that the chosen instrument for international migration is not a weak one.

For remittances, the associated coefficient of non-income land ownership is 0.22. The positive sign on the coefficient also confirms the argument that non-income land ownership positively supports migration which in turn results in the inflow of remittances. The F-statistic is 58.32 which is also higher than the critical threshold of 10. This confirms as well that the chosen instrument for remittances is not a weak one.

### **4.5.4 Implementation Procedure of Chosen IV in Logit Model**

The implementation procedure of IV in a logit regression model is guided by the work of Terza, Basu, and Rathouz (2007). The authors in their paper experimented with two ways of including an IV in non-linear models using simulations. They concluded from their results that the framework of utilizing an IV in non-linear models that will generally yield consistent estimators is the two-stage residual inclusion (2SRI) method, which is identical to the two-stage least squares (2SLS) method in linear models.

Just like 2SLS, the procedure of implementing an IV in a non-linear model involves two but different steps: (i) regress the dependent variable on the chosen instrument (and controls) and obtain the predicted residual vector of the error term (ii) regress the independent variable on

the dependent variable (and controls) including the predicted residual vector of the error term from the first step. More specifically, in the following equations, in (A1), regress the dependent variable  $x$  on instrument  $z$  (including control vector  $X$ ) and obtain the predicted residual vector of the error term  $\epsilon$ . Then, in (A2), regress outcome  $y$  on dependent variable  $x$  (and control vector  $X$ ) including the predicted error term vector  $\epsilon^{2SRI}$  from the first step involving (A1). The entire procedure should also be bootstrapped to obtain corrected standard errors, and non-linear regression should be used in both steps.

$$x = \alpha + \beta z + \gamma X + \epsilon \quad (A1)$$

$$y = \alpha + \beta x + \gamma X + \epsilon^{2SRI} \quad (A2)$$

Terza et al. (2007) explains that the reason this should work is because even though the endogenous confounders in (A1) are unknown, it is possible to consistently estimate  $\epsilon$  and thereby include the predicted or estimated residual vector as a control vector in the second stage (A2), and thus minimize the endogeneity in the final model.

Unfortunately, there is no single command to do the steps above in one step in STATA. As I had to do so step by step in STATA, I used the bootstrapping command to obtain the standard errors and hopefully minimize biases caused by the inclusion of predicted values over actual values of the residuals.

#### **4.5.5 Implementation Procedure of Chosen IV in Quantile Regression Model**

Due to the QR model being similar to OLS model, the implementation of IV in such model involves mimicking the 2SLS approach. Following Kwak (2010), the procedure is guided in the following steps:

- (i) Using least squares, regress the endogenous independent variable  $X$  on a set of chosen instruments  $Z$  and obtain the predicted values of  $X$ .
- (ii) Using the predicted values of  $X$ , estimate the  $n^{\text{th}}$  quantile of the dependent variable  $Y$ , just like the standard quantile regression estimation as theorized by Koenkar (2005).

Unfortunately, also in this procedure, there is no single command to do the steps above in one step in STATA. As I had to do so step by step in STATA, I used the bootstrapping command to obtain the standard errors and hopefully minimize biases caused by the inclusion of predicted values over actual values of the variables of interest.

# 5 Results

## 5.1 Results from Logit Regression

### 5.1.1 The Effects of International Migration on Poverty

Table 14 summarizes the results from the logit regression of international migration on poverty. From the standard logit regression results, it is observed that households with at least one current international migrant reduce their poverty probabilities by odd ratios of 19%. The negative sign of the coefficient confirms this reduction effect, and it is significant at the 1% significance level. When this logit regression model is injected with non-income land ownership as an IV, the poverty reducing odds ratios from international migration decrease to 12% with the negative sign of the associated coefficient intact. This effect remains significant at the 1% significance level. Thus, after possibility minimizing endogeneity bias, there exists a poverty reducing effect for households caused by international migration via the positive channels, and this effect is both statistically and economically significant.

Table 14: Logit regression results for international migration (Dependent variable: Poverty)

Variables	Logit		Logit with IV	
	Coefficients (Robust Std. Errors)	Odds Ratios (Robust Std. Errors)	Coefficients (Bootstrapped Std. Errors)	Odds Ratios (Bootstrapped Std. Errors)
Migration	-1.66*** (0.170)	0.190 (0.0322)	-2.09*** (0.444)	0.124 (0.0497)
Household Size	0.0496 (0.040)	1.05 (0.0418)	.0575 (.0390)	1.06 (0.0455)
Dependency Ratio	0.00979*** (0.00181)	1.01 (0.00182)	0.00963*** (0.00195)	1.01 (0.00185)
Education of Household Head	-0.120*** (0.0164)	0.886 (0.0148)	-0.119*** (0.0186)	0.888 (0.0162)
Age of Household Head	0.00294 (0.00576)	1.00 (0.00577)	0.004 (0.0186)	1.00 (0.00593)
Male	-0.220 (0.183)	0.802 (0.147)	-0.308 (0.223)	0.735 (0.143)
Married	-0.419 (0.287)	0.658 (0.189)	-0.453 (0.317)	0.635 (0.201)
Religion	0.751** (0.291)	2.12 (0.616)	0.788 (0.338)	2.20 (0.556)
Urban	-0.786*** (0.136)	0.456 (0.0619)	-0.775*** (0.121)	0.461 (0.0635)
<i>First-stage F statistic</i>	-	-	<b>32.28</b>	<b>32.28</b>
<i>Pseudo R-squared</i>	<b>0.1600</b>	<b>0.1600</b>	<b>0.1609</b>	<b>0.1609</b>
<i>Total observations</i>	<b>1,205</b>	<b>1,205</b>	<b>1,205</b>	<b>1,205</b>

\*\*\*/\*\*/\* Significant at 1 /5/10% level, IV: Non-Income Land Ownership

## 5.1.2 The Effects of Remittances on Poverty

Table 15 summarizes the results from the logit regression of receiving remittances on poverty. From the standard logit regression results, it is observed that households receiving remittances from abroad reduce their poverty probabilities by odds ratios of 10%. The negative sign of the coefficient confirms this reduction effect, and it is significant at the 1% significance level. Using non-income land ownership as an IV in the logit regression model to possibly overcome endogeneity, the poverty reducing odds ratios from international migration decrease to 9% with the negative sign of the associated coefficient intact. This effect remains significant at the 1% significance level. This finding suggests after trying to solve for endogeneity, that there exists a poverty reducing effect for households from receiving international remittances via the income gains, and this effect is both statistically and economically significant.

Table 15: Logit regression results for remittances (Dependent variable: Poverty)

Variables	Logit		Logit with IV	
	Coefficients	Odds Ratios	Coefficients	Odds Ratios
	(Robust Std. Errors)	(Robust Std. Errors)	(Bootstrapped Std. Errors)	(Bootstrapped Std. Errors)
Remittances	-2.21*** (0.216)	0.101 (0.0237)	-2.367*** (0.474)	0.0938 (0.0504)
Household Size	0.0515 (0.0400)	1.053 (0.0421)	0.0538 (0.0406)	1.06 (0.0422)
Dependency Ratio	0.0104*** (0.00191)	1.01 (0.00193)	0.0104*** (0.00195)	1.01 (0.00187)
Education of Household Head	-0.124*** (0.0165)	0.883 (0.0146)	-0.124*** (0.0163)	0.884 (0.0138)
Age of Household Head	0.00265 (0.00603)	1.00 (0.00604)	0.00291 (0.00666)	1.00 (0.00588)
Male	-0.206 (0.190)	0.814 (0.154)	-0.228 (0.221)	0.796 (0.155)
Married	-0.363 (0.300)	0.695 (0.209)	-0.372 (0.261)	0.689 (0.216)
Religion	0.651** (0.295)	1.92 (0.566)	0.655 (0.296)	1.92 (0.572)
Urban	-0.691*** (0.137)	0.501 (0.0687)	-0.682*** (0.168)	0.506 (0.0642)
<i>First-stage F statistic</i>			<b>58.32</b>	<b>58.32</b>
<i>Pseudo R-squared</i>	<b>0.1797</b>	<b>0.1797</b>	<b>0.1798</b>	<b>0.1798</b>
<i>Total observations</i>	<b>1,205</b>	<b>1,205</b>	<b>1,205</b>	<b>1,205</b>

\*\*\*/\*\*/\* Significant at 1 /5/10% level, IV: Non-Income Land Ownership

## 5.2 Results from Quantile Regression

### 5.2.1 The Effects of International Migration on Income

#### Results from Standard Quantile Regression

Table 16 summarizes the results from the standard quantile regression of international migration on household per capita income compared with its associated standard OLS estimates. From column (1), according to standard OLS estimates, households with international migration have a per capita income of 54% more than households with no international migrants abroad. The sign of the coefficient confirms the positive direction of the effect, which is significant at 1% significance level.

On the other hand, quantile regression estimates from the rest of the columns which are also displayed in Figure 6 suggest that the magnitude of the income gains from international migration are different across the income distribution in each quantile. Among the migrant households, the poor seem to earn 61%, the upper poor appear to earn 69%, the median earners earn 67%, the rich earn 60%, and the richest earn 41% more than their counterpart non-migrant households. This finding suggests that the upper poor households in the second quantile below the median quantile are having the most income gains from international migration when compared to all the other quantiles. The richest households in the whole income distribution are having the lowest income gains from international migration. In all four quantiles, the effects are statistically significant at 1% level and economically significant. Therefore, the overall poverty mitigating effect from international migration in the economy is significant but not large as it is the upper poor households (not the poorest) who are benefitting from the relatively highest positive income effects. However, this finding may not be sound as endogeneity was not attempted to be corrected in this standard QR estimation.

#### Results from IV Quantile Regression

Table 17 summarizes the results from instrumental variable quantile regression (IVQR) of international migration on households per capita income compared with its associated IV 2SLS estimates. From column (1), compared to OLS estimate in Table 16, the IV 2SLS estimated coefficient to international migration jumps to 170%, implying that after possibly

correcting for endogeneity, migrant households earn 170% more than non-migrant households per capita

Table 16: Standard quantile regression results compared to OLS estimates for international migration with dependent variable: ln (per capita income)

Variables	OLS		Quantile Regression			
	Coefficients (Robust Std. Errors)		Coefficients (Bootstrapped Standard Errors)			
	(1)	(2)	(3)	(4)	(5)	(6)
	<b>100.00</b>	<b>0.10</b>	<b>0.25</b>	<b>0.50</b>	<b>0.75</b>	<b>0.90</b>
Migration	0.535*** (0.0657)	0.613*** (0.139)	0.688*** (0.0768)	0.667*** (0.0591)	0.603*** (0.066)	0.414*** (0.146)
Household Size	-0.00531 (0.0213)	-0.0486 (0.0307)	-0.0445** (0.0217)	-0.0445** (0.0207)	-0.0160 (0.0253)	0.0421 (0.0517)
Dependency Ratio	-0.00471*** (0.000687)	-0.00324*** (0.00105)	-0.00428*** (0.000745)	-0.00395*** (0.000747)	-0.00480*** (0.000660)	-0.00477*** (0.00158)
Head Education	0.0615*** (0.00739)	0.0355** (0.0165)	0.0408*** (0.00866)	0.0524*** (0.00696)	0.06702*** (0.00747)	0.0904*** (0.0183)
Head Age	0.000370 (0.00272)	-0.00857* (0.00484)	-0.00199 (0.00248)	0.00190 (0.00254)	0.00404 (0.00250)	0.00834 (0.00657)
Male	-0.0109 (0.0873)	0.0915 (0.148)	0.06016 (0.0843)	0.0231 (0.0740)	0.0387 (0.0963)	0.00473 (0.169)
Married	0.339 (0.170)	0.7802** (0.353)	0.251 (0.170)	0.130 (0.141)	0.1529 (0.108)	-0.0772 (0.309)
Religion	-0.0504 (0.100)	-0.0332 (0.272)	-0.239** (0.105)	-0.224* (0.126)	-0.00652 (0.0881)	0.0381* (0.226)
Urban	0.246*** (0.0586)	0.221** (0.104)	0.226*** (.0682)	0.146** (0.059)	0.214*** (0.0520)	0.319** (0.131)
<i>Pseudo/ R-squared</i>	<b>0.1676</b>	<b>0.0689</b>	<b>0.1093</b>	<b>0.1377</b>	<b>0.1261</b>	<b>0.0928</b>
<i>Total observations</i>	<b>1,205</b>	<b>1,205</b>	<b>1,205</b>	<b>1,205</b>	<b>1,205</b>	<b>1,205</b>

\*\*\*/\*\*/\* Significant at 1 /5/10% level

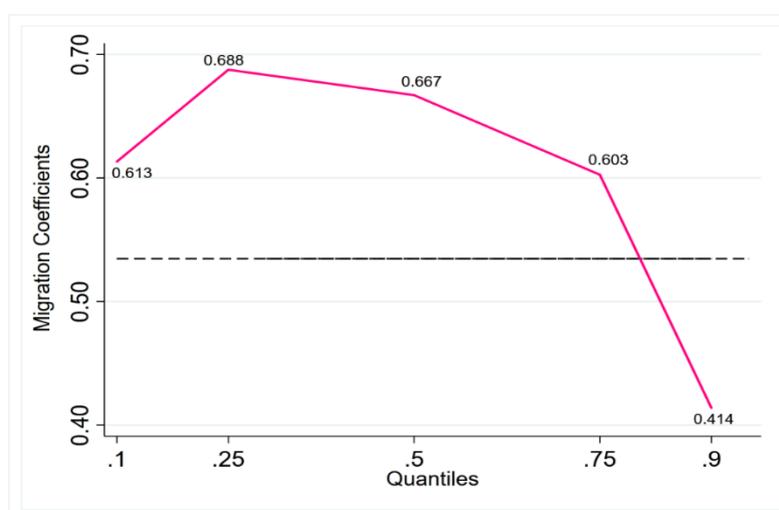


Figure 6: Standard quantile regression coefficients of migration

income wise. The sign of the coefficient confirms the positive direction of the effect, which is significant at 1% significant level.

On the other hand, IVQR estimates from the rest of the columns which are also displayed in Figure 7 suggest that after possibly minimizing endogeneity, the magnitude of the income gains from international migration are different across the income distribution in each quantile. Among the migrant households, the poor seem to earn 192%, the upper poor appear to earn 87%, the median earners earn 167%, the rich earn 155%, and the richest earn 315% more than their counterpart non-migrant households. The magnitude of these effects across the four quantiles in IVQR are also different from the previously estimated coefficients in standard QR, implying the existence of potential endogeneity bias. This finding suggests that amongst the first two quantiles which are below the median quantile, it is the poorest households who are enjoying more income gains than the upper poor households. But in the entire income distribution, the richest households are having the highest income gains from international migration. Only households in the upper poor quantile have income gains from international migration which are not statistically significant, but the effects in all the four quantiles are economically significant. Therefore, the overall poverty reduction effect in the economy from international migration is significantly low as it is the richest households who are the furthest from and over the poverty line that are having the most income gains. This could also be a valid result as endogeneity has been attempted to be corrected in this IVQR estimation.

Table 17: IVQR results compared to 2SLS estimates for international migration with dependent variable: ln (per capita income)

Variables	IV 2SLS		IV Quantile Regression			
	Coefficients (Robust Std. Errors)		Coefficients (Bootstrapped Standard Errors)			
	(1)	(2)	(3)	(4)	(5)	(6)
	<b>100.00</b>	<b>0.10</b>	<b>0.25</b>	<b>0.50</b>	<b>0.75</b>	<b>0.90</b>
Migration	1.70*** (0.575)	1.92* (1.15)	0.868 (0.860)	1.67*** (0.431)	1.55** (0.606)	3.15*** (0.659)
Household Size	-0.0277 (0.0264)	-0.0497 (0.0398)	-0.0552** (0.0239)	-0.0517*** (0.0166)	-0.0509 (0.0379)	-0.00427 (0.0421)
Dependency Ratio	-0.00388*** (0.000873)	-0.00187 (0.00131)	-0.00326*** (0.000886)	-0.00399*** (0.000787)	-0.00442*** (0.00116)	-0.00310** (0.00152)
Head Education	0.0568*** (0.00874)	0.0291** (0.0143)	0.0564*** (0.00893)	0.0593*** (0.00671)	0.0598*** (0.0102)	0.0688*** (0.0140)
Head Age	-0.00268 (0.00321)	-0.00943* (0.00523)	-0.00169 (0.00377)	0.0000397 (0.00237)	-0.000358 (0.00310)	-0.00514 (0.00482)
Male	0.224 (0.149)	0.244 (0.225)	0.151 (0.207)	0.263** (0.107)	0.221 (0.168)	0.445** (0.203)
Married	0.447 (0.1869)	0.895*** (0.341)	0.462** (0.182)	0.211 (0.198)	0.265 (0.190)	0.356 (0.264)
Religion	-0.154 (0.126)	-0.373 (0.357)	-0.226** (0.111)	-0.261* (0.134)	-0.147 (0.130)	0.0583 (0.164)
Urban	-0.154*** (0.126)	0.189* (0.0982)	0.280*** (0.0741)	0.281*** (0.0632)	0.104 (0.0829)	0.133 (0.114)
<i>First-stage F statistic</i>	<b>32.28</b>	<b>32.28</b>	<b>32.28</b>	<b>32.28</b>	<b>32.28</b>	<b>32.28</b>
<i>Pseudo/ R-squared</i>	-	<b>0.0467</b>	<b>0.0656</b>	<b>0.0902</b>	<b>0.0800</b>	<b>0.0866</b>
<i>Total observations</i>	<b>1,205</b>	<b>1,205</b>	<b>1,205</b>	<b>1,205</b>	<b>1,205</b>	<b>1,205</b>

\*\*\*/\*\*/\* Significant at 1 /5/10% level, IV: Non-Income Land Ownership

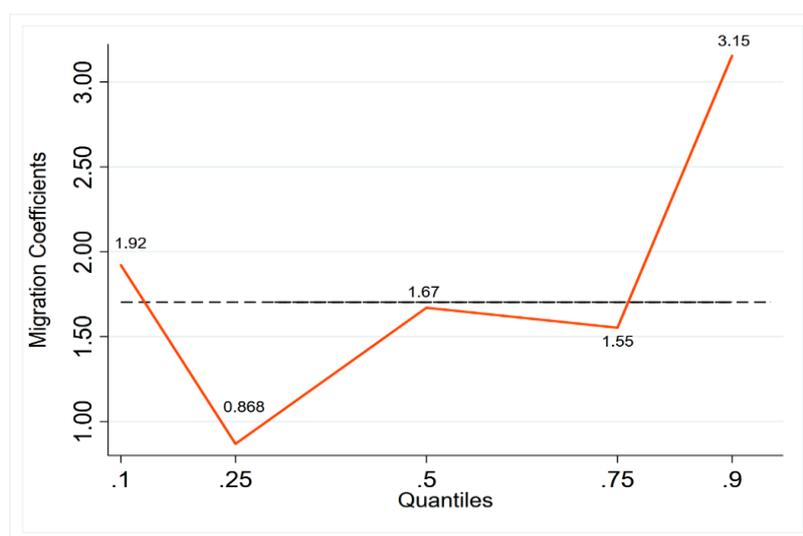


Figure 7: Instrumental variable quantile regression coefficients of migration

## 5.2.2 The Effects of Remittances on Income

### Results from Standard Quantile Regression

Table 18 summarizes the results from the standard quantile regression of receiving remittances on household per capita income compared with its associated standard OLS estimates. From column (1), according to standard OLS estimates, households with remittances have a per capita income of 70% more than households receiving no remittances. The sign of the coefficient confirms the positive direction of this effect, which is significant at 1% significance level.

On the other hand, quantile regression results from the rest of the columns which are also displayed in Figure 8 suggest that the magnitude of the income gains from receiving remittances are different and decreasing in nature across the income distribution in each quantile. Among the remittance recipient households, the poor seem to earn 105%, the upper poor appear to earn 83%, the median earners earn 72%, the rich earn 63%, and the richest earn 39% more than their counterpart non-recipient of remittances households. This finding suggests that the poorest households from the first two quantiles below the median quantile are having the most income gains from foreign remittances when compared to all the other quantiles. The richest households in the whole income distribution are having the lowest income gains from remittances. In all four quantiles, the effects are statistically significant at 1% level and economically significant. Therefore, the overall poverty mitigating effect from remittances in the economy is significant as it is the poorest households who are benefitting from the relatively highest positive income effects. However, this finding may not be valid as endogeneity was not attempted to be corrected in this standard QR estimation.

### Results from IV Quantile Regression

Table 19 summarizes the results from instrumental variable quantile regression (IVQR) of receiving international remittances on households per capita income compared with its associated IV 2SLS estimates. From column (1), compared to OLS estimate in Table 18, the IV 2SLS estimated coefficient to remittances jumps to 176%, implying that after possibly correcting for endogeneity, remittance earning households earn 176% more than non-migrant households per capita income wise. The sign of the coefficient confirms the positive direction of the effect, which is significant at 1% significant level.

Table 18: Standard quantile regression results compared to OLS estimates for remittances with dependent variable: ln (per capita income)

Variables	OLS		Quantile Regression			
	Coefficients (Robust Std. Errors)		Coefficients (Bootstrapped Standard Errors)			
	(1)	(2)	(3)	(4)	(5)	(6)
	100.00	0.10	0.25	0.50	0.75	0.90
Remittances	0.698*** (0.0626)	1.05*** (0.125)	0.883*** (0.0677)	0.724*** (0.0604)	0.631*** (0.0555)	0.391*** (0.128)
Household Size	-0.00620 (0.0208)	-0.0596** (0.0312)	-0.0410** (0.0179)	-0.0397* (0.0214)	-0.00308 (0.0239)	0.0424 (0.0428)
Dependency Ratio	-0.00478*** (0.000690)	-0.00353*** (0.00112)	-0.00409*** (0.000752)	-0.00410*** (.000906)	-0.00518*** (0.000553)	-0.00432** (0.00143)
Head Education	0.0624*** (0.00719)	0.0237* (0.0101)	0.0446*** (0.00776)	0.0528*** (0.00637)	0.0709*** (0.00896)	0.0894*** (0.0198)
Head Age	0.000691 (0.00272)	-0.00207 (0.00461)	-0.00244 (0.00234)	0.00143 (0.00266)	0.00252 (0.00246)	0.00785 (0.00564)
Male	-0.0155 (0.0864)	0.119 (0.124)	0.0944 (0.0697)	0.0397 (0.0753)	-0.0358 (0.114)	-0.0162 (0.183)
Married	0.330 (0.167)	0.492 (0.446)	0.3818*** (0.130)	0.115 (0.163)	0.154 (0.128)	-0.088 (0.290)
Religion	-0.0184 (0.0992)	0.0272 (0.232)	-0.214* (0.106)	-0.188 (0.109)	0.00782 (0.0811)	0.470** (0.1844)
Urban	(0.208)*** (0.0579)	0.134 (0.106)	0.162*** (0.0596)	0.155*** (0.0525)	0.196*** (0.0591)	0.238* (0.122)
<i>Pseudo/R-squared</i>	<b>0.1901</b>	<b>0.1057</b>	<b>0.1370</b>	<b>0.1464</b>	<b>0.1266</b>	<b>0.0926</b>
<i>Total observations</i>	<b>1,205</b>	<b>1,205</b>	<b>1,205</b>	<b>1,205</b>	<b>1,205</b>	<b>1,205</b>

\*\*\*/\*\*/\* Significant at 1 /5/10% level

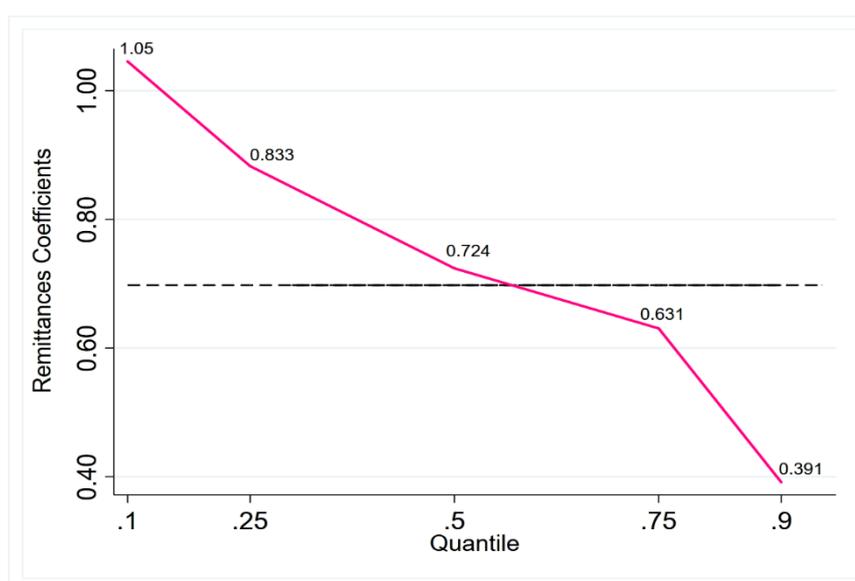


Figure 8: Standard quantile regression coefficients of remittances

On the other hand, IVQR estimates from the rest of the columns which are also displayed in Figure 9 suggest that after possibly minimizing endogeneity, the magnitude of the income gains from international migration are different across the income distribution in each quantile. Among the remittance recipient households, the poor seem to earn 198%, the upper poor appear to earn 90%, the median earners earn 172%, the rich earn 160%, and the richest earn 276% more than their counterpart non-recipient remittances households. The magnitude of these effects across the four quantiles in IVQR are also different from the previously estimated coefficients in standard QR, implying the existence of potential endogeneity bias. This finding suggests that amongst the first two quantiles which are below the median quantile, it is the poorest households who are enjoying more income gains than the upper poor households. But in the entire income distribution, the richest households are having the highest income gains from international migration. Only households in the poor and upper poor quantiles have income gains from remittances which are not statistically significant, but the effects in all the four quantiles are economically significant. Therefore, the overall poverty reduction effect in the economy from remittances is significantly low as it is the richest households who are the furthest from and over the poverty line that are having the most income gains. Similar to the IVQR result of the effect of international migration on income, this could also be a valid result as endogeneity has been attempted to be corrected in this IVQR estimation.

Table 19: IVQR results compared to 2SLS estimates for remittances with dependent variable: ln (per capita income)

Variables	IV 2SLS		IV Quantile Regression			
	Coefficients (Robust Std. Errors)		Coefficients (Bootstrapped Standard Errors)			
	(1)	(2)	(3)	(4)	(5)	(6)
	<b>100.00</b>	<b>0.10</b>	<b>0.25</b>	<b>0.50</b>	<b>0.75</b>	<b>0.90</b>
Remittances	1.76*** (0.547)	1.98 (1.26)	0.895 (0.930)	1.72*** (0.531)	1.60*** (0.756)	2.76*** (0.940)
Household Size	-0.0231 (0.0244)	-0.0445 (0.0380)	-0.0528** (0.0246)	-0.0472** (0.0186)	-0.0467 (0.0364)	0.0116 (0.0430)
Dependency Ratio	-0.00433*** (0.000803)	-0.00238* (0.00144)	-0.00349*** (0.000735)	-0.00443*** (0.000763)	-0.0048347*** (0.00109)	-0.00412*** (0.00166)
Head Education	0.0605*** (0.00787)	0.0332 (0.0136)	0.0582*** (0.00784)	0.0628*** (0.00684)	0.0632*** (0.0106)	0.0758 (0.0173)
Head Age	-0.000939 (0.00296)	-0.00747 (0.00464)	-0.000800 (0.00352)	0.00175 (0.00271)	0.00123 (0.00423)	-0.00118 (0.00588)
Male	0.140 (0.125)	0.150 (0.220)	0.108 (0.187)	0.181 (0.114)	0.145 (0.163)	0.220 (0.265)
Married	0.392* (0.174)	0.833* (0.305)	0.434*** (0.151)	0.140 (0.189)	0.215 (0.197)	0.223 (0.280)
Religion	-0.0418 (0.112)	-0.246 (0.380)	-0.169* (0.111)	-0.150 (0.135)	-0.0441 (0.127)	0.274* (0.142)
Urban	0.125* (0.0738)	0.0924 (0.134)	0.236*** (0.108)	0.197*** (0.0788)	0.0260 (0.131)	0.0154 (0.150)
<i>First-stage F statistic</i>	<b>58.32</b>	<b>58.32</b>	<b>58.32</b>	<b>58.32</b>	<b>58.32</b>	<b>58.32</b>
<i>Pseudo/ R-squared</i>	<b>0.0300</b>	<b>0.0467</b>	<b>0.0656</b>	<b>0.0902</b>	<b>0.0800</b>	<b>0.0866</b>
<i>Total observations</i>	<b>1,205</b>	<b>1,205</b>	<b>1,205</b>	<b>1,205</b>	<b>1,205</b>	<b>1,205</b>

\*\*\*/\*\*/\* Significant at 1 /5/10% level, IV: Non-Income Land Ownership

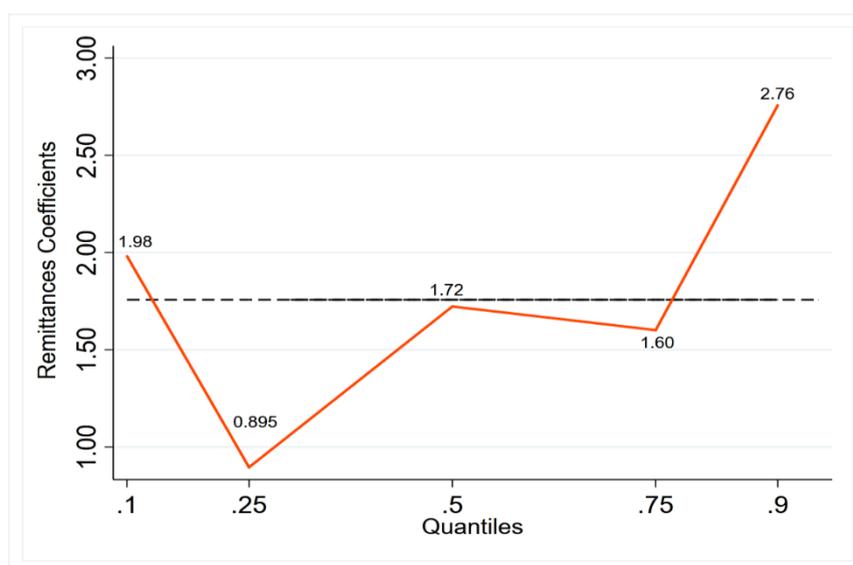


Figure 9: Instrumental variable quantile regression coefficients of remittances

### 5.3 Results from Household Interviews

Table 20 summarizes the responses of households when asked to compare the quality of life between present and five years ago. It can be observed that around 66% of migrant households reported that their life has become easier while 52% of non-migrant households said the same.

Table 20: Quality of life compared between present and five years ago

<b>Options</b>	<b>Households with international migration</b>	<b>Households with no international migration</b>
Much easier	8.56	4.21
Easier	65.51	52.11
Neither easier nor harder	20.86	27.44
Harder	4.81	15.52
Much harder	0.27	0.72
<b>Total</b>	<b>100</b>	<b>100</b>

Table 21 summarizes the current financial situation of households. It can be observed that households with international migration has higher average savings than households with no international migrants. The costly nature of international migration being usually financed by borrowings is perhaps reflected by the fact that the average debt value of migrant households is much higher than non-migrant households and possibly fuels the harmful side of international migration on households. Average insurance is close to same for both types of households.

Table 21: Current financial situation

<b>Financial Indicators</b>	<b>Households with international migration</b>	<b>Households with no international migration</b>
Average debt	288,815.50	57,228.87
Average savings	73,398.66	26,811.72
Monthly insurance	3,338.27	3,420.36

Table 22 summarizes the response of migrant households when asked to compare the quality of life before and after migration has taken place. A majority 59% of total migrant households reported that their life has become easier, while around 20% reported that it has stayed the same. Around 14% stated that their life has actually become harder after international migration.

Table 22: Quality of life compared between before and after Migration

<b>Options</b>	<b>Households with international migration</b>
Much easier	4.28
Easier	59.36
Neither easier nor harder	19.79
Harder	14.17
Much harder	2.41
<b>Total</b>	<b>100</b>

Table 23 summarizes the answers by households when asked how their life has improved through international migration. Around 65% responded that this has happened due to increase in income while another 11% reported stability in their regular income to be another reason.

Table 23: Reasons for improvement in quality of life

<b>Options</b>	<b>Households with international migration</b>
Increase in Income	64.48
Stability in Regular Income	11.20
Growth Opportunity	0.27
Children's Education	1.37
Access to Utilities and Public Services	0.55
Safety and Security	0.55
Others	21.58
<b>Total</b>	<b>100</b>

Table 24 summarizes the replies by left-behind women of migrant households on how their life has improved from international migration. Around 30% replied that their work burden has been reduced, while another 10% reported that their purchasing power has improved. This finding gives support to the hypothesis (but does not confirm it) that remittances from international migration reduce labor participation rate by left-behind members as their purchasing capacity is improved.

Table 24: Reasons for improvement in quality of left-behind women

<b>Options</b>	<b>Households with international migration</b>
Reduced Work Burden	29.61
Enhanced Purchasing Power	10.34
Increased Employment Opportunities	2.23
Increased Mobility	8.38
Better Education	4.75
Social Status Enhanced	5.31
Improved Decision-Making Capacity	10.06
Not Applicable (No Female Household Members)	29.33
<b>Total</b>	<b>100</b>

## 6 Conclusion

As the global world of today is gradually coming together under one roof through easier movement of resources across borders, the phenomenon of international migration strives on. It is heavily favored by specialists due to its welfare-generating and problem-solving nature in the origin, migrant countries. This study, as one of many, has tried to shed some light on this hypothesis, by investigating its role in the alleviation of one particular but severe problem of the developing world: poverty.

Using a survey of 1205 households from Bangladesh which is a developing country in the South-Asia, the study utilized two methodological techniques. First, a logit regression model was used to estimate the predictive probabilities of overcoming poverty from income gains caused by international migration and remittances. Then, a quantile regression analysis was used to assess which households along the income tiers are benefitting most and least from such income gains. In an attempt to overcome endogeneity issues, an instrumental variable was utilized in both the models. The study found that after trying to solve for endogeneity, according to the logit regression results, international migration reduced poverty by odds ratios of 12% and receiving remittances from abroad mitigated poverty by odds ratios of 9%. From instrumental variable quantile regression results, after using an instrumental variable for endogeneity, it is implied that in both cases of international migration and remittances, the poorest gained more amongst the non-rich groups below the middle-income earners, but the richest migrant households had the largest income gains compared to all the quantiles. A possible explanation of this could be that relative to poorer migrants, richer migrants are usually better educated and have better knowledge to land higher paying jobs abroad.

This finding also shows that the overall poverty reducing effect from income gains via international migration and remittances is small in the economy, as the richest households who are much less poverty-prone are enjoying the largest effects. This result also implicates international migration and remittances as elements to creating income inequality in the society by boosting the income of upper income earners by a bigger proportion than the households lower in the income ranks. From the results of qualitative survey interviews, it was found that for a majority of interviewed households, quality of life has improved over time for both migrant and non-migrant households. The work participation of left-behind women has reduced while their purchasing power has increased. But a considerable amount of

debt strain is observed on the migrant households possibly (but not surely) because of the huge cost of financing the migration.

Although the results suggest an overall positive effect on poverty alleviation through income gains generated from international migration and remittances, the fact that the richest households seem to benefit the most from this effect is something the government of Bangladesh should be concerned about policy-wise. The government may wish to utilize the beneficial effects from overseas migration towards solving the country's economic problems. But it may also want to reduce income inequality from such effects by investing in education and training of migrants from poor households to increase their earning potential abroad. This may hopefully enable poor and upper-poor migrant households to match their proportional income gains with the richest households, and thus have a significant poverty reducing effect in the overall economy without creating too much income inequality. However, an alternative but also an obvious case of income inequality may occur between high income gains of migrant households and little income gains of non-migrant households. This could be the research question for another much-needed empirical study.

In lieu of skepticism of the methodologies used in this study and their shortcomings, I would encourage follow-up empirical research. Given the potential pitfalls in the exclusion restriction argument of the chosen instrumental variable of this study, I would recommend a complementary study using different methodological approaches to tackle the endogeneity measurement challenges. It could also have been beneficial if the community effects from international migration and remittances on non-migrant households were controlled for. As the dataset is outdated and smaller in size, it would be wise to utilize a newer and broader dataset to arrive at conclusions that may be more internally valid at a national scale.

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# Appendix

In this chapter, I present the script codes for STATA v15.1 that were used for estimation purposes in this study.

The original dataset files, the survey questionnaires, and the user guide can be freely downloaded from the following link:

“<http://migratingoutofpoverty.dfid.gov.uk/themes/migration-data/bangladeshquant>”

These original files, along with the working dataset and script files, can also be provided upon request.

In the following, the working dataset which is mainly used for regression estimations is summarized. After that, the STATA script codes are presented.

<b>Variables</b>	<b>Description</b>
HHID	Unique questionnaire serial no. for surveyed household
mig	Migration dummy
income	Monthly household income
pincome	Monthly per capita household income
lpincome	Logarithm of monthly per capita household income
pov	Poverty dummy
remotal	Total monthly remittances received
rem	Remittances dummy
rpi	Remittances as a share of income
members	Total number of household members
edu_head	Education in years of household head
age_head	Age in years of household head
married	Married dummy of household head
religion	Religion dummy of household head if Muslim
male	Male dummy of household head if male
urban	Urban dummy if household is in urban area
landdummy	Non-income land ownership dummy
depart	Dependency ratio in %

## 1. Data Clearing\_DO.do (Generates the working dataset)

```
//Please download the datasets (HH, Income, Member), user guide, and
questionnaire from:
"http://migratingoutofpoverty.dfid.gov.uk/themes/migration-
data/bangladeshquant"

clear
//Load Income Dataset

sysuse BNG-PUBLISHED_MIGRANT_NONMIGRANT_HH_INCOME.dta

//Merge with HH Dataset

merge m:m HHID using "BNG-PUBLISHED_MIGRANT_NONMIGRANT_HH.dta"

//Merge with Member Dataset

merge m:m HHID using "BNG-PUBLISHED_MIGRANT_NONMIGRANT_HH_MEMBER.dta",
nogenerate

//Save Merged Dataset

save merged

//Generate Migration Dummy

decode cb_1, gen(cb_1r)
decode cb_2, gen(cb_2r)
gen mig=1 if cb_1r=="international migrant"
replace mig=1 if cb_1r=="regional migrant"
replace mig=0 if mig==.
replace mig=0 if cb_2r=="returned migrant"

//Generate Avg. Monthly HH Income and Avg. Monthly HH per capita Income

egen income= total(q63_), by(HHID)
gen pincome=(income)/q3

//Generate Natural Log of Avg. Monthly HH per capita income

gen lpincome=log(pincome)
replace lpincome=0 if lpincome==.

//Generate Upper Poverty Line

gen povline= (1862 + 1485)/2

//Generate Poverty Dummy

gen pov=1 if povline-pincome>=0
replace pov=0 if pov==.
```

```

//Generate Remittance Dummy

decode source, gen(sourcer)
egen rt= total(q63_) if sourcer=="Money sent by household members working
overseas" , by(HHID)
replace rt=0 if rt==.
egen remtotal= total(rt), by(HHID)
replace remtotal=0 if mig==0
drop rt
gen rem=1 if remtotal>0
replace rem=0 if rem==.
replace rem=0 if mig==0

//Generate Remittance share in Income

gen rpi=(remtotal/income)*100
replace rpi=0 if rpi==.
replace rpi=0 if mig==0

//Generate HH size

clonevar members=q3

//Generate HH Head Dummy

decode q7, gen(q7r)
gen head=1 if q7r=="self"
replace head=0 if head==.

//Generate HH Head Education in years

gen edu_head=q18 if head==1
sort HHID
by HHID: replace edu_head = edu_head[_n-1] if edu_head >= .
gsort -HHID
replace edu_head = edu_head[_n-1] if edu_head >= .
sort HHID

//Generate HH Head Age in years

gen age_head=q9 if head==1
sort HHID
by HHID: replace age_head = age_head[_n-1] if age_head >= .
gsort -HHID
replace age_head = age_head[_n-1] if age_head >= .
sort HHID

//Generate HH Head Marital Dummy

decode q10, gen(q10r)
gen married=1 if q10r=="married" & head==1
replace married=0 if q10r!="married" & head==1

```

```

by HHID: replace married = married[_n-1] if married >= .
gsort -HHID
replace married = married[_n-1] if married >= .
sort HHID

//Generate HH Head Religion Dummy

decode q15, gen(q15r)
gen religion=1 if q15r=="muslim" & head==1
replace religion=0 if q15r!="muslim" & head==1

by HHID: replace religion = religion[_n-1] if religion>= .
gsort -HHID
replace religion = religion[_n-1] if religion>= .
sort HHID

//Generate HH Head Male Dummy

decode q8, gen(q8r)
gen male=1 if q8r=="male" & head==1
replace male=0 if q8r!="male" & head==1

by HHID: replace male = male[_n-1] if male>=.
gsort -HHID
replace male = male[_n-1] if male>=.
sort HHID

//Generate Urban Dummy

decode dist, gen(distr)
gen urban=1 if distr=="chapai nawabganj"
replace urban=0 if urban==.
replace urban=1 if distr=="tangail"
replace urban=1 if distr=="chittagong"

//Generate Non-Income Land Dummy

clonevar vland= q51_3a
clonevar uland= q51_3b
replace vland=0 if vland==.
replace uland=0 if uland==.
gen land=vland+uland
gen landdummy=1 if land>0
replace landdummy=0 if landdummy==.

//Save merged for regression

save reg_byhh

```

```

//Drop duplicates and keep only necessary variables

clear
sysuse reg_byhh

duplicates drop HHID, force
keep HHID income pincome lpincome remtotal mig rem pov members edu_head
age_head male married religion urban landdummy rpi

save, replace

//Generate Dependency Ratio

clear
sysuse BNG-PUBLISHED_MIGRANT_NONMIGRANT_HH_MEMBER.dta
keep HHID q9

egen agemin= total(q9<15), by(HHID)
egen agemax= total(q9 >64), by(HHID)
egen ageint= total(q9>=15&q9<=64), by(HHID)
gen deprat= ((agemin+agemax)/ageint)*100
replace deprat=0 if deprat==.
keep HHID deprat
duplicates drop HHID, force

save deprat

//Import Dependency Ratio

clear
sysuse reg_byhh

merge 1:1 HHID using "deprat.dta", nogenerate

save, replace

//Label and rename variables

label variable mig "migration dummy"
label variable income "monthly HH income"
label variable lpincome "ln (per capita income)"
label variable pov "poverty dummy"
label variable members "total HH members"
label variable edu_head "education in years of HH head"
label variable age_head "age in years of HH head"
label variable married "married dummy of HH head"
label variable religion "religion dummy of HH head if muslim"
label variable urban "urban dummy if HH is in urban district"
label variable landdummy "non-income land ownership dummy"
label variable male "male dummy if HH head is male"
label variable remtotal "total monthly remittances received"
label variable rem "remittance dummy"

```

```
label variable rpi "remittance as a share of income"  
label variable deprat "dependency ratio in %"  
label variable pincome "monthly per capita HH income"  
  
save, replace
```

## **2. Regression\_DO.do (Regression commands)**

```
clear  
sysuse reg_byhh  
  
//Logit Regression for International Migration on Poverty  
  
logit pov mig members deprat edu_head age_head male married religion urban,  
robust  
logit pov mig members deprat edu_head age_head male married religion urban,  
robust or  
  
//Logit Regression for Remittances on Poverty  
  
logit pov rem members deprat edu_head age_head male married religion urban,  
robust  
logit pov rem members deprat edu_head age_head male married religion urban,  
robust or  
  
//Logit 2SRI Regression for International Migration on Poverty  
  
reg mig landdummy members deprat edu_head age_head male married religion  
urban, robust  
test landdummy  
  
logit mig landdummy members deprat edu_head age_head male married religion  
urban, robust  
predict resid, residuals  
logit pov mig members deprat edu_head age_head male married religion urban  
resid, vce(bootstrap, reps(100))  
logit pov mig members deprat edu_head age_head male married religion urban  
resid, vce(bootstrap, reps(100)) or  
drop resid
```

```

//Logit 2SRI Regression for Remittances on Poverty

reg rem landdummy members deprat edu_head age_head male married religion
urban, robust
test landdummy

logit rem landdummy members deprat edu_head age_head male married religion
urban, robust
predict resid, residuals
logit pov rem members deprat edu_head age_head male married religion urban
resid, vce(bootstrap, reps(100))
logit pov rem members deprat edu_head age_head male married religion urban
resid, vce(bootstrap, reps(100)) or
drop resid

//Standard OLS with International Migration on Income

reg lpincome mig members deprat edu_head age_head male married religion
urban, robust

//Standard OLS with Remittances on Income

reg lpincome rem members deprat edu_head age_head male married religion
urban, robust

//Standard QR with International Migration on Income

sqreg lpincome mig members deprat edu_head age_head male married religion
urban, quantiles (0.10 .25 .50 .75 .90) reps (100)
grqreg mig

//Standard QR with Remittances on Income

sqreg lpincome rem members deprat edu_head age_head male married religion
urban, quantiles (0.10 .25 .50 .75 .90) reps (100)
grqreg rem

//IV 2SLS with International Migration on Income

ivregress 2sls lpincome (mig=landdummy)members deprat edu_head age_head
male married religion urban, robust

```

```

//IV 2SLS with Remittances on Income

ivregress 2sls lpincome (rem=landdummy)members deprat edu_head age_head
male married religion urban, robust

//IVQR with International Migration on Income

reg lpincome mig members deprat edu_head age_head male married religion
urban, robust

reg mig landdummy members deprat edu_head age_head male married religion
urban, robust
test landdummy

predict pr_mig, xb
sqreg lpincome pr_mig members deprat edu_head age_head male married
religion urban, quantiles (0.10 .25 .50 .75 .90) reps (100)
grqreg pr_mig
drop pr_mig

//IVQR with Remittances on Income

reg lpincome rem members deprat edu_head age_head male married religion
urban, robust

reg rem landdummy members deprat edu_head age_head male married religion
urban, robust
test landdummy

predict pr_rem, xb
sqreg lpincome pr_rem members deprat edu_head age_head male married
religion urban, quantiles (0.10 .25 .50 .75 .90) reps (100)
grqreg pr_rem
drop pr_rem

```

### 3. Figures\_DO.do (Generates the figures)

//Figure 1

```
clear
set obs 10
gen year = 2009
gen GDP = 102.478
replace year = 2010 in 2
replace year = 2011 in 3
replace year = 2012 in 4
replace year = 2013 in 5
replace year = 2014 in 6
replace year = 2015 in 7
replace year = 2016 in 8
replace year = 2017 in 9
replace year = 2018 in 10
replace GDP = 115.279 in 2
replace GDP = 128.638 in 3
replace GDP = 133.356 in 4
replace GDP = 149.99 in 5
replace GDP = 172.885 in 6
replace GDP = 195.079 in 7
replace GDP = 221.415 in 8
replace GDP = 249.724 in 9
replace GDP = 266.266 in 10
twayay (line GDP year, sort)
```

//Figure 2

```
clear
set obs 5
gen year=2000
gen poverty=48.9
replace year = 2005 in 2
replace year = 2010 in 3
replace year = 2016 in 4
replace year = 2020 in 5
replace poverty = 40.0 in 2
replace poverty = 31.5 in 3
```

```
replace poverty = 24.3 in 4
replace poverty =0 in 5
twoway (bar poverty year, sort)
```

```
//Figure 3
```

```
clear
set obs 10
gen year = 2009
gen pro = 1426
gen sk = 134265
gen ssk = 84517
gen lsk = 246585
gen others = 8485
gen total = 475278
replace year = 2010 in 2
replace year = 2011 in 3
replace year = 2012 in 4
replace year = 2013 in 5
replace year = 2014 in 6
replace year = 2015 in 7
replace year = 2016 in 8
replace year = 2017 in 9
replace year = 2018 in 10
replace pro = 1.426 in 1
replace sk = 134.265 in 1
replace ssk = 84.517 in 1
replace lsk = 246.585 in 1
replace others = 8.485 in 1
replace total = 475.278 in 1
replace pro = 0.387 in 2
replace sk = 90.621 in 2
replace ssk = 20.016 in 2
replace lsk = 272.118 in 2
replace others = 7.560 in 2
replace total = 390.702 in 2
replace pro = 1.192 in 3
replace sk = 229.149 in 3
replace ssk = 28.729 in 3
replace lsk = 301.552 in 3
replace others = 7.440 in 3
```

replace total = 568.062 in 3  
replace pro = 36.084 in 4  
replace sk = 173.331 in 4  
replace ssk = 104.721 in 4  
replace lsk = 284.153 in 4  
replace others = 9.509 in 4  
replace total = 607.798 in 4  
replace pro = 0.689 in 5  
replace sk = 133.754 in 5  
replace ssk = 62.528 in 5  
replace lsk = 203.508 in 5  
replace others = 9.224 in 5  
replace total = 409.253 in 5  
replace pro = 1.730 in 6  
replace sk = 148.766 in 6  
replace ssk = 70.095 in 6  
replace lsk = 193.403 in 6  
replace others = 11.690 in 6  
replace total = 425.684 in 6  
replace pro = 1.828 in 7  
replace sk = 214.328 in 7  
replace ssk = 91.099 in 7  
replace lsk = 243.929 in 7  
replace others = 4.697 in 7  
replace total = 555.881 in 7  
replace pro = 4.638 in 8  
replace sk = 318.851 in 8  
replace ssk = 119.946 in 8  
replace lsk = 303.706 in 8  
replace others = 10.590 in 8  
replace total = 757.731 in 8  
replace pro = 4.507 in 9  
replace sk = 434.344 in 9  
replace ssk = 155.569 in 9  
replace lsk = 401.803 in 9  
replace others = 12.302 in 9  
replace total = 1008.525 in 9  
replace pro = 2.673 in 10  
replace sk = 317.528 in 10  
replace ssk = 117.734 in 10  
replace lsk = 283.002 in 10

```
replace others = 13.244 in 10
replace total = 734.181 in 10
graph bar pro sk ssk lsk others total, over (year)
```

```
//Figure 4
```

```
clear
set obs 10
gen year=.
gen aid=.
gen remittance=.
replace year = 2018 in 10
replace year = 2017 in 9
replace year = 2016 in 8
replace year = 2015 in 7
replace year = 2014 in 6
replace year = 2013 in 5
replace year = 2012 in 4
replace year = 2011 in 3
replace year = 2010 in 2
replace year = 2009 in 1
replace remittance = 15544.68 in 10
replace remittance = 13526.84 in 9
replace remittance = 13609.77 in 8
replace remittance = 15270.99 in 7
replace remittance = 14942.57 in 6
replace remittance = 13832.13 in 5
replace remittance = 14163.99 in 4
replace remittance = 12168.09 in 3
replace remittance = 11004.73 in 2
replace remittance = 10717.73 in 1
replace aid = 1237.38 in 1
replace aid = 1404.6 in 2
replace aid = 1494.68 in 3
replace aid = 2154.05 in 4
replace aid = 2633.59 in 5
replace aid = 2422.64 in 6
replace aid = 2570.13 in 7
replace aid = 2505.05 in 8
replace aid = 3740.01 in 9
graph bar aid remittance, over (year)
```

```
//Figure 5
```

```
clear  
sysuse reg_byhh  
kdensity pincome
```

#### **4. Tables\_DO.do (Generates the tables)**

```
//Table 1
```

```
clear  
sysuse reg_byhh  
sum  
sum remtotal if mig==1  
sum rpi if mig==1
```

```
//Table 2
```

```
clear  
sysuse reg_byhh  
tab pov if mig==1  
tab pov if mig==0  
sum income if mig==1  
sum income if mig==0  
sum pincome if mig==1  
sum pincome if mig==0
```

```
//Table 3
```

```
clear  
sysuse reg_byhh  
tab pov if rem==1  
tab pov if rem==0  
sum income if rem==1  
sum income if rem==0  
sum pincome if rem==1  
sum pincome if rem==0
```

```
//Table 4 and Table 5
```

```

clear
sysuse reg_byhh
povdeco pincome, pline (1673)
povdeco pincome if mig==1, pline (1673)
povdeco pincome if mig==0, pline (1673)
povdeco pincome if rem==1, pline (1673)
povdeco pincome if rem==0, pline (1673)

```

//Table 6

```

clear
sysuse reg_byhh
tab mig rem

```

//Table 7

```

clear
sysuse BNG-PUBLISHED_MIGRANT_NONMIGRANT_HH_MEMBER
decode cb_1, gen(cb_1r)
decode cb_2, gen(cb_2r)
gen mig=1 if cb_1r=="international migrant"
replace mig=1 if cb_1r=="regional migrant"
replace mig=0 if mig==.
replace mig=0 if cb_2r=="returned migrant"
tab q22 if mig==1, sort

```

//Table 8

```

clear
sysuse BNG-PUBLISHED_MIGRANT_NONMIGRANT_HH_MEMBER
decode cb_1, gen(cb_1r)
decode cb_2, gen(cb_2r)
gen mig=1 if cb_1r=="international migrant"
replace mig=1 if cb_1r=="regional migrant"
replace mig=0 if mig==.
replace mig=0 if cb_2r=="returned migrant"
sum q28 if mig==1
tab q29_1 if mig==1, sort

```

```
//Table 9
```

```
clear
sysuse BNG-PUBLISHED_MIGRANT_NONMIGRANT_HH_MEMBER
decode cb_1, gen(cb_1r)
decode cb_2, gen(cb_2r)
gen mig=1 if cb_1r=="international migrant"
replace mig=1 if cb_1r=="regional migrant"
replace mig=0 if mig==.
replace mig=0 if cb_2r=="returned migrant"
tab q21_1 if mig==1,sort
```

```
//Table 10
```

```
clear
sysuse BNG-PUBLISHED_MIGRANT_NONMIGRANT_HH_MEMBER
decode cb_1, gen(cb_1r)
decode cb_2, gen(cb_2r)
gen mig=1 if cb_1r=="international migrant"
replace mig=1 if cb_1r=="regional migrant"
replace mig=0 if mig==.
replace mig=0 if cb_2r=="returned migrant"
tab q37 if mig==1, sort
```

```
//Table 11
```

```
clear
sysuse BNG-PUBLISHED_MIGRANT_NONMIGRANT_HH_MEMBER
decode cb_1, gen(cb_1r)
decode cb_2, gen(cb_2r)
gen mig=1 if cb_1r=="international migrant"
replace mig=1 if cb_1r=="regional migrant"
replace mig=0 if mig==.
replace mig=0 if cb_2r=="returned migrant"
tab q44 if mig==1, sort
```

```
//Table 12
```

```
clear
sysuse BNG-PUBLISHED_MIGRANT_NONMIGRANT_HH_MEMBER
decode cb_1, gen(cb_1r)
```

```

decode cb_2, gen(cb_2r)
gen mig=1 if cb_1r=="international migrant"
replace mig=1 if cb_1r=="regional migrant"
replace mig=0 if mig==.
replace mig=0 if cb_2r=="returned migrant"
tab q46_1 if mig==1, sort

```

```
//Regression Tables are in Regression do file
```

```
//Table 20
```

```

clear
sysuse BNG-PUBLISHED_MIGRANT_NONMIGRANT_HH
decode cb_1, gen(cb_1r)
decode cb_2, gen(cb_2r)
gen mig=1 if cb_1r=="international migrant"
replace mig=1 if cb_1r=="regional migrant"
replace mig=0 if mig==.
replace mig=0 if cb_2r=="returned migrant"
tab q67 if mig==1, sort
tab q67 if mig==0, sort

```

```
//Table 21
```

```

clear
sysuse BNG-PUBLISHED_MIGRANT_NONMIGRANT_HH
decode cb_1, gen(cb_1r)
decode cb_2, gen(cb_2r)
gen mig=1 if cb_1r=="international migrant"
replace mig=1 if cb_1r=="regional migrant"
replace mig=0 if mig==.
replace mig=0 if cb_2r=="returned migrant"

replace q69_a1=0 if q69_a1==.
sum q69_a1 if mig==1
sum q69_a1 if mig==0

replace q69_a2=0 if q69_a2==.
sum q69_a2 if mig==1
sum q69_a2 if mig==0

```

```

replace q69_a3=0 if q69_a3==.
sum q69_a3 if mig==1
sum q69_a3 if mig==0

//Table 22

clear
sysuse BNG-PUBLISHED_MIGRANT_NONMIGRANT_HH
decode cb_1, gen(cb_1r)
decode cb_2, gen(cb_2r)
gen mig=1 if cb_1r=="international migrant"
replace mig=1 if cb_1r=="regional migrant"
replace mig=0 if mig==.
replace mig=0 if cb_2r=="returned migrant"

tab q73 if mig==1

//Table 23

clear
sysuse BNG-PUBLISHED_MIGRANT_NONMIGRANT_HH
decode cb_1, gen(cb_1r)
decode cb_2, gen(cb_2r)
gen mig=1 if cb_1r=="international migrant"
replace mig=1 if cb_1r=="regional migrant"
replace mig=0 if mig==.
replace mig=0 if cb_2r=="returned migrant"

tab q73a1 if mig==1

//Table 24

clear
sysuse BNG-PUBLISHED_MIGRANT_NONMIGRANT_HH
decode cb_1, gen(cb_1r)
decode cb_2, gen(cb_2r)
gen mig=1 if cb_1r=="international migrant"
replace mig=1 if cb_1r=="regional migrant"
replace mig=0 if mig==.
replace mig=0 if cb_2r=="returned migrant"

tab q74b1 if mig==1

```