

Essays in the Economics of Emigration and the Lifecycle Deficit in Ethiopia

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Abstract

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This work explores the effects of international migration on sending families, and the lifecycle deficit in Ethiopia. The first two chapters examine the effects of emigration on the living standards and health of the sending families, using (for identification) the Diversity Visa (DV) lottery program - a migration channel through which about a million people have relocated to the US since 1995. The random assignment of migration opportunities allows estimation of experimental treatment effects.

In chapter 1, I use data from a survey of Ethiopian DV participants to study the causal effects of emigration. I infer that migration contributes positively to the wellbeing of source families. Overall, migrant sending families spend about 22% more on food and 41% more on energy, reflecting their improved standard of living. They have better quality durables, drinking water and sanitation facilities. However, migration does not improve the senders' saving, bank use and business ownership. The positive treatment effects do not diminish with longer stay of emigrants abroad. Migrant men contribute more to the increase in their families' standard of living than their female counterparts do. I find that DV participants are favorably selected relative to the overall population.

In chapter 2, I exploit the survey on Ethiopian DV participants (lottery winners and non-winners) to explore the health effects of emigration on those left behind. I find that the health effects of emigration are mixed. Migration increases overall BMI of those remaining behind by 0.56, contributing affirmatively to physical health of about 80% of them, while causing an uptick in the obesity rate by 5%. It

increases the incidence of vascular diseases and diabetes by 10%, and has adverse effects on the mental health of the migrant senders. Adults fare poorly in terms of the less desirable health effects of migration.

Chapter 3 estimates the support ratio for Ethiopia, using the US Census Bureau's population projections by age and the method developed by the National Transfer Accounts (NTA), which employs the age-profiles of labor income and consumption. Ethiopia has a labor income profile with high youth and old-age earnings, much like a typical poor agrarian country with low savings, low levels of upward public transfers and low levels of schooling. Interestingly, private consumption declines more than moderately in the country with age, beginning in the early 30's, implying that poverty might be pronounced in older age groups. The average Ethiopian consumes more than s/he produces for roughly half the number of years s/he can expect to live. The support ratio for Ethiopia is expected to increase for another generation or so, potentially augmenting its per-capita income.

Dedicated with Love to the Memory of My Father, Mergo Saketa,
my First Teacher and my Inspiration

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Chapter One

The Effects of International Migration on Migrant-Source Households: Evidence from Ethiopian Diversity-Visa Lottery Migrants

1. Introduction

Remittances are arguably the principal channel through which migrant sending families benefit from emigration.¹ (Knowledge transfers are another possible channel: see Hilderbrandt and McKenzie, 2006). Yet, the net impact of migration on the sending families is unclear. In particular, when migrants move away, their remaining family members lose a share of their income, as well as in-kind contributions to household production, including the care of elderly parents and younger siblings. These losses can be particularly large if the most productive members of a family are most likely to emigrate. To the extent that there are important local externalities from human capital, and migrants tend to be relatively young and better-educated, emigration can also create wider social costs -- the so-called “brain drain” phenomenon.

In this paper, I explore the effects of international migration on sending households by focusing on migrants from a poor country – Ethiopia – who are essentially randomly assigned the possibility of migration through the United States’ Diversity Visa lottery. The DV lottery, which has been in effect since 1995, has attracted tens of millions of applicants from all corners of the world. Every year, about 50,000 people (not including their immediate families) migrate to the US by winning the lottery. The majority of the DV migrants are from Africa, with anywhere between 6% and 8% consistently coming from Ethiopia.

¹ Remittances are a significant source of income and hard currency for several developing countries, in some cases overtaking Official Development Aid and Foreign Direct Investment. According to the World Bank, official remittances to developing countries are currently in the range of \$340 billion per year.

My analysis is based on a specially designed survey of households of previous DV lottery participants (winners and losers) in Addis Ababa – the Ethiopian capital. I use comparisons between the lottery winners and losers to infer the causal effects of having a family member migrate to the U.S. I find that having a family member win the lottery and migrate has significant positive effects on several dimensions of the remaining family's standard of living. Migrant sending families spend nearly 22% more on food (total and per-capita), are better fed and have higher body mass indexes (+0.56 average BMI).² They also spend about 41% more on energy, reflecting their increased energy requirements for enhanced quality of life. Moreover, they possess better quality consumer durables (which include personal computers, modern cooking stoves, household furniture and home entertainment appliances) in addition to improved sources of drinking water and sanitation facilities. They, however, have about the same savings and business ownership rates as DV lottery participating households with no emigrants. The positive treatment effects do not diminish as migrants spend more time abroad.

Migrant men, making up slightly above 60% of all DV migrants, contribute more to increases in their families' standard of living than women migrants do. Expenditure on food and energy are invariant to the migrants' gender; whereas the gains in terms of durable ownership, access to clean water and sanitation facilities occur almost entirely in families where the emigrants are men. These evidences (which are quasi-experimental) are consistent with a study of African migrants in OECD countries, which document that male migrants remit more than female migrants do (Bolard et al, 2010).

Ethiopian DV migrants are positively selected relative to the overall population. Compared to DV winners and losers, lottery non-participants have substantially lower food spending, lower-valued durables, and lower access to clean drinking water and convenient sanitation facilities. They are also the least likely to use banking facilities. Although there is some difference with respect to non-response

² Expenditure on food is the most significant indicator of family welfare for the majority of Addis residents, taking up nearly 70% of the average family's budget. The other significant expenditure items for the average family in Addis Ababa include cost of energy and telephone (mobile phone) usage fee. Housing, education and health services are still largely subsidized by the government, with combined private expenditure on these items accounting for a small fraction (less than 10%) of total family expenditure.

(attrition) in the treatment and the control groups, the worst-case scenario Lee (2009) Treatment Effect Bounds indicate that the estimates are robust.

Earlier studies on the effects of emigration generally find that migration has positive effects on sending households and countries. Some report robust correlations between emigration and desirable outcomes in sending areas, making no explicit causal claims; others employ a variety of estimation techniques to tease out the effects of emigration. The methods used include instrumental variables estimation (e.g. Mansuri, 2006; Woodruff and Zenteno, 2007; McKenzie and Rappoport 2007, Lopez-Cordova, 2006), propensity-score matching (e.g. Esquivel and Huerta-Pineda, 2006), and parametric selection correction models (e.g. Acosta, Fajnzylber and Lopez, 2007). Since migrants are typically positively selected (see, for instance, Chiswick, 1999; Chiquiar and Hanson, 2005; McKenzie, 2006), non-experimental estimates of the effects of migration may be biased if there are concerns with the identifying assumptions. Antman (2012) provides a succinct review of a few of the studies on the effects of international migration on those left behind, with critical evaluation of their identification strategies.

A few recent papers have tried to substantially address the causality issues in different ways. Yang (2008) evaluates the effects of remittances made by Filipino migrants on the well-being of their families, exploiting the depreciation of the Philippine peso as an exogenous source of variation in the amount of money sent home by migrants. Gibson, et al (2011) and Gibson, et al (2013) exploit lottery migration to New Zealand of the residents of the Pacific islands of Tonga and Samoa, respectively, to study the effects of emigration. Yang (2008) argues that remittances have positive effects on family members who remain at home; whereas, Gibson, et al (2011) find negative overall effects of emigration in the short run, with Gibson, et al (2013) inferring that migration reduced poverty in Samoa, but the effect may be short lived.

This paper is organized as follows: Section II describes the data set and the identification issues associated with the nature of the data collection process. Section III and IV present the empirical frameworks and the main results. Section

V checks the robustness of the estimated treatment effects, and Section VI concludes.

2. Constructing a New Sample of Families of DV Lottery Winners and Losers

2.1: The Diversity Lottery

The DV was instituted pursuant to the Immigration and Naturalization Act of 1990, Sections 201(d) and 203(c); the latter was amended in Section 131 (Pub. L. 101-649). Section 201 (e) stipulates that the maximum level of diversity immigrants not exceed 55,000 every year. As the title suggests, the purpose of this congressional Act is to diversify the U.S. population through a lottery made available to people from countries with historically low rates of immigration into the US. As a result, the majority (about 75%) of diversity immigrants come from the continent of Africa, with the top five African countries accounting for about 35% of all diversity immigrants.

A dynamic formula determines how these visas are distributed globally. No diversity visas are granted to countries which send more than 50,000 immigrants to the United States within a previous five year period. Accordingly, the natives of Brazil, Canada, China, Colombia, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, India, Jamaica, Mexico, Pakistan, the Philippines, Peru, Poland, South Korea, United Kingdom (except Northern Ireland) have been deemed not eligible for the DV lottery for the last several years.

To be eligible, DV applicants have to meet either the education or the work-experience requirement. According to the US State Department DV Immigration Guidelines, one must have “either a high school education or its equivalent, defined as successful completion of a 12-year course of elementary and secondary education; or two years of work experience within the past five years in an occupation requiring at least two years of training or experience to perform.” Only applicants with formal courses of study are considered eligible; those with correspondence programs or equivalency certificates (such as the G.E.D.) do not satisfy the education requirement. The qualifying DV Occupations

are those listed on the Department of Labor O*Net Online Database. None of these requirements is overly burdensome in the sense that a very large segment of the qualifying countries' nationals are able to meet them.

In the past, anyone with access to the post-office and satisfying the aforementioned criterion could have applied for the lottery, but only electronic applications are accepted as of 2003. This limits the pool of potential applicants only to those with access to internet services. Given the low level of computer and internet penetration rates in some of the DV eligible countries, the online-only application requirement seems to be more restrictive than either the education or the work experience requirement.

After determining the list of eligible applicants for each qualifying country, the Kentucky Consular Center selects winners from an applicant pool of millions based on a computer generated, random lottery drawing. The procedure guarantees each applicant an equal probability of winning the lottery as other applicants from the same country.

DV migrants can be single or married with children. The latter can bring their spouses and dependent children younger than 21 years of age, but are required to list them at the time of initial DV entry. It is possible that one's marital status may change, particularly from single to married, after winning the lottery and before migrating; when such cases turn up, U.S. embassy staff in each country determine the legitimacy of these claims on a case-by-case basis, as there seem to be incentives for fraud.

2.2: A Sample of Lottery Winners and Losers

I was able to obtain a complete listing of lottery winners from Addis Ababa for the years 2006 through 2010 from the Ethiopian Postal Service. It was, however, not possible to find a comparable list of DV lottery losers. Using a screening procedure outlined below, I drew representative samples of DV lottery losers and non-participants, relying on an estimate that around 45% of households in Addis Ababa have participated in the lottery in the years since 2006, which is not surprising given the overwhelming popularity of the DV lottery, the low threshold

requirements needed to enter it, and the length of time the lottery has been in operation.³

The majority of DV participants were young adults who had not yet formed families of their own; household heads with dependent children and/or a spouse constituted less than 8% of all DV applicants. Subjects where the DV applicants are a household head are excluded from this study; including them would have biased the treatment effects, as the comparable DV winners' entire family members had likely migrated to the US and would not have been observed in Addis. (Gibson et al, 2013) find that failing to exclude households in which all members would move leads to a downward bias of the estimated treatment effects.

2.2.1 Lottery Winners:

A complete list of DV lottery winners was stratified by the various sub-districts (Kebelles) of Addis Ababa, and numbered 1 through ω_k (total number of DV winners from Kebele K) in ascending order of their municipality provided house numbers.⁴ A target number of lottery winners constituting the treatment group from each Kebele (T_k) were determined with the goal of proportional representation.⁵ The overall target number of the treatment group was intentionally set higher at 300 than was justified by power calculation, which had suggested that 270 DV-winner households were sufficient to find effects, if any.

³ The estimate is based on publicly available figures of the total number of DV migrants from Ethiopia for the years indicated and on the assumption that, a) that the proportion of DV winners from Addis Ababa is the same as the city's share of the country's urban population; and b) that the typical DV applicant from Addis Ababa enters the lottery every other year. The approximation is consistent with other estimates in similarly situated countries. Torres and Pelham (2008) find that upwards of 60 percent of adults in Sierra Leone would like to migrate if they had the opportunity. The World Bank in its 2007 report had also found that between 50% and 90% of the young adults in certain developing countries would like to migrate if offered the option.

⁴ Lottery winners are unevenly distributed throughout the different sub-districts (Kebelles) of Addis Ababa. On average, each Kebele has about 6,500 households, which are identified by natural numbers assigned to them by the city Administration.

⁵ $T_k = (\omega_k/W) * 300$; where, W = Total number of [2006, 2009] DV winners from all districts

The interval size (i) - the number of proximate DV winning households in a Kebele (in the sense of their municipality provided home ID numbers), from which one family is to be selected for the treatment group - was then set as follows.⁶ Based on a simple lottery, the n^{th} house (n is any number between 1 and i) was picked as the first candidate house for the treatment group from the first interval in each sub-district. The k^{th} household (k is defined in the footnote) was then selected from subsequent intervals.⁷

Not surprisingly, not all randomly pre-selected lottery winners took part in the study. Because some families were unwilling to participate in the survey, the aforementioned procedure was repeated until the completed interviews in each sub-district reached as close as possible to the target number (T_k) for each Kebele. Three of the pre-selected treatment households had moved to a different location - one to a different city and two to a different area within Addis, but the latter refused to participate in the survey. Overall, approximately 38 percent of the DV winners approached for interviewing participated in the survey.

2.2.2 The Control Group and Lottery Non-Participants:

Because the complete listings of the population of interest for the control group and DV lottery non-participants were not available, the following strategy was implemented for the selection of their representative samples. The entire set of Addis households were first divided into several enumeration areas (EA), equaling in number the total count of lottery winners from the city for the four years. More importantly, since the distribution of lottery applicants can be assumed to be significantly positively correlated with the distribution of lottery winners, the number of EAs in each Kebele was set to be the same as the number of lottery winners in each Kebele. The poorer neighborhoods such as Addis Ketema, Kolfe and Akaki have the smallest number of lottery winners, while middle class neighborhoods (e.g. Bole, Nefas Silk, Gulele and Yeka) have the largest number of DV winners.

⁶ $i = \omega_k / T_k$, where, ω_k and T_k are as defined above

⁷ $k = [(M - 1)i + n]$; where, $M = \{1, 2, \dots, T_k\}$ is the sequence of intervals in a sub-district

Enumeration areas were chosen based on the same criteria used to select treatment households for the study, guaranteeing each EA an equal probability of being chosen for the study. Control and lottery non-participating households in the randomly selected EAs were picked as follows: A household was chosen from the randomly selected EA based on a simple lottery and screened to see if the family is control or lottery non-participant. If the household was unwilling or unable to participate in the survey for any reason, the next immediate house was invited to take part in the survey, until we found one control and another lottery non-participating household in the EA. About 59% of the control households selected in this manner were unwilling to participate in the long survey. Control and lottery non-participating households were asked the same set of questions, except that those dealing with the DV lottery status of the family were disregarded while interviewing the latter. The specific procedures employed for data gathering and quality control are described in Appendix one.

2.3: Descriptive Statistics

Table 1 describes the data using certain key variables by treatment status and for the overall sample. The summarized variables include estimated monthly family expenditure on food (by level and per-capita), total estimated value of durables owned by households, as well as their monthly energy cost and wireless phone bill. Summary statistics for some of the important consumer durables (e.g. Sofa, TV) are also included to further characterize the data. The amounts in the table are all in the Ethiopian currency (Birr).

2.4: Randomization Check

Respondents were asked certain questions to check if the treatment and control subjects were balanced at baseline. Since the first cohort of DV migrants in the sample frame left Ethiopia in 2006, the questions dealt with household characteristics prior to 2006. The variables used for randomization check include: mean age, stature, and pre-intervention education of household head and spouse. These variables are independent of the variables of interest in the causal

model. Stature is biologically set in human populations in the early stages of adulthood, and none of the household heads and their spouses were younger than 18 in 2005. To the extent subjects might have had to guess their age, there is no reason to believe that the possible inaccuracies are systematically different across the two groups. Furthermore, 98% of the individuals in this set have not attended any school in the years since 2005. Subjects were asked a categorical question regarding their schooling, which were coded zero for No Schooling, one for Less than High School, two for High School graduate, three for Some College, and four for Bachelor's or Advanced degree.

Households in both groups look very similar in terms of their pre-DV characteristics (Table 2). The groups exhibit no systematic differences, with the exception of the average age of the population of mothers; the average age of the mothers in the control group (51) is about 2.5 years less than the average age of the mothers in the treatment group.

3: Estimation Frameworks and Outcome Variables

The effect of the DV lottery can be measured using the reduced form (1). The framework allows outcomes' comparisons for households that won the lottery, that lost the lottery, and that did not participate in the lottery. The indicator variable D_i equals one if household i won the DV lottery, and zero otherwise.

$$Y_i = \beta + \alpha D_i + \epsilon_i \quad (1)$$

If all DV lottery winners migrated but none of the DV lottery losers did, α would capture the effects of migration. However, not all DV winners migrate and not all migrants are DV winners. Some DV lottery winners get disqualified for falsifying their records; others fail to make the final cut due to medical reasons. On the other hand, not everyone who migrates is a DV winner, as certain people migrate to the United States via channels other than the DV lottery. An IV-2SLS

framework, with the lottery outcome as the instrument for migration, is thus used to estimate the treatment effect, with the LATE clearly the policy-relevant treatment effect of interest. Randomness of the lottery does not guarantee that potential outcomes are independent of the instrument. For the IV estimates to have a causal interpretation, potential outcomes of households have to be independent of lottery outcomes (Angrist and Imbens, 1994; Angrist et al, 1996). Arguably, the reason for any relation between household outcomes and the DV lottery is the latter's effect on migration.

The effect of migration (remittances) might diminish and disappear altogether as migrants spend more time abroad, or the effects might increase over time as migrants adapt to living abroad and perhaps become more successful. Empirical evidence on which argument holds appears mixed: See for instance Brown (1998) and Gibson, et al (2013). I will test which of the two arguments is borne by the Ethiopian data, using a specification shown below in (2), which is similar to the one used in Gibson, et al (2013). I instrument for the interaction between migration status (M_i - which equals one if the DV applicant migrates, and zero otherwise) and duration abroad (t_i) by the interaction between the dummy for lottery status (D_i) and duration abroad.

$$Y_i = \beta + \alpha M_i + \mu(t_i * M_i) + u_i \quad (2)$$

Similarly, using an empirical model shown in (3), I explore if the treatment effects vary with the migrant's gender. The key variable of interest - ($gen_i * M_i$), is an interaction between gen_i (an indicator which assumes the value of one if the migrant is a man, and zero otherwise) and M_i (an indicator for migration status which is as defined above). The interaction between the dummy for lottery status ($D_i = 0,1$) and gen_i is used as the exogenous source of outcome differences due to gender.

$$Y_i = \beta + \alpha M_i + \mu(gen_i * M_i) + u_i \quad (3)$$

The outcome variables (Y_i) - current outcomes for household i - include households' monthly food budget (total and per-capita), anthropomorphic measures of immediate family members (BMI), estimated total monthly expenditure on energy consumption, total value of consumer durables, and monthly telephone (wireless) phone bill. They also include indicators for access to clean drinking water, toilets and bathroom facilities, as well as dummies for households ownership of business, bank use, and savings. As would be expected of any study attempting to evaluate the impacts of migration on sending families, attempts were made to gather remittance and current income data; however, a plurality of the sampled families were unwilling to discuss their income (remittances in particular), even though the questions regarding income and remittances were placed at the very end of the questionnaire, because of sensitivities surrounding these issues. The principal government agency responsible for producing data about the Ethiopian economy and its population, the Ethiopian Central Statistics Authority, has faced similar issues while implementing the Income and Expenditure surveys over the years, and does not publish Income data, using instead total expenditure as a proxy for total income, because households are either unwilling to discuss their income with interviewers, or report earning much less than their reported expenditure.

4. Results and Discussion

4.1: Reduced Form Estimates

Families of lottery winners have higher food budgets: they spend about 13% more on food, and 25% more on energy, than lottery losing families (Table 3, Panel A).⁸ More importantly, they have higher anthropomorphic outcomes (+0.34, average BMI). The winners also own higher quality consumer durables; the level of significance of this effect is notable, given the valuation of the items is based on self-reported figures, which are noisier than current market values. In addition, DV winners are 12% less likely to share latrines with other households. (Table 4,

⁸Regressions using the expenditure variables are log - level. All other regressions using binary and categorical outcome variables, as well as BMI are level-level.

Panel A). The DV lottery also increases the chances of a family having access to clean drinking water and a modern bathing facility inside its home by about 18%.

The rate of business ownership is remarkably similar for the DV winning and losing households (Table 5, Panel A). DV winners, though they have better standards of living in terms of their caloric intake and ownership of consumer durables, do not start businesses at higher rates than DV losers. Nor does winning the lottery induce a household to use banking facilities at higher rates. The roughly 4% higher probability of bank use by lottery winners is statistically insignificant at traditional levels. More importantly, the percentage of savers among the two groups is almost indistinguishable.

4.2: Instrumental Variable Estimates of Effects of Migration

The impacts of migration on several dimensions of the remaining family's standard of living are significantly positive (Panel A of Tables 3 and 4). Families of DV migrants spend about 22% more on food (both in terms of expenditure levels and per-capita), are better fed and have higher body mass indexes (+0.56 average BMI). Migration also allows family members that are left behind to own more and better quality consumer durables, which include modern household appliances (e.g. cooking stoves) that increase the productivity of household production and enhance the working conditions of persons using them. Where household chores are disproportionately conducted by women and girls, the welfare of young girls and women is bound to improve as more efficient tools of home production become available. In addition, school-age girls may be able to focus on their education (e.g. doing their home-work) as a result of the increased efficiency gained due to ownership of better quality home production tools.

The increased energy consumption by migrant senders - they spend about 41% more on energy - reflects their improved living conditions as a result of the treatment. In general, higher energy consumption is associated with improvements in living standards. The positive relationship between (electrical) energy consumption and people's economic outcomes holds across different

societies at different stages of economic development; thus a higher consumption of energy by migrant senders is yet another dimension through which the treatment has improved their standard of living.

The gains from migration for staying family members in terms of better access to clean drinking water as well as sanitation facilities are also remarkable. Migration reduces the chances of a sending family sharing a latrine with another household by 20% (Table 4, Panel B); it increases the likelihood of a family having access to clean drinking water and having a more decent bathing facility by about 29%. By any measure, these are significant improvements with likely affirmative consequences in the quality of life of those impacted by migration.

Migration does not seem to have any effect on savings, bank use and business ownership by sending families (Table 5, Panel B). In particular, the savings and banking results appear surprising if migrant senders receive remittances through the formal financial institutions. However, these seemingly non-intuitive results could be rational from the point of view of the remittance recipients. The macro environment in today's Ethiopia does not encourage individuals and families to save, since the rates of interest offered on savings by financial institutions have consistently and significantly been lower than the rate of inflation in the country. The more recent Chinese-like economic growth Ethiopia is experiencing has been coupled with significant inflation - ranging between the lower double-digits and 60% in the last several years - leaving the plurality of the country's population, particularly those in the urban areas, struggling to stay afloat. Therefore, the positive effects of the treatment on the migrant sender's liquidity may be just enough to pay for their essential needs, with saving and business ownership down the list of their priorities. Similarly, the remarkable similarities in business ownership rates of DV winners, DV losers and lottery non-participants (compare Panel A of Table 5 and Table 12) suggest that institutional and the prevailing macro policy environment could be more binding to productive investment activities in the country than household liquidity constraints.

The families that win the DV lottery and send a migrant (about 63% of the treatment group), and those that win the lottery but do not send a migrant are

fairly similar in terms of their characteristics. On the other hand, 99% of the DV losers comply with their assignment, indicating that the DV lottery is a key vehicle of legal migration for the overwhelming majority of Ethiopians.

4.3: Duration Effects

The duration effects obtained by estimating (2) would be biased if lottery entrants in different years were differently selected. To check if this is an issue or not, I grouped the subjects into the earlier group (2006 and 2007 lottery winners) and the more recent group (2008 and 2009 lottery winners) and compared them in terms of certain characteristics. I find that that the two groups are fairly similar in terms of their baseline characteristics (Table 7).

The point estimates in table 8 indicate that the impacts of migration do not diminish with DV migrants spending more time in the US. It should, however, be noted that the findings re: the duration of the treatment effects can be interpreted only as suggestive evidences. That is because identification of the effects is based on the assumption that the non-linearity in the interaction term in (2) is correctly specified. Since there are two endogenous variables (Migration and Migration times Time), one needs two valid instruments in order to experimentally test whether the treatment effects decay or grow over time. We only have one valid instrument in this case; hence, the estimated duration effects are quasi-experimental (informative) at best.

4.4. Outcome Differences Due to the Migrant's Gender

Several studies have attempted to answer whether or not migrants' gender determines migration's outcomes for the sending families (See, for instance, Lindey, 2009; Abrego, 2009). However, these studies can hardly claim anything other than documenting an association between the migrants' gender and the senders' outcomes. Differences in migration by gender are likely non-random

(since the reasons why men and women migrate are different), and none of the studies cited have successfully addressed the associated identification issues.

The quasi-experimental estimates in table 9 indicate that migrant men contribute more to increases in their families' standard of living than women migrants do. The gender impact of migration varies by which outcome is considered. Expenditure on food and energy are invariant to the migrant's gender, while the gains in terms of durable ownership, access to clean water and sanitation facilities occur almost entirely in families where the emigrants are men.

5. Robustness Checks

5.1. Non-Response and Sample Selectivity

Respectively, about 62% and 59% of the pre-selected (pre-screened) treatment and control families were unwilling or unavailable to participate in the survey, despite repeated attempts to interview them. It is not surprising that certain families, particularly those receiving remittances, are not open to discussing their finances with any one, let alone strangers. These levels of non-response may cause unobserved differences between lottery winners and losers who participated in the survey, resulting in biased treatment effects. Using the procedure outlined in (Lee, 2009), bounds for the treatment effects are estimated (Table 10), assuming monotonic effect of treatment on truncation, which is plausible here because treatment tends to increase non-response. The table indicates that the treatment effects remain statistically significant, even with the worst-case scenario bound.

I also examined whether participation rates differed by neighborhoods with different socio-economic characteristics. I ranked Addis' neighborhoods using the following socio-economic indicators: proportion of households with non-slum dwellings, proportion of households with water piped into their homes or yard, and proportion of households which share toilet facilities with other families.

Regardless of which indicator was used, the participation rates appear statistically similar across the different neighborhoods of the city (Table 11).

5.2. The Importance of the Control Group

A naive comparison of the outcomes of migrants and non-migrants would have overstated the effect of migration on the sending families. DV winners have even higher outcomes when compared to DV non-participants', suggesting that Ethiopian DV migrants are indeed positively selected from the overall population (compare Tables 3, 4 and 5 with Table 12). Of the three groups represented in this study (DV winners, DV losers, and non participants), the latter spend the least on food, own lower valued durables, and have lower access to clean drinking water and convenient sanitation facilities. They are also the least likely to use banking facilities. These results are in line with other similar studies exploring the impacts of international migration on sending families.

5.3. Ethiopian Migrants in the US:

According to the 2011 American Community Survey, there are about 160,000 Ethiopian immigrants in the US (US residents born in Ethiopia), about 50% of whom are naturalized US citizens, and 60% entered the US since the year 2000. Their median age is 36. Of those sixteen years of age and older, about 95% are gainfully employed, suggesting that the overwhelming majority of DV migrants do find jobs within a year of their arrival in the US. This is not surprising since all of them obtain their Work Authorization Cards immediately upon their arrival, and their Green Cards within a few months of coming to the US. Most of them end up in cities like Washington DC, Minneapolis, Los Angeles, Dallas, New York, Seattle and others, where there are established Ethiopian community networks, which assist them in language training, basic skill acquisition, and job searches.

The top four occupations of Ethiopian immigrants are: Educational Services, Health and social services (25.5%); Transportation, Warehousing and Utilities (16%); Arts, entertainment, recreation, accommodation and food services (11.5%); Professional, Scientific, Management, and Administrative Services (10.4%); Other services (7.4%). There is also a sizable minority working in other white-collar jobs such as finance and real estate. More importantly, the median and mean (annual) household incomes of Ethiopian immigrants are roughly 45,000 and 60,000 US dollars respectively, with only about 5% earning less than 10,000 dollars per year. Per capita income for Ethiopian immigrants rounds up to 25,000 dollars per year. Just under 40% of Ethiopian immigrants own their own homes, with the remaining living in renter occupied units, with average household sizes of 3.7 and 2.9 respectively.

If the average DV migrant repatriated between two to three percent of his/her income, the migrant sending families would experience an increase in their welfare consistent with the findings in this paper. It is thus not too surprising that migration has been found to improve the sending families' living standards, as measured by food consumption, BMI, quality of consumer durables, quality of drinking water, and access to modern sanitation facilities.

6. Conclusion

Much has been done to understand the impacts of international migration; still, more research is needed to improve our knowledge of how migration affects the senders. In making the case that a new research agenda is needed for a better understanding of the consequences of emigration, Clemons (2011) intriguingly argues that allowing a freer global mobility of labor could lead to the doubling of world GDP. Even traditional research topics on international migration, such as the literature on “brain drain”, have plenty of room to grow. It is not entirely clear if high skilled emigration is detrimental to the sending areas, as is widely believed to be the case. According to Gibson and McKenzie (2011), “...we are still some way from a comprehensive global answer on the effect of brain drain on sending country growth and development outcomes, and further still from knowing the efficacy of policies chosen with high-skilled migration in mind.” Adding a voice to

the call for more research from a different angle, Yang (2011) argues, "... new data collection and empirical approaches have expanded what we know about migration, remittances and development in recent years, but many fundamental questions remain incompletely answered."

This study has uncovered new experimental evidences re: the impact of emigration on staying family members. It finds that migration contributes positively to the welfare of family members remaining behind, by allowing them to increase their consumption expenditure. However, emigration does not appear to have any impact on the sending families' business ownership, bank usage and saving. The findings that a) migrant men contribute more to the increase in the welfare of the sending families than migrant women do; and b) the treatment effects do not decrease with longer duration of migrants abroad, are suggestive at best.

These evidences could enhance the policy debate on international migration in the migrant recipient countries, which contribute significantly to development aid in poor countries. The conclusion that emigration improves the living standard of family members who are left behind, could create a space for policy makers in the aid-fatigued migrant-recipient nations, allowing them to pursue creative liberal migration policies, such as the DV lottery, particularly if these policies benefit the recipient nations as well.

Table 1: Descriptive Statistics

Panel A: Summary Statistics For The Overall Sample

Item	N	Mean	SD	Min	Max
Food Expenditure	494	1,284	694	300	4,500
Food Expenditure (Per Capita)	494	288	195	37.5	1,500
Energy Cost	432	131	87	4	510
Mobile Phone Usage Fee	448	147	198	15	2,500
Estimated Value of Durables	494	16,282	47,308	0	861,600

Panel B: Summary Statistics By Treatment Status

DV Winners

Item	N	Mean	SD	Min	Max
Food Expenditure	246	1,377	764	300	4,500
Food Expenditure (Per Capita)	246	309	216	57	1,500
Energy Cost	217	147	96	4	510
Mobile Phone Usage Fee	223	155	222	24	2,500
Estimated Value of Durables	246	21,337	64,284	0	861,600

DV Losers

Item	N	Mean	SD	Min	Max
Food Expenditure	248	1,192	604	300	3,000
Food Expenditure (Per Capita)	248	268	169	37.5	1,000
Energy Cost	215	115	75	10	500
Mobile Phone Usage Fee	225	139	172	15	2,000
Estimated Value of Durables	248	11,268	17,815	0	199,250

Panel C: Summary Statistics Of Selected Durables

Item	N	Mean	SD	Min	Max
Sofa	424	3,354	2,675	200	30,000
Stove	353	535	965	25	7,000
TV	465	2,777	2,453	100	43,200
Mobile Phone	459	1,923	1,861	200	17,000
Computer	86	7,312	5,015	400	30,000
Car	27	116,796	153,362	4,500	800,000

Note: amounts are in Ethiopian currency (Birr)

Table 2: Randomization Check

	Number of Observations	DV Losers (Mean)	DV Winners (Mean)	Mean Difference	P-Value
Education of Male HH Head (Pre-DV)	494	1.72	1.81	-0.1	0.38
Education of Female HH Head (Pre-DV)	494	0.95	0.88	0.07	0.49
Age of Fathers	323	58.19	59.42	-1.23	0.28
Age of Mothers	424	49.29	51.91	-2.62	0.01
Fathers' Stature	325	169.86	171.16	-1.3	0.35
Mothers' Stature	425	163.41	162.48	0.93	0.2

Note: Education Indicators: 0 = Illiterate; 1 = Less than High School; 2 = High School; 3 = College; 4 = Bachelors Degree and Higher

Table 3: Effects of the DV Lottery and Migration on Important Expenditure Items, BMI and Durable Ownership

Panel A: Reduced Form Estimates

	Food Budget (Total)	Food Expenditure (Per Capita)	Value of Durables	Telephone (Wireless) Bill	Energy Expense	BMI
Effect of DV Lottery	0.13** (2.9)	0.13* (2.42)	0.26** (3.1)	0.04 (0.52)	0.25*** (3.89)	0.34* (2.37)
Number of Observations	494	494	489	448	432	2412

Panel B: Instrumental Variables Estimates

	Food Budget (Total)	Food Expenditure (Per Capita)	Value of Durables	Telephone (Wireless) Bill	Energy Expense	BMI
Effect of Migration	0.22** (2.89)	0.21** (2.44)	0.42** (3.08)	0.07 (0.52)	0.41*** (3.9)	0.56* (2.37)
Number of Observations	494	494	489	448	432	2412

Note: The Standard Errors are robust. *, **, and *** indicate significance levels at the 10%, 5% and 1%.

Table 4: Effects of the DV Lottery and Migration on Clean Water and Sanitation Facilities

Panel A: Reduced Form Estimates

	Water	Bath	Toilet	Latrine Share
Effect of DV Lottery	0.18** (3.3)	0.18** (3.21)	0.09* (2.21)	-0.12** (-2.65)
Number of Observations	480	486	485	473

Panel B: Instrumental Variables Estimates

	Water	Bath	Toilet	Latrine Share
Effect of Migration	0.29** (3.26)	0.29** (3.18)	0.16* (2.2)	-0.20** (-2.62)
Number of Observations	480	486	485	473

Note: The Standard Errors are robust. *, **, and *** indicate significance levels at the 10%, 5% and 1%.

Table 5: Effects of the DV Lottery and Migration on Business Ownership, Saving and Bank Use

Panel A: Reduced Form Estimates						
	OLS			Probit		
	Business Ownership	Bank Use	Savings Account	Business Ownership	Bank Use	Savings Account
Effect of DV Lottery	0.02 (0.55)	0.04 (1.04)	0.03 (0.63)	0.08 (0.55)	0.12 (1.04)	0.07 (0.63)
Number of Observations	493	492	491	493	492	491
Panel B: Instrumental Variables Estimates						
	IV			IV Probit		
	Business Ownership	Bank Use	Savings Account	Business Ownership	Bank Use	Savings Account
Effect of Migration	0.03 (0.55)	0.07 (1.04)	0.04 (0.62)	0.13 (0.55)	0.2 (1.06)	0.12 (0.63)
Number of Observations	493	492	491	493	492	491

Note: The Standard Errors are robust.

Table 6: Comparison of Migrant and Non-Migrant DV Winners' Characteristics

	Number of Observations	Non-Migrant DV Winners (Mean)	Migrant DV Winners (Mean)	Mean Difference	P-Value
Education of Male HH Head (Pre-DV)	246	1.74	1.86	-0.12	0.47
Education of Female HH Head (Pre-DV)	246	0.84	0.9	-0.07	0.66
Age of Fathers	150	60.63	58.68	1.95	0.25
Age of Mothers	208	50.28	52.81	-2.53	0.1
Fathers' Stature (cm)	150	170.49	171.57	-1.08	0.43
Mothers' Stature (cm)	207	162.36	162.54	-0.18	0.89

Note: Education Indicators: 0 = Illiterate; 1 = Less than High School; 2 = High School; 3 = College; 4 = Bachelors Degree and Higher

Table 7: Selectivity Check of Earlier and More Recent DV Winners

	Number of Observations	Earlier DV Winners	More Recent DV Winners	Mean Difference	P- Value
Education of Male HH Head (Pre-DV)	246	1.9	1.73	0.16	0.3
Education of Female HH Head (Pre-DV)	246	0.88	0.88	0.01	0.96
Age of Fathers	150	60.26	58.53	1.73	0.3
Age of Mothers	208	51.53	52.3	-0.77	0.61
Fathers' Stature (cm)	150	170.55	171.81	-1.26	0.34
Mothers' Stature (cm)	207	161.7	163.26	-1.56	0.19

Note: Education Indicators: 0 = Illiterate; 1 = Less than High School; 2 = High School;
3 = College; 4 = Bachelors Degree and Higher

Table 8: Estimates with Duration Effects

	Food Budget (Total)	Food Budget (Per Capita)	Value of Durables	Energy Expense	BMI	Water	Bath	Toilet	Latrine Share
Effect of Migration	0.07 (0.47)	0.2 (1.26)	0.17 (0.63)	0.4 (1.87)	0.02 (0.04)	0.04 (0.2)	0.08 (0.42)	0.1 (0.71)	0.04 (0.25)
Effect of Each Year in the US	0.06 (1.22)	0 (0.02)	0.1 (0.97)	0.01 (0.08)	0.22 (1.3)	0.11 (1.56)	0.08 (1.16)	0.02 (0.48)	-0.09 (-1.78)
Number of Observations	494	494	489	432	2412	480	486	485	473

Note: The Standard Errors are robust.

Table 9: The Gender Effects of Migration

	Food Budget (Total)	Food Budget (Per Capita)	Value of Durables	Energy Expense	Business	Bank	Saving	Water	Bath	Toilet	Latrine Share
Effect of Migration	0.25*	0.19	0.1	0.4**	-0.01	0.04	-0.02	0.03	0.01	-0.04	-0.07
	(2.54)	(1.62)	(0.56)	(2.8)	(-0.14)	(0.38)	(-0.17)	(0.27)	(0.09)	(-0.42)	(-0.75)
Gender Effects	-0.05	0.03	0.51*	0.01	0.06	0.06	0.1	0.42**	0.44**	0.31**	-0.19
	(-0.43)	(0.26)	(2.54)	(0.1)	(0.81)	(0.58)	(0.95)	(3.1)	(3.22)	(2.98)	(-1.76)
Number of Observations	494	494	489	432	493	492	491	480	486	485	473

Note: The Standard Errors are robust. * and ** indicate significance levels at the 10% and 5%.

Table 10: Lee Bound Estimates

Panel A: Lower Bound Estimates

	Food Budget (Total)	Food Budget (Per Capita)	Value of Durables	Energy	Water	Bath	Toilet	Latrine Share
Effect of Migration	0.16*	0.17*	0.33**	0.29**	0.24**	0.27**	0.1	-0.18*
	(2.15)	(2.3)	(2.59)	(2.99)	(2.68)	(2.9)	(1.4)	(-2.33)
Number of Observations	486	486	485	424	472	478	477	465

Panel B: Upper Bound Estimates

	Food Budget (Total)	Food Budget (Per Capita)	Value of Durables	Energy	Water	Bath	Toilet	Latrine Share
Effect of Migration	0.27***	0.27***	0.54***	0.49***	0.35***	0.37***	0.21**	-0.23**
	(3.66)	(3.34)	(4.2)	(4.75)	(3.87)	(4.17)	(2.96)	(-3.1)
Number of Observations	486	486	481	424	472	478	477	465

Note: The Standard Errors are robust. *, **, and *** indicate significance levels at the 10%, 5% and 1%.

Table 11: Participation Rates By Neighborhood
Neighborhood Ranking Variables (NRV)

	Percentage with Water Piped into Home or Yard	Percentage with Non-Slum Dwellings	Percentage of Families Sharing Toilet Facilities
Participation Rate Group A	0.41	0.42	0.4
Participation Rate Group B	0.39	0.38	0.39
Mean Difference	0.02	0.04	0.01
P Value	0.59	0.24	0.68

Note: The classification of the neighborhoods into Group A and B is based on the rankings of the NRV; half the neighborhoods are in A, with the other half in B.

Table 12: Effects of the DV Lottery With Lottery Non-Participants as a Comparison Group

	Food Budget (Total)	Value of Durables	Energy Expense	Business Ownership	Bank Use	Saving	Water	Bath	Toilet	Latrine Share
Effect of DV Lottery	0.36*** (7.48)	0.74*** (7.59)	0.47*** (7.67)	0.13 (0.93)	0.36** (3.19)	0.2 (1.76)	0.32*** (5.67)	0.29*** (5.38)	0.15*** (3.59)	-0.15*** (-3.4)
Number of Observations	520	508	432	516	516	515	498	501	503	489

Note: The Standard Errors are robust. *, **, and *** indicate significance levels at the 10%, 5% and 1%.

Chapter 2

The Health Effects of Migration on the Left-Behind: Evidence from Ethiopian Diversity-Visa (DV) Lottery Migrants*

1. Introduction

It is unclear what effect the migration of children might have on the health of family members left behind. To the extent migrant remittances improve the socioeconomic status (“SES”) of the sending families, potentially affording them the opportunity to enjoy better nutrition, housing, sanitation facilities, medical care, etc. migration could have salutary effects on their health. However, there are a number of reasons why a positive association between SES and health, referred to in the empirical literature as the health gradient in SES, may not exist.¹ In particular, in communities with restricted health knowledge, increases in SES do not always lead to improvements in health.

On the other hand, migration could have injurious effects on the health of those remaining behind. If parents depend on their children for physical care in old age, and close substitutes for these services are lacking in the sending areas, emigration might have harmful effects on the health and overall welfare of the elderly. Additionally, because it typically involves separation from a family member for an extended period of time, international migration could inflict certain psychological and emotional costs on the senders, adversely affecting their mental health. It is possible that families with emigrants, even while enjoying better physical health made possible by remittances, might have lower mental health outcomes due to separation from a loved one.

¹ Some of the likely factors leading to the breakdown in the hypothesized link between SES and health are discussed in, among others, Cutler et al. (2006), Smith (2004), Frankenberg et al. (1999), Liang et al (2001), Zimmer et al. (2004)

In this paper, I contribute to the literature of the health effects of emigration on the left behind by focusing on migrants from a poor country – Ethiopia – who are essentially randomly assigned the possibility of migration through the United States’ Diversity Visa lottery. The DV lottery, which has been in effect since 1995, has attracted tens of millions of applicants from all corners of the world. Every year, about 50,000 people (not including their immediate families) migrate to the US by winning the lottery. The majority of the DV migrants are from Africa, with anywhere between 6% and 8% consistently coming from Ethiopia.

I use comparisons between the lottery winners and the (non-winning) participants to infer the causal effects of having a family member migrate to the U.S. Based largely on the well-established inverted U-shaped empirical relationship between BMI and indicators of good physical health (e.g. longevity), with BMI reaching optimum-health levels near 25, I infer that migration contributes both affirmatively and adversely to health of families left behind, with the latter accruing more immediately.² I find that emigration has significant effects on body mass indexes for the population with BMI less than 25 (+0.38), and the overweight population (+0.95), increasing the obesity rate by 4.7%. Being overweight and obese are significant risk factors for the onset of vascular diseases and diabetes. Not surprisingly, families of emigrants are afflicted with these diseases at higher rates (+10%), suggesting that some DV winners might have picked up less healthy dietary habits. Emigration’s physical health effects on the left behind are thus mixed, improving the health outlook of the plurality, while adversely affecting the health of a minority of the population.³ The obesity rate in the adult population increases by the same rate as in the overall population, with no conclusive evidence showing if children are affected by the rise in obesity. It is

² A recent study published in The Lancet shows that the risk of mortality increases by about a third for every 5kg/m square increase in BMI above the optimal level, leading to reduction in life expectancy by as much as two to four years for obese individuals. Below the optimal level, BMI and mortality are generally inversely related.

³ About 18% of the control subjects are classified as overweight. 68% of them have BMI between 18.5 and 25, with another 14% in the underweight category. These numbers are fairly similar to the most recent World Health Organization figures for Addis Ababa.

possible that migration has enhanced the stature of minors, counteracting its effects on their weight and BMI gains.

Although migrant senders have gained more in terms of their physical health, they claim (on average) to be less healthy than those with no migrant members: 12% more of the latter report that they are in good health. Migration has thus likely inflicted certain psychological costs on migrant senders, contributing to their poor mental health, broadly defined to include emotional distress because of separation from a loved one. Another interesting conclusion is that DV lottery participants (hence migrants) are differently selected from the overall population. Reflecting their lower socio-economic status as a group, DV non-participants have the highest (lowest) percentage of underweight (overweight) individuals among their ranks (about 5%). They also have fewer cases of obesity and individuals with vascular diseases. Compared to lottery winners, about 16% more of them obtain inferior medical care when sick.

This paper is organized as follows. Section 2 provides some background for the study, focusing on the issue of selection bias common in the literature, including a brief literature review. Section 3 describes the data set and the identification issues associated with the nature of the data collection process. Section 4 presents the study's main results together with the underlying empirical frameworks. Section 5 concludes, suggesting certain policy measures that may need to be undertaken in order to "maximize the development benefits of international migration to the sending families."

2. Background and Literature Review

Empirical analyses of the effects of migration on the health of those left behind is difficult, because the causal variable of interest is endogenous in the outcome variable(s). Observed correlations between migration and the health of the left-behind might be spurious. In particular, variables that typically determine selection into migration (e.g. family SES, individual drive, motivation etc.) also affect the health demand and health production functions directly or indirectly. Further, the relationship could be due to reverse causation, with migration taking

place in response to parental health shock (Stark and Bloom 1985; VanWey 2004). As a result, isolating the causal effects of migration on the senders' health requires a careful identification strategy.

Observational studies, which use a variety of cross-sectional and longitudinal approaches, generally conclude that migration improves the health outcomes of migrant sending households. (Knodel and Debavalya 1997; Kuhn 2005; Kuhn 2006; Keasbury 2001; Toyota et al. 2007) A common shortcoming of these studies is, however, that they are not causal. More recent works have utilized different techniques to tease out the effects of emigration on those left behind. Kuhn et al (2011) employed propensity score matching, inferring that having a migrant child contributes positively to the health of elderly parents in sending areas. However, since migrants are typically positively selected along both observable and unobservable characteristics (McKenzie et al 2006; Chiquiar and Hanson, 2005; Chiswick, 1999), propensity score approaches continue to be susceptible to the selection bias problem. Others have utilized instrumental variables methods to tease out the health effects of emigration (See, for instance, Hilderbrandt and McKenzie, 2005; Antman, 2011). Hilderbrandt and McKenzie (2005) argue that migration of adults lowers infant mortality rates and raises child birth weights in Mexico, by increasing senders' wealth and health knowledge. Antman (2011) finds that child migration is associated with poor mental and physical health of parents in Mexico.

3. Constructing a Sample of Families of DV Lottery Winners and Losers

3.1: The Diversity Lottery

The DV was instituted pursuant to the Immigration and Naturalization Act of 1990, Sections 201(d) and 203(c); the latter was amended in Section 131 (Pub. L. 101-649). Section 201 (e) stipulates that the maximum level of diversity immigrants not exceed 55,000 every year. As the title suggests, the purpose of this congressional Act is to diversify the U.S. population through a lottery made available to people from countries with historically low rates of immigration into

the US. As a result, the majority (about 75%) of diversity immigrants come from the continent of Africa, with the top five African countries accounting for about 35% of all diversity immigrants.

A dynamic formula determines how these visas are distributed globally. No diversity visas are granted to countries which send more than 50,000 immigrants to the United States within a previous five year period. Accordingly, the natives of Brazil, Canada, China, Colombia, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, India, Jamaica, Mexico, Pakistan, the Philippines, Peru, Poland, South Korea, United Kingdom (except Northern Ireland) have been deemed not eligible for the DV lottery for the last several years.

To be eligible, DV applicants have to meet either the education or the work-experience requirement. According to the US State Department DV Immigration Guidelines, one must have “either a high school education or its equivalent, defined as successful completion of a 12-year course of elementary and secondary education; or two years of work experience within the past five years in an occupation requiring at least two years of training or experience to perform.” Only applicants with formal courses of study are considered eligible to apply for the DV lottery; those with correspondence programs or equivalency certificates (such as the G.E.D.) do not satisfy the education requirement. The qualifying DV Occupations are those listed on the Department of Labor O*Net Online Database. None of these requirements is overly burdensome in the sense that a very large segment of the qualifying countries’ nationals are able to meet them.

In the past, anyone with access to the post-office and satisfying the aforementioned criterion could have applied for the lottery, but only electronic applications are accepted as of 2003. This has the consequence of limiting the pool of potential applicants only to those with proper access to internet services. Given the low level of computer and internet penetration rates in some of the DV eligible countries, the online-only application requirement seems to be more restrictive than either the education or the work experience requirement.

After determining the list of eligible applicants for each qualifying country, the Kentucky Consular Center selects winners from an applicant pool of millions based on a computer generated, random lottery drawing. The procedure guarantees each applicant an equal probability of winning the lottery as other applicants from the same country.

Diversity lottery migrants can be single or married with children. Married migrants can bring their spouses and dependent children younger than twenty one years of age, but are required to list them at the time of initial entry for the lottery. It is possible that one's marital status may change, particularly from single to married, after winning the lottery and before migrating; when such cases turn up, U.S. embassy staff in each country determine the legitimacy of these claims on a case-by-case basis, as there seem to be incentives for fraud.

3.2: A Sample of Lottery Winners and Losers

I was able to obtain a complete listing of lottery winners from Addis Ababa for the years 2006 through 2010 from the Ethiopian Postal Service. It was, however, not possible to find a comparable list of DV lottery losers. Using a screening procedure outlined below, I drew representative samples of DV lottery losers and non-participants, relying on an estimate that around 45% of households in Addis Ababa have participated in the lottery in the years since 2006, which is not surprising given the overwhelming popularity of the DV lottery, the low threshold requirements needed to enter it, and the length of time the lottery has been in operation.⁴

⁴ The estimate is based on publicly available figures of the total number of DV migrants from Ethiopia for the years indicated and on the assumption that, a) that the proportion of DV winners from Addis Ababa is the same as the city's share of the country's urban population; and b) that the typical DV applicant from Addis Ababa enters the lottery every other year. The approximation is consistent with other estimates in similarly situated countries. Torres and Pelham (2008) find that upwards of 60 percent of adults in Sierra Leone would like to migrate if they had the opportunity. The World Bank in its 2007 report had also found that between 50% and 90% of the young adults in certain developing countries would like to migrate if offered the option.

The majority of DV participants were young adults who had not yet formed families of their own; household heads with dependent children and/or a spouse constituted less than 8% of all DV applicants. Subjects where the DV applicants are a household head are excluded from this study; including them would have biased the treatment effects, as the comparable DV winners' entire family members had likely migrated to the US and would not have been observed in Addis. (Gibson et al, 2013) find that failing to exclude households in which all members would migrate leads to a downward bias of the estimated treatment effects.

3.2.1 Lottery Winners:

A complete list of DV lottery winners was stratified by the various sub-districts (Kebelles) of Addis Ababa, and numbered 1 through ω_k (total number of DV winners from Kebele K) in ascending order of their municipality provided house numbers.⁵ A target number of lottery winners constituting the treatment group from each Kebele (T_k) were determined with the goal of proportional representation.⁶ The overall target number of the treatment group was intentionally set higher at 300 than was justified by power calculation, which had suggested that 270 DV-winner households were sufficient to find effects, if any. The interval size (i) - the number of proximate DV winning households in a Kebele (in the sense of their municipality provided home ID numbers), from which one family is to be selected for the treatment group - was then set as follows.⁷ Based on a simple lottery, the n^{th} house (n is any number between 1 and i) was picked as the first candidate house for the treatment group from the first interval in each

⁵ Lottery winners are unevenly distributed throughout the different sub-districts (Kebelles) of Addis Ababa. On average, each Kebele has about 6,500 households, which are identified by natural numbers assigned to them by the city Administration.

⁶ $T_k = (\omega_k/W) * 300$; where, W = Total number of [2006, 2009] DV winners from all districts

⁷ $i = \omega_k / T_k$; where, ω_k and T_k are as defined above

sub-district. The k^{th} household (k is defined in the footnote) was then selected from subsequent intervals.⁸

Not surprisingly, not all randomly pre-selected lottery winners took part in the study. Because some families were unwilling to participate in the survey, the aforementioned procedure was repeated until the completed interviews in each sub-district reached as close as possible to the target number (T_k) for each Kebele. Three of the pre-selected treatment households had moved to a different location - one to a different city and two to a different area within Addis, but the latter refused to participate in the survey. Overall, approximately 38 percent of the DV winners approached for interviewing participated in the survey.

3.2.2 The Control Group and Lottery Non-Participants:

Because the complete listings of the population of interest for the control group and DV lottery non-participants were not available, the following strategy was implemented for the selection of their representative samples. The entire set of Addis households were first divided into several enumeration areas (EA), equaling in number the total count of lottery winners from the city for the four years. More importantly, since the distribution of lottery applicants can be assumed to be significantly positively correlated with the distribution of lottery winners, the number of EAs in each Kebele was set to be the same as the number of lottery winners in each Kebele. The poorer neighborhoods such as Addis Ketema, Kolfe and Akaki have the smallest number of lottery winners, while middle class neighborhoods (e.g. Bole, Nefas Silk, Gulele and Yeka) have the largest number of DV winners.

Enumeration areas were chosen based on the same criteria used to select treatment households for the study, guaranteeing each EA an equal probability of being chosen for the study. Control and lottery non-participating households in the randomly selected EAs were picked as follows: A household was chosen from the randomly selected EA based on a simple lottery and screened to see if the family is control or lottery non-participant. If the household was unwilling or

⁸ $k = [(M - 1)i + n]$; where, $M = \{1, 2, \dots, T_k\}$ is the sequence of intervals in a sub-district

unable to participate in the survey for any reason, the next immediate house was invited to take part in the survey, until we found one control and another lottery non-participating household in the EA. About 59% of the control households selected in this manner were unwilling to participate in the long survey. Control and lottery non-participating households were asked the same set of questions, except that those dealing with the DV lottery status of the family were disregarded while interviewing the latter. The specific procedures employed for data gathering and quality control are described in Appendix two.

3.3: Randomization Check

Respondents were asked certain questions to check if the treatment and control subjects were balanced at baseline. Since the first cohort of DV migrants in the sample frame left Ethiopia in 2006, the questions dealt with household characteristics prior to 2006. The variables used for randomization check include: mean age, stature, and pre-intervention education of household head and spouse. These variables are independent of the variables of interest in the causal model. Stature is biologically set in human populations in the early stages of adulthood, and none of the household heads and their spouses were younger than 18 in 2005. To the extent subjects might have had to guess their age, there is no reason to believe that the possible inaccuracies are systematically different across the two groups. Furthermore, 98% of the individuals in this set have not attended any school in the years since 2005. Subjects were asked a categorical question regarding their schooling, which were coded zero for No Schooling, one for Less than High School, two for High School graduate, three for Some College, and four for Bachelor's or Advanced degree.

Households in both groups look very similar in terms of their pre-DV characteristics (Table 2). The groups exhibit no systematic differences, with the exception of the average age of the population of mothers; the average age of the mothers in the control group (51) is about 2.5 years less than the average age of the mothers in the treatment group.

4. Empirical Frameworks and Results

A: Estimation Frameworks

The average effect of the DV lottery can be measured using the reduced form (1). The framework can be used to compare outcomes of households that won the lottery, that lost the lottery, and that did not participate in the lottery. The indicator variable D_i equals one if household i won the DV lottery, and zero otherwise. The dependent variable y_i measures certain outcomes for household (i). These include anthropomorphic measures of immediate household members, self-reported health outcomes, a binary indicator for whether households have health problems typically associated with being overweight and obese, such as vascular diseases and diabetes.

$$Y_i = \beta + \alpha D_i + \epsilon_i \quad (1)$$

If all DV lottery winners migrated but none of the DV lottery losers did, α would capture the effects of migration. However, not all DV winners migrate and not all migrants are DV winners. Some DV lottery winners get disqualified for falsifying their records; others fail to make the final cut due to medical reasons. On the other hand, not everyone who migrates is a DV winner, as certain people migrate to the United States via channels other than the DV lottery. An IV-2SLS framework, with the lottery outcome as the instrument for migration, is thus used to estimate the treatment effect, with the LATE clearly the policy-relevant treatment effect of interest. Randomness of the lottery does not guarantee that potential outcomes are independent of the instrument. For the IV estimates to have a causal interpretation, potential outcomes of households have to be independent of lottery outcomes (Angrist and Imbens, 1994; Angrist et al, 1996). Arguably, the reason for any relation between household outcomes and the DV lottery is the latter's effect on migration.

B: Reduced Form Estimates of Effects of DV Lottery

An empirical regularity describes the relationship between BMI and certain indicators of health. For instance, a study in Lancet, conducted on 900,000 subjects, reveals that mortality rates are associated inversely with BMI levels less than 23, reaching optimum levels for body mass indexes between 23 and 25, and strictly rising thereafter. Overall, DV winners have higher body mass indexes than the people in the control group (0.34, on average). In particular, the average BMI of a segment of the population with BMI less than 25 increases by 0.22 as a result of a family member winning the lottery, with the average BMI of individuals in the overweight category increasing by 0.61, contributing to the incidence of obesity by about 3% (Table 2). It can thus be argued that the DV lottery has contributed both affirmatively and negatively to the health outcomes of the left behind.

Compared to lottery non-participants, DV winners have even higher anthropomorphic outcomes (0.68 BMI, on average), suggesting that Ethiopian DV participants (hence migrants) are differently selected from the overall population (Tables 4). Lottery non-participants have 4.8% more underweight individuals among their ranks than DV winners, but about the same percentage less overweight cases. About 16% more of the DV non-participants obtain inferior medical care when sick (Table 4). Reflecting their lower socioeconomic status, they have fewer cases of individuals with vascular diseases and diabetes among their ranks.

C. IV Estimates of Effects of Migration

Migration of a family member enhances the health status of the plurality of the remaining population, while worsening the health outcomes of some. Table 2 shows that emigration has significant effects on body mass indexes for the overall population (+0.56) and for about 80% of the population - those with BMI less than 25 (+0.38). Unfortunately, it also induces a BMI increase of 0.95 for those in the

overweight category. The table shows that the percentage of obese people increases by about 5% among the left behind, as a result of a family member migrating. Note that the incidence of obesity increases by roughly the same percentage points in the adult population.

While the adult population is affected by unhealthy weight gains and increased obesity rates, there is no conclusive evidence showing whether people younger than 19 fare as badly in terms of these less desirable changes. It is possible that migration might have positively contributed to the stature of people younger than 19, thus counteracting its effects on their weight and BMI gains.

Being overweight and obese are significant risk factors for the onset of vascular diseases and diabetes. Consistent with the finding that migration increases the obesity rate, families of emigrants are afflicted with vascular diseases and diabetes at higher rates (+10%, See Table 3). Even though the most common Ethiopian cuisine is vegetarian by necessity, and relatively healthy, these findings indicate that some Ethiopians might have picked up poor dietary habits, as their living standard improves due to emigration of a family member.

Migrants' families claim to be less healthy than non-winning DV participants; 12% more of the latter claim they are healthier⁹ (table 3). It is likely that migration inflicts certain emotional costs on migrant senders, contributing to their poorer mental health, leading them to making claims, seemingly in contradiction with directly measurable evidences. People's perception of their health is obviously partly dependent on the state of their mental health. It is not possible, based on the data gathered for this study, to identify which part of people's perception of their health is due to physical ailments/ or lack thereof, and which part is the result of mental health issues. Nevertheless, given that the net effects in physical health due to migration are positive (in the sense that the positives affect a wider segment of the population than the negatives do), the only plausible explanation for migrant senders' claims of being less healthy than otherwise is that migration

⁹ The subjects were asked to identify their health status on a scale of 1 to 5, 5 being the healthiest. For easier interpretation, I recoded these on a binary 0 (not healthy) and 1 (healthy) scale. Those who characterized their health as 1, 2 or 3 were coded as zero.

has contributed to their poorer mental health, broadly defined to include emotional distress because of separation from a loved one.

5. Conclusion and Recommendations

The key conclusion of this study is that the consequences of emigration on the left behind are mixed. Migration appears to have both beneficial and adverse effects on the physical health of those remaining behind, even though the latter tend to accrue more immediately. The literature on health suggests that BMI increases up to the optimal level contribute to good physical health and longevity; therefore, the majority of migrant senders will sooner or later, likely in the long run, reap the benefits of their increased robustness resulting from emigration of a family member. On the other hand, the adverse physical health consequences of emigration for some of the left behind, albeit for a smaller fraction of the population, are already beginning to be felt in the form of increased vascular diseases and diabetes. Emigration has raised the obesity rate and vascular diseases among the left behind, suggesting that a slice of the population might have picked up unhealthy dietary habits.

Even in a malnourished/undernourished country like Ethiopia, one can not underestimate the potential challenges of the rise in obesity rates and related health problems, as households begin to enjoy more relaxed income constraints. In particular, obesity related health problems could easily get out of control in a community where the majority is predisposed to mistake increases in waist size for wealth and health. These potential developments are particularly problematic in countries like Ethiopia where the health sector is severely underdeveloped. Therefore, targeted educational outreach about the side effects of unhealthy dietary choices might be essential to alleviate emigration's adverse physical health consequences. These efforts can have the benefits of, not only optimizing existing resources, but also averting the potential further rise in obesity related illnesses.

Treated households, though they are physically more robust, claim to be less healthy than non-treated families. The most likely explanation for this apparent puzzle is that migration inflicts certain emotional and psychological costs on the senders, adversely affecting their mental health. On some levels, the psychological costs are unavoidable, as international migration involves physical separation from a loved one, often for extended periods of time. However, to the extent that increased communication between migrants and the senders helps in reducing the associated emotional distress, it might be appropriate for policy-makers to find ways and means (where it is viable) to improve communication between migrants and their staying families.

Incidentally, the cost of a telephone call from and to Ethiopia is prohibitively high, likely inhibiting communication between the Ethiopian diaspora and their family members back home. It costs up to 50 cents per minute to place a call to Addis Ababa, while a call to Nairobi – the capital of a neighboring country – costs about 80% less. Even if one were capable of paying the fees, the services are sporadic, of lower quality and heavily controlled. The Ethiopian government's monopoly of telecommunications services in the country has more than likely contributed to the prohibitively high cost and poor quality of communication between Ethiopia and the rest of the world.

Table 1: Randomization Check

	Number of Observations	DV Losers (Mean)	DV Winners (Mean)	Mean Difference	P-Value
Education of Male HH Head (Pre-DV)	494	1.72	1.81	-0.1	0.38
Education of Female HH Head (Pre-DV)	494	0.95	0.88	0.07	0.49
Age of Fathers	323	58.19	59.42	-1.23	0.28
Age of Mothers	424	49.29	51.91	-2.62	0.01
Fathers' Stature	325	169.86	171.16	-1.3	0.35
Mothers' Stature	425	163.41	162.48	0.93	0.2

Note: Education Indicators: 0 = Illiterate; 1 = Less than High School; 2 = High School; 3 = College; 4 = Bachelors Degree and Higher

Table 2: Effects of the DV Lottery and Migration on Certain Indicators of Health

Panel A: OLS Estimates Using the Control Group

	Overall BMI	BMI<25	BMI>25	Percent					
				Under Weight	Healthy Weight	Over Weight	Obese	Obese Children	Obese Adults
Effects of DV Lottery	0.336*	0.222*	0.612**	-2.2	0.9	1.4	2.8***	3.6	2.7***
	(2.37)	(2.03)	(2.84)	(-1.79)	(0.46)	(0.83)	(3.88)	(1.79)	(3.47)
Number of Observations	2412	1930	482	2424	2424	2424	2424	257	2167

Panel C: IV Estimates

	Overall BMI	BMI<25	BMI>25	Percent					
				Under Weight	Healthy Weight	Over Weight	Obese	Obese Children	Obese Adults
Effects of DV Lottery	0.559*	0.377*	0.953**	-3.7	1.4	2.2	4.7***	5.1	4.6***
	(2.37)	(2.03)	(2.82)	(-1.79)	(0.46)	(0.83)	(3.88)	(1.8)	(3.47)
Number of Observations	2412	1930	482	2424	2424	2424	2424	257	2167

Table 3: Effects of the DV Lottery and Migration on Some Measures of Health Input and Outcome

Panel A: Reduced Form Estimates

	OLS			Probit		
	Self Reported Health	Quality of Care	Incidence of vascular diseases	Self Reported Health	Quality of Care	Incidence of vascular diseases
Effects of DV Lottery	-0.07* (-2.03)	0.07 (1.61)	0.06* (2.15)	-0.26* (-2.03)	0.18 (1.61)	0.32* (2.14)
No. of Observations	494	494	494	494	494	494

Panel B: IV Estimates

	IV			IV Probit		
	Self Reported Health	Quality of Care	Incidence of vascular diseases	Self Reported Health	Quality of Care	Incidence of vascular diseases
Effects of DV Lottery	-0.12* (-2.04)	0.12 (1.61)	0.10* (2.14)	0.42* (-2.00)	0.30 (1.62)	0.51* (2.20)
No. of Observations	494	494	494	494	494	494

Table 4: OLS Estimates Using Lottery Non-Participants

Panel A: Estimates Using BMI Groups

	Overall BMI	BMI<25	BMI>25	Percent					
				Under Weight	Healthy Weight	Over Weight	Obese	Obese Children	Obese Adults
Effects of DV Lottery	0.679*** (4.75)	0.432*** (3.89)	0.418 (1.72)	-4.8*** (-3.72)	0.2 (0.09)	4.6** (2.96)	2.8*** (3.87)	1.9 (1.00)	2.9*** (3.75)
Number of Observations	2482	2028	454	2494	2494	2494	2494	363	2131

Panel B: Estimates Using Self-Reported Health, Quality of Care and Incidence of Vascular Diseases

	OLS			Probit		
	Self Reported Health	Quality of Care	Incidence of vascular diseases	Self Reported Health	Quality of Care	Incidence of vascular diseases
Effects of DV Lottery	-0.02 (-0.49)	0.16*** (3.89)	0.07** (2.71)	-0.06 (-0.49)	0.43*** (3.84)	0.40** (2.68)
No. of Observations	519	520	520	520	520	520

Chapter Three

Ethiopia's Lifecycle Deficit and Projected Support Ratio

I. Introduction

The debate of whether or not population growth facilitates economic growth, dates back to the origin of Malthusian theories, and remains unresolved. Current research emphasizes changes in age-structure (working through the channels of support ratios, saving rates and investment in education, etc.) in promoting economic growth and associated improvements in social welfare, further illuminating the traditional debate on the relationship between population growth and economic development. Population age structures change when a country undergoes demographic transition, a process that takes place when a country moves from high birth and death rates to low birth and death rates over time.

Various countries have experienced this transition, reaping the associated benefits known in the literature as demographic dividend, the extent of which varies according to the depth and duration of the transition, as well as how conducive the general policy environment happens to be in the country experiencing the change. A large number of African countries are currently undergoing demographic transitions and are likely to benefit from the associated decline in the dependency ratios resulting in increased support ratios. Ethiopia is the second largest African country with one of the highest (but declining) birth rates and the fastest expanding economies in the world (albeit from a low base), presenting a clear opportunity to study the likely impact of its changing age distribution on its economy.

In this paper, I estimate the support ratio for Ethiopia for a number of years, using the US Census Bureau's population projections and the method developed by the National Transfer Accounts (NTA), which employs the age-profiles of labor income and consumption.¹ Ethiopia is a poor country, where subsistence agriculture is the only source of livelihood for the plurality. Child labor is not uncommon in the country, particularly on family owned farms and in small scale businesses. In addition, the country's social security system is severely underdeveloped, supporting only a tiny minority of the old and the disabled. As a result, its labor income profile depicts a picture where people start working early and continue to work in old age. On the other hand, private consumption peaks early on, between the ages of 24 and 28. It declines more than moderately starting in the mid 30's, suggesting that poverty might be pronounced in older age groups. This result is fairly atypical when compared to the age profiles of consumption for the other NTA countries. The average Ethiopian is in deficit for the first thirty years of her life, producing more than she consumes during the second thirty years of her life. The support ratio is expected to increase in Ethiopia for at least the next generation or so, potentially augmenting its per capita income. The size of the demographic dividend accruing to the country will be larger, the higher the decline in fertility. Moreover, the potential positive effects of the imminent favorable changes in population age-structure on the economy can be further enhanced with complimentary policies that increase employment opportunities, promote human capital investment, and enhance the deepening of financial markets.

II. Background

Demography:

Ethiopia has surpassed Egypt to become the second largest country in Africa in terms of population size (94 million). Currently, the population is increasing at the annual rate of 2.9%, and according to the US Census Bureau estimate, the country

¹ The National Transfer Accounts (NTA) is a project developing a system to measure economic flows across age groups in a manner consistent with National Income and Product Accounts.

is slated to become the seventh most populous country in the world by the year 2050. Ethiopia has one of the highest Total Fertility Rates (TFR) with 5.39 children born per child-bearing woman, with birth and death rates of 38.1 births and 8.9 deaths/1000 people, respectively. As is common in similarly situated developing countries, the country has an expansive population pyramid: About 45% of Ethiopians are younger than 15, with another 20% between the ages of 15 and 24. The median age of the population is one of the lowest in the world (17.5). Consequently, the country has one of the highest youth dependency ratios, thus a low support-ratio. Life expectancy has climbed to its current level of 60 years, after taking a dive in the 1990's due largely to HIV/AIDs.²

The proportion of Ethiopians living in urban areas is low even by sub-Saharan African standard - just 17% of the country's population reside in urban areas, although the rate of urbanization has picked up in more recent years (3.6% per year). There is a significant gap in fertility in urban and rural areas in the country (Teller et al, 2008). Without taking a stand on what may have contributed to lower fertility in urban areas, since the question is still largely unsettled in the literature as to what really causes decreases in fertility³, the uptick in the rate of urbanization, should it continue in the future, is likely to be accompanied by the slowing of fertility and decline in the rate of growth of the population. This would in turn raise the support ratio, creating the potential for the country to benefit from the first and second demographic dividends, which have been found to have contributed to the phenomenal economic growth experienced by the Asian Tigers. (Bloom and Williamson, 1998; Bloom et al, 2007)

² The country's basic and latest demographic data are obtained from the latest CIA World FACTBOOK. They are available online.

³ Despite some evidence showing the role of family planning programs in reducing fertility rates (e.g. Miller, 2007), thus slowing population growth and inducing favorable changes in population age-structure, economists attribute lesser significance to these interventions, emphasizing the importance of demand factors such as income and education in reducing fertility.

Economy:

Despite the recent economic progress the country has made, making it one of the top five fastest growing countries in the world for a few years in a row (the economy has experienced double-digit growth over the past seven/eight years), Ethiopia remains one of the Least Developed Countries, with a per-capita income of just under \$400 (about \$1100 when considering per-capita income at PPP), which is below the regional average of \$1250 (World Development Indicators Data Base, The World Bank.) The government claims that it will be able to sustain the recent phenomenal economic expansion in the future, transforming the country into a middle income country in about a decade.⁴ In a widely publicized and highly ambitious plan it has called the Growth and Transformation Plan, the current Ethiopian government boldly states that its objective is to:

"to build an economy which has a modern and productive agricultural sector with technology and an industrial sector that plays a leading role in the economy; to sustain economic development and secure social justice; and, increase per-capita income of citizens so that it reaches at the level of those in middle-income countries."

Whatever the future holds, the country remains poor by the World Bank's World Development Indicators, with roughly a third of its population living under the national poverty line. Ethiopia's economy is largely agrarian, depending heavily on small-scale and family-owned farms. Agriculture - subsistence agriculture to be more exact - continues to play the dominant role in the economy in terms of its contribution to GDP, exports and employment. A recent estimate indicates that the agricultural sector contributes about 47% to GDP, with the manufacturing and service sectors, respectively adding roughly 15% and 39% to GDP. Likewise, agriculture contributes to about 84% of exports and 80% of total employment in the country. Perhaps largely as a function of this, formal employment is a small fraction of total employment. Most people are engaged in informal employment (unpaid family labor, self employment within the service sector, etc.).

⁴ Critics maintain that such rosy predictions are based on unrealistic assumptions not supported by the conditions on the ground.

Education:

Ethiopia is slated to meet much of the United Nations Millennium Development Goals, with the possible exception of the Education Goals.⁵ Generally speaking, the state of education in the country is still underdeveloped as measured by several indicators, despite the recent attempts by the government to expand education, particularly at secondary and tertiary levels. According to the most recent World Development Indicators data compiled by the World Bank, a significant achievement has been attained in primary education, with gross enrollment rising to above 95% in the academic year 2010/2011, from just over 50% a decade earlier. The government claims that it can attain universal primary enrollment by the year 2015. Although the general enrollment rate of secondary education has risen as well, it is still below 40% and considered low even by African standards. The country is also making some headway in expanding tertiary education. In the last eight years alone, 10 new public universities with total enrollment capacities of more than 120,000 were built, in addition to a number of private colleges that have sprung up, the latter catering largely, if not exclusively, to students who wouldn't otherwise obtain college education. (The public universities are more competitive to attend.)

Most of the pupils, at the primary and secondary levels, attend public schools, making private schools rare and only for the privileged few, as they are largely very expensive and thus beyond the reach of the plurality. The Federal government, which is responsible for about 50% of public expenditure on education, spends slightly more than 20% of its entire budget on education. (The rest of the money comes from the regional governments and local administrations.) Overall, the share of education in the GDP is about 5%, which is higher than in most African countries.

⁵ The Eight UN Millennium Development Goals include: Eradicating Extreme Poverty and Hunger, Achieving Universal Primary Education, Promoting Gender Equality and Empowering Women, Reducing Child Mortality, Improving Maternal Health, Combating HIV/AIDS, Malaria, and Other Diseases, Ensuring Environmental Sustainability, and Developing a Global Partnership for Development

The quantitative indicators cited above create the impression that Ethiopia has made breakthroughs in providing education to its young people. However, when one considers various indicators of education quality, a different picture emerges, suggesting significant work still remains. The education sector is riddled with a number of poor-quality indicators, including high drop-out rates, low completion rates particularly in primary schools (50%), failure to achieve minimum learning targets set by the government, lack of knowledge of basic subject matters by teachers, and similar others. (Japan International Cooperation Agency, 2012)

III. Data

The primary source of data for the analyses used in this paper comes from the Ethiopian Income and Expenditure Survey of 2004/2005. The data were gathered by the Ethiopian Central Statistical Authority (CSA), and include information on certain demographic and economic variables of interest. The demographic variables include detailed information on certain basic variables such as age, gender, education, and employment status. The economic variables include, among other things, detailed information on household expenditure on numerous household needs. Households consistently reported earning less than their expenditure. As a result, the Authority did not publish the income data it collected, deeming them unreliable. The data gathering procedures meet standard requirements and have been reviewed for accuracy by independent experts from the United Nations.

III. Age Profile of Labor Income and Consumption

A. Labor Income

Figure 1 depicts the smoothed age profile of labor income for Ethiopia. Because the CSA did not publish the income data it gathered, I employed the following procedures to back out the age profile of labor income from information that was available. First of all, total household expenditure was used as a proxy for total

family income. Total household expenditure is the sum of consumption expenditure and non-consumption expenditure. The former includes expenses on items such as food and non-alcoholic beverages, alcoholic beverages and tobacco, clothing and footwear, housing, water, fuel, health, transport and communication, recreation, etc. Non-consumption expenditure includes, among others, transfers made, bank deposits, interest paid, insurance premiums, loans given out, repayment of loans made, fines and related legal expenses, income tax, purchases of lottery tickets and gambling expenses, operating costs of household economic enterprise, and Ikub and Idir payments. The latter two are, respectively, traditional non-interest bearing savings and insurance mechanisms, and are ubiquitous throughout the country.

The survey contains information on the work status of family members, their occupations, and whether one contributes to family income or not. I utilized these to identify individuals who are not actively contributing to family income. About 79% of all individuals included in the survey were determined to be non-income earners. Of the income earners, just under half of them are the sole breadwinners to their families (call them group A). This meant that I had to find a way to allocate total family income between the income earners in the remaining cases (call these group B).

I estimated the standard earnings equation for group A households, to predict income for individuals in group B. Using the estimated education and work-experience coefficients, I obtained predicted labor income for each working age individual member in group B households. Finally, I utilized the within-family-ratios of predicted income to distribute reported total family income (expenditure) between the income contributing members in group B. Interestingly, several versions of the earnings equation yield remarkably similar age-profiles of labor income.

It is worth highlighting some features of the age profile of labor income. First, some children as young as 11 contribute to family income, as is typical in countries with similar stages of economic development, where subsistence family owned agriculture is the dominant form of economic activity. Secondly, the

profile descends gradually with age suggesting that people continue to work in old age, reflecting their poor economic status and lack of social security. It is also interesting that the profile's gradient rises sharply in the early to mid 20's. This appears to be consistent with the fact that individuals with some college education, thus higher earnings, join the work force in their early to mid 20's.

B. Private Consumption:

The age profiles of total private expenditure, education, health and all other goods and services are shown together in figure 2A. The profile of expenditure on all other goods and services is estimated in accordance with equivalence scales prescribed by the NTA (Mason and Lee, 2011), which draw upon the Engel's method and the Rorbath method (See Deaton, 1997 and Lee et al, 2008). As depicted in graphs in 2A, expenditure on education and health constitute insignificant proportion of the family budget in Ethiopia. To estimate the age profile of private expenditure on education, I have used all available information, including enrollment by grade at the household level.

The profile of private consumption of other goods and services indicates that consumption peaks early on around age 30, declining thereafter, implying that poverty might be pronounced in older age groups. Those around fifty consume about 25% less, with those in advanced age groups consuming roughly about a third less, than those in their early 30's. This is a peculiar result in the sense that it is unlike the findings in the majority of other NTA countries. It is true that the slope of the age profile of labor income is at its steepest between ages 20 and 30 (see Figure 1), when presumably college graduates join the work force. It is also true that Ethiopia has experienced an East Asian-like economic growth in the last decade or so, which may have benefitted even those less skilled workers in the younger age groups. Further it is possible, and even likely, that these young professionals are single, and may be enjoying higher consumption, while a higher percentage of individuals in their 30's and beyond might have their own children to support, implying that they would be consuming slightly less, per capita. However, for a consumption profile to have shown increased levels of poverty among people in older age groups, the high earners among the younger age

cohorts must be less likely to be co-residing with their parents and extended families, where resources would be shared more equally. As it turns out, the proportion of families with higher (advanced) age groups declines with the rise in family expenditure, suggesting that high earners in the younger age groups are less likely than their low earning peers to co-reside with their parental households. The proportion of families with people older than 45 and 55 is lower in those with more than the average expenditure (thus earning) by 3 and 6 percents respectively.

The age profile of private education (which may be viewed separately in 2B) rises with age, reaching a maximum near age seventeen, gradually declining thereafter. Two main factors contribute to this profile. First, in urban and middle class families where children start attending schools fairly early and stay in school, their families pay progressively higher money out of pocket, because the cost of education rises with grade levels. (I regressed private expenditure on grade levels by family and found that cost rises almost exponentially with grade level.) Secondly, in more rural settings with lower economic means where children work on family farms, children who may attend schools start doing so at advanced ages, and drop out of schools sooner. The age profile of private expenditure on health (2C) is rather unremarkable in that it is fairly insignificant across all age groups. This is a reflection of the fact that most Ethiopians live outside of the reach of modern health facilities.

C. Public Consumption

The age profile of public education (2D) is interesting because it increases sharply relatively late attaining a maximum near age 20. This is because a significant proportion of the public money available for public education has in more recent days been used for a very substantial expansion of tertiary education in the country. As noted earlier, the government has built around 10 comprehensive universities throughout the country just in the last ten years. Much like the private health expenditure profile, the age profile of public health (2E) is fairly unremarkable and insignificant, even considering the contribution of aid money as part of public expenditure on health.

IV. The Lifecycle Deficit

The combined labor income and expenditure profiles for Ethiopia are shown in figure 3A. According to this figure the average Ethiopian consumes more than he/she produces until about age 29, producing more than her/his consumption needs for about 30 years thereafter. At age 58, one starts relying for one's consumption needs on (in addition to one's own labor income) other sources of livelihood such as return from asset income, transfers from younger family members, and the government. Figure 3B depicts the corresponding lifecycle deficit (surplus) for Ethiopia.

V. The Implied Support Ratios

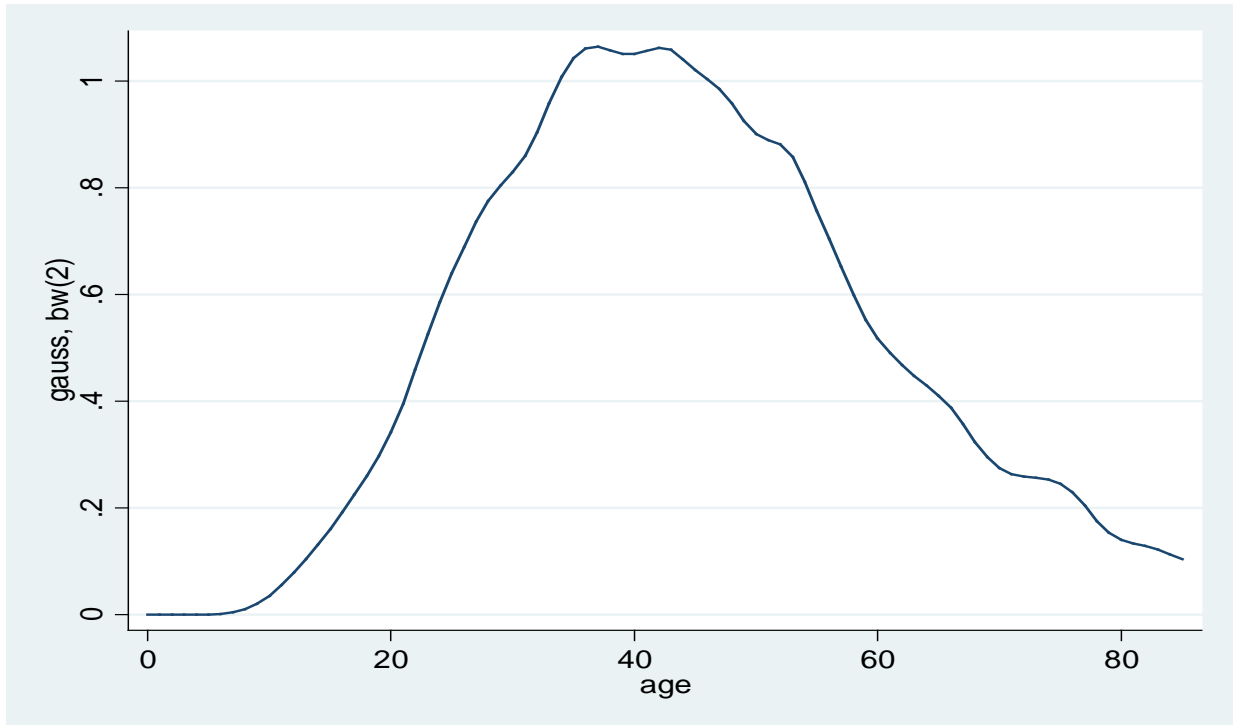
Support ratios were estimated for Ethiopia for a number of years using its labor income and consumption age profiles, which respectively represent age variation in productivity and consumption needs. For the estimation, I also utilized the US Census Bureau's population-by-age projection for Ethiopia until the year 2037. According to these estimates, the support ratio is expected to increase for Ethiopia for another generation or so (Figure 4), suggesting the country's per-capita income could increase due to the favorable changes in its age structure. The increase in per-capita income associated with the increase in the support ratio is what is known in the literature as demographic dividend. Therefore, the projected rise in Ethiopia's support ratio is expected to have beneficial impacts on the living standards of the average Ethiopian for the foreseeable future.

CONCLUSION

Consistent with the socio-economic conditions prevailing in the country, the age profile of labor income for Ethiopia is characterized by gradual ascent and descent throughout the life cycle. People start earning a living at fairly young age (11) and continue to do so in old age. On the other hand, Ethiopia's private consumption profile is peculiar, because consumption peaks fairly early and declines with age

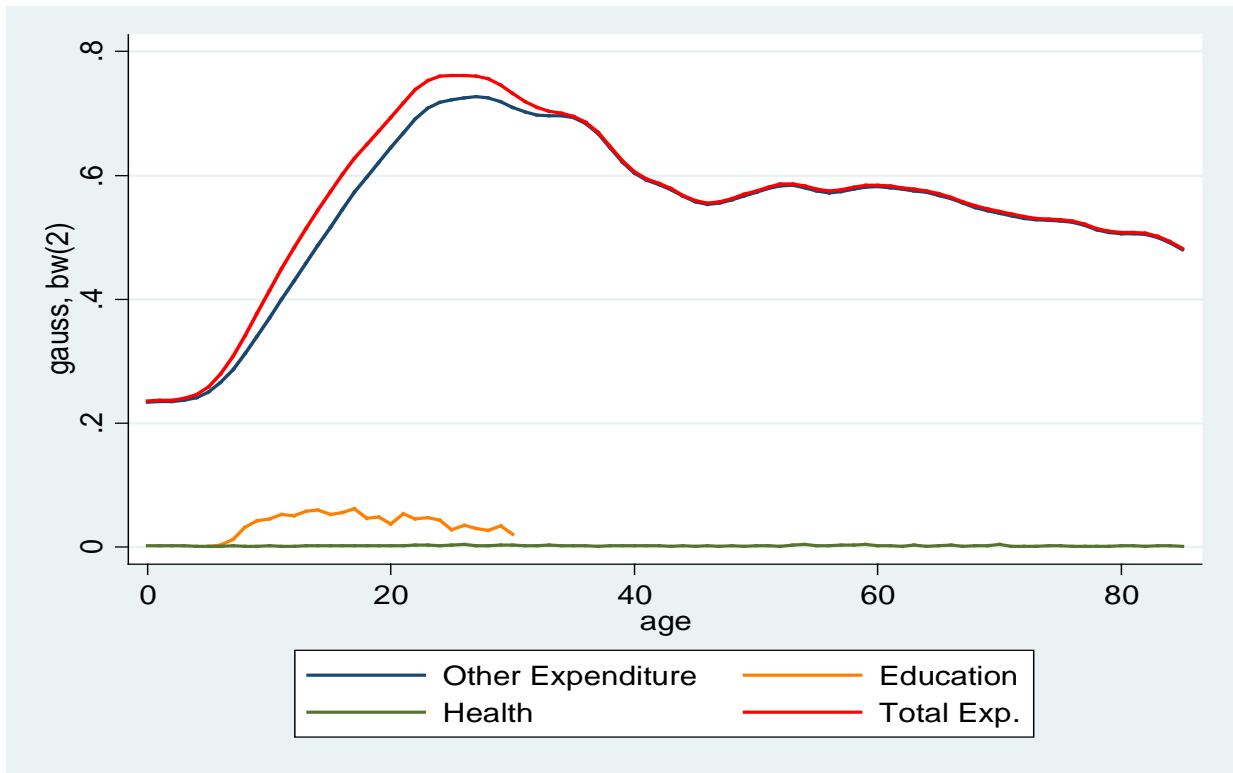
beginning in the early 30's, unlike the findings in many other NTA countries. A preliminary finding suggests that high earners in the younger age groups are less likely than their low earning peers to co-reside with their parental households. Finally, the average Ethiopian can expect to consume more than she/he produces, and is in deficit for about 29 years, which is roughly half her/his life expectancy. The age profiles of labor income and consumption suggest that Ethiopia is slated to experience a boost in its support ratio for another generation, making it possible for the country to reap the associated benefits - the first and the second demographic dividends.

Figure 1: Age Profile of Labor Income (Smooth Plot)



Note: The average labor income for individuals in the age group 30-49 is scaled to 1.

Figure 2A. Private Expenditure Profiles



Note: Scaled as a percentage of the average labor income of individuals in the age group 30-49.

Figure 2B. Private Expenditure on Education (in Ethiopian Birr)

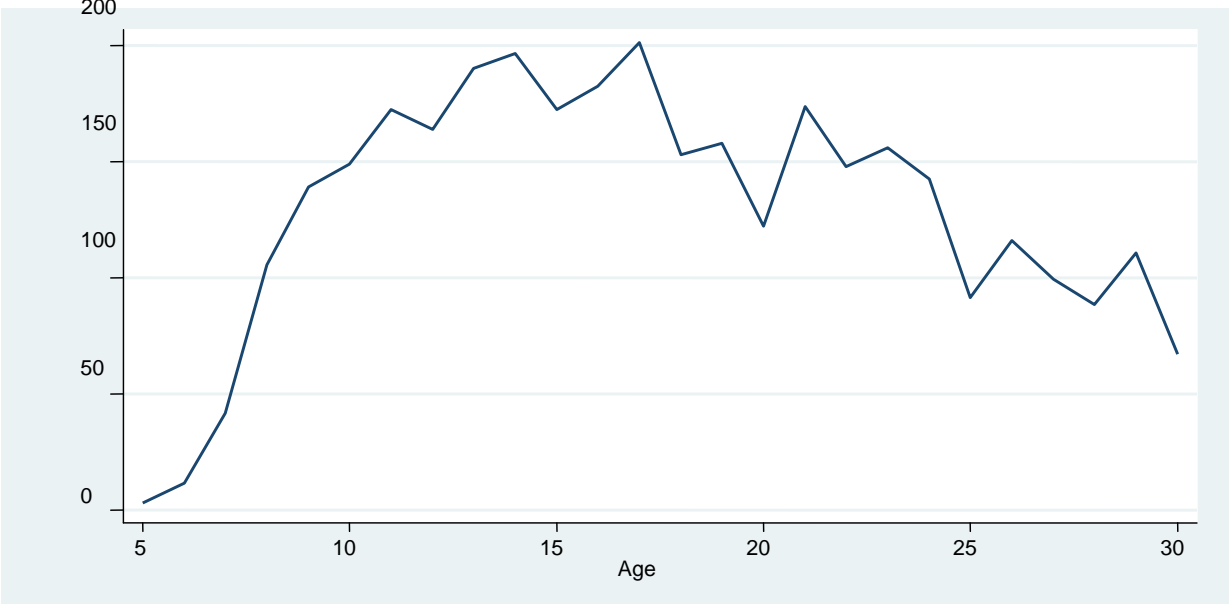


Figure 2C. Private Expenditure on Health (in Ethiopian Birr)

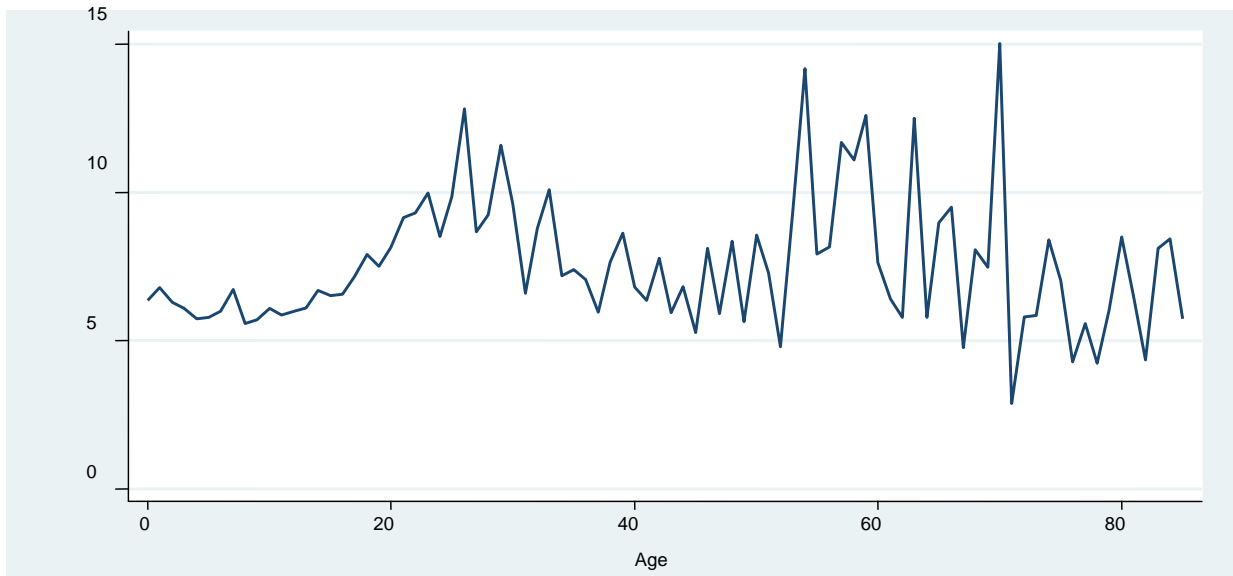


Figure 2D. Public Expenditure on Education (in Ethiopian Birr)

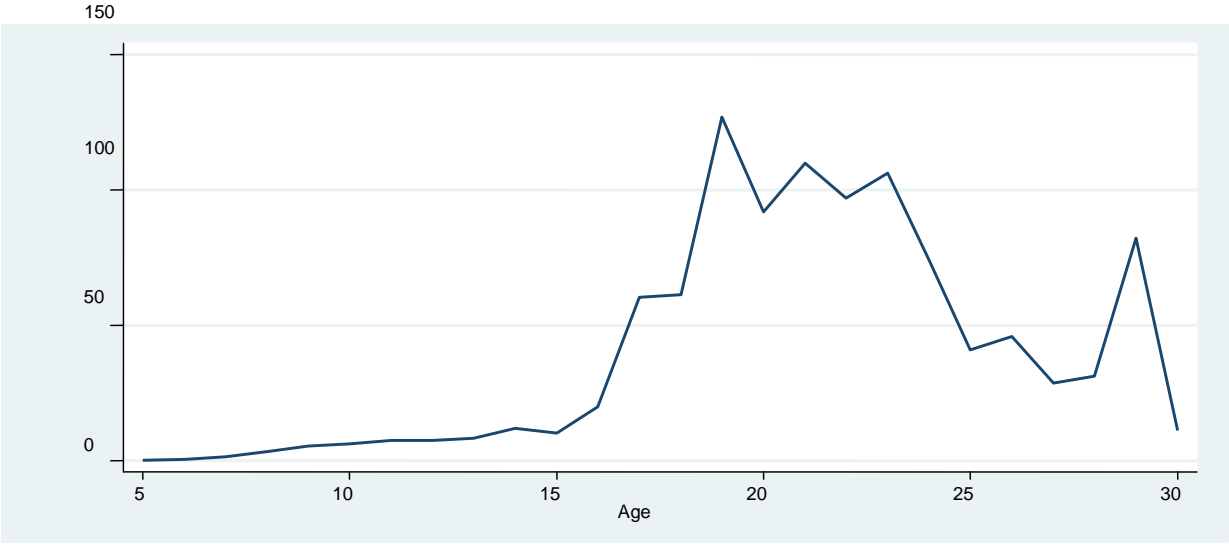


Figure 2E. Public Expenditure on Health (in Ethiopian Birr)

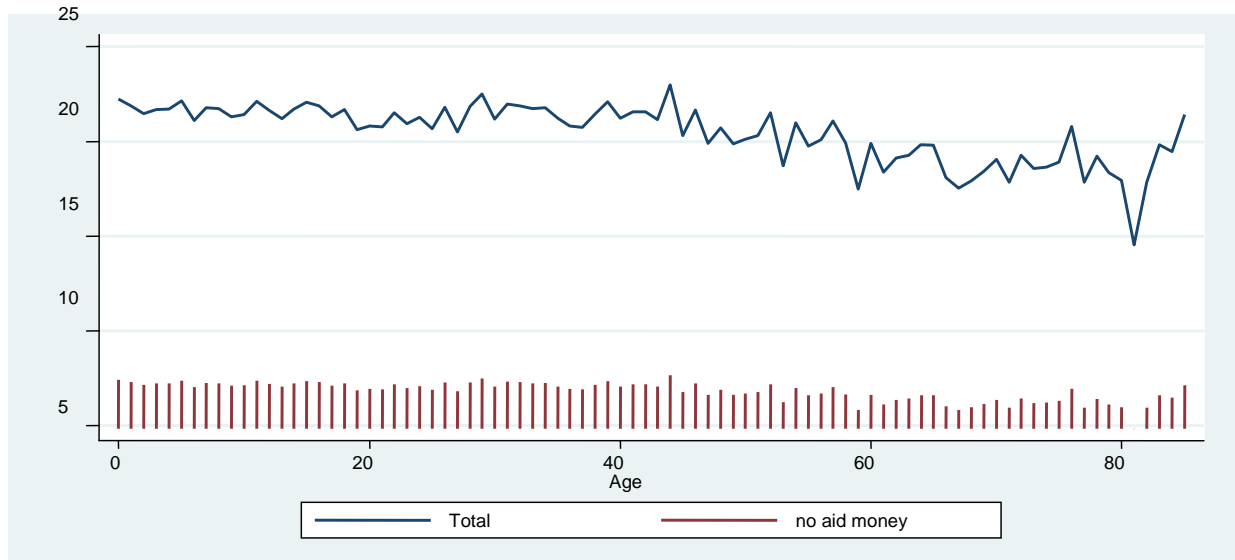


Figure 2F. Public Expenditure on Defense and Security (in Ethiopian Birr)

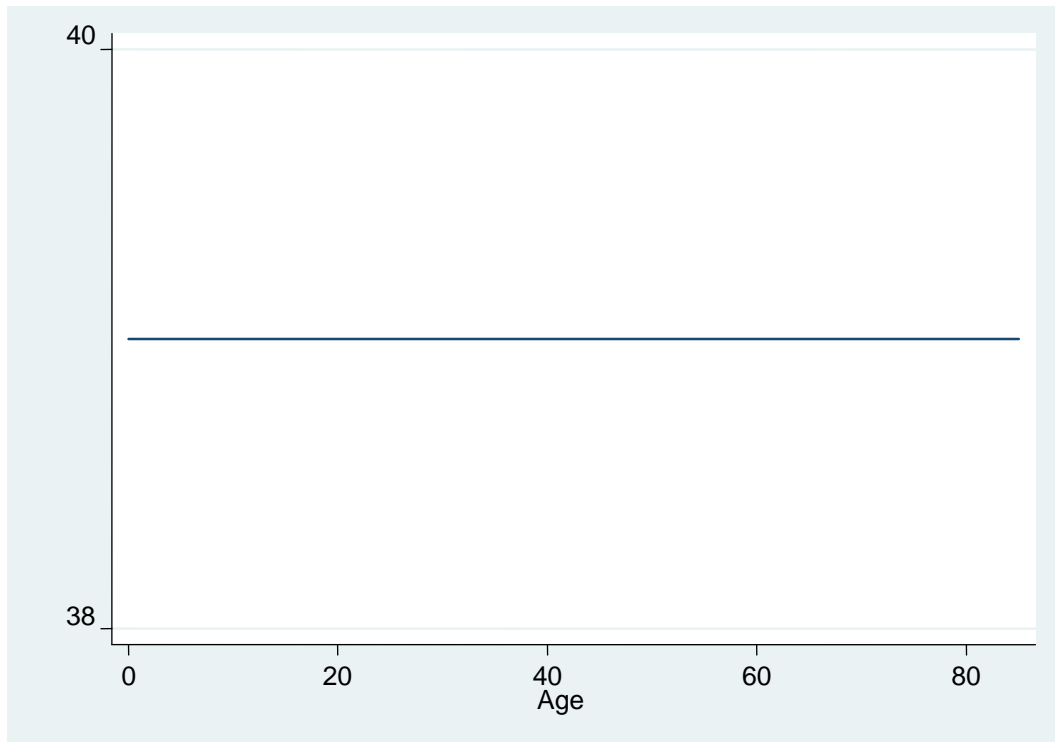


Figure 3A. Age Profiles of Labor Income and Consumption

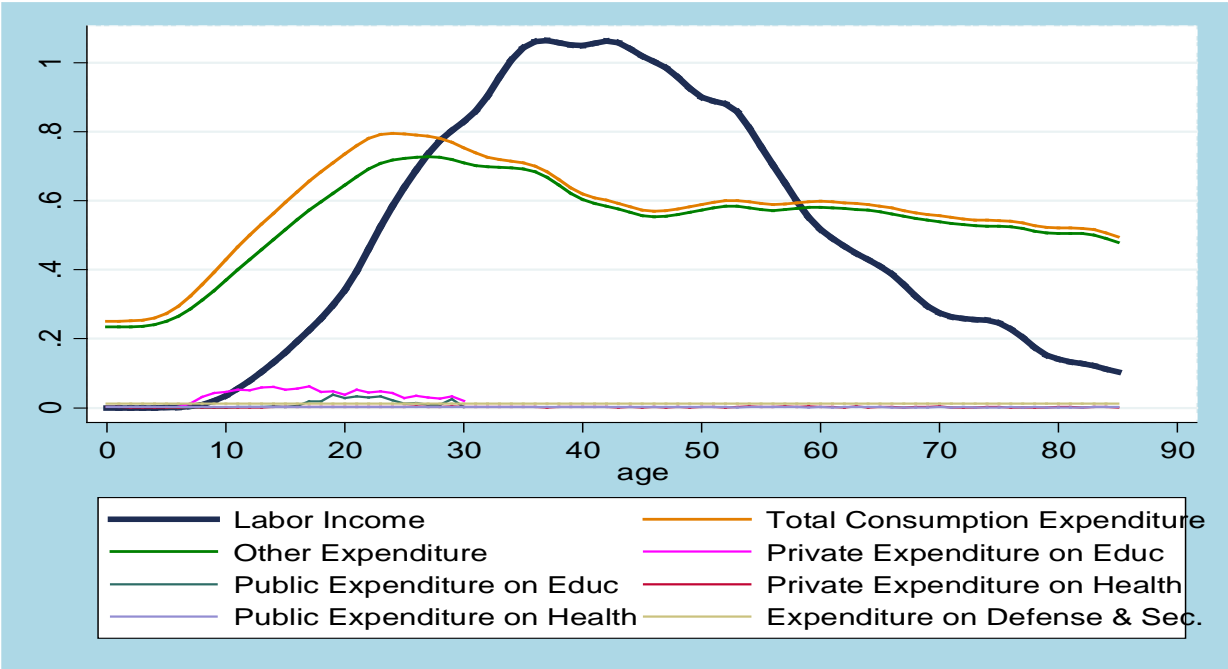


Figure 3B. The Lifecycle Deficit

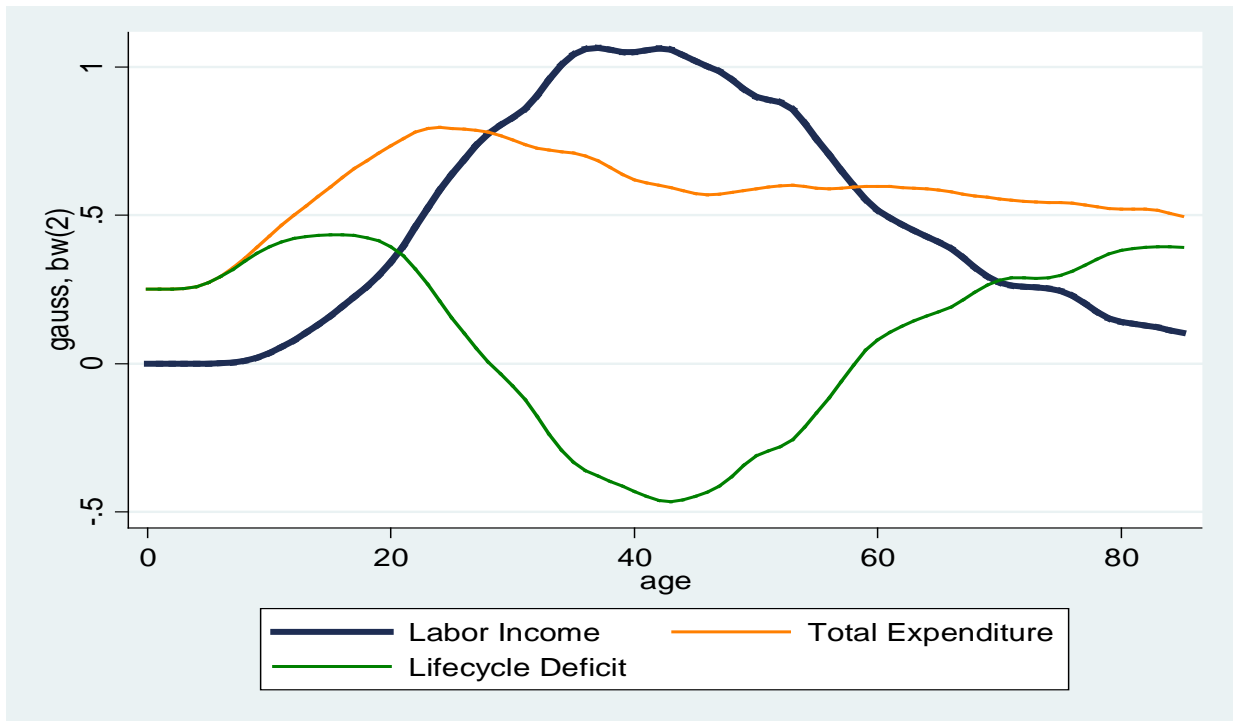
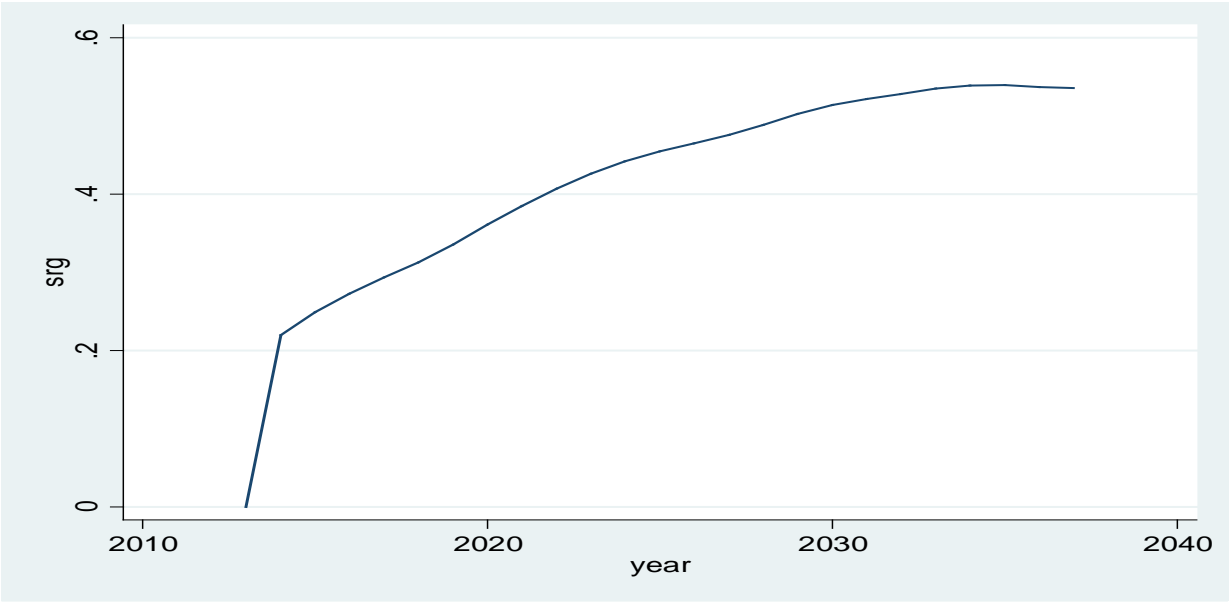


Figure 4: The Projected Rate of Growth of the Support Ratio for Ethiopia



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Appendix 1: Data Gathering and Quality Control Procedures

The survey was conducted by sixteen experienced enumerators hired in consultation with the Economics department of Addis Ababa University.¹ A day-long training was given at Addis-Ababa University to the enumerators re: the purpose of the survey, specific guidelines on how to implement it, and most importantly, the appropriateness of the questions included in the survey. The enumerators had very pointed comments and suggestions about what should be asked, what questions should not be part of the survey, which questions need to be reframed and how, etc. The Questionnaire was redesigned taking the participants' comments into account.

After the training and a pilot survey, one or two enumerators were assigned to each district to implement a pilot survey, depending on the anticipated difficulty of finding pre-selected houses in the treatment group, the size of the district, and the target number of treatment (hence control and lottery non-participating households). The enumerators had supporting letters obtained from Ethiopia's Ministry of Foreign Affairs and the Addis Ababa city council.

Quality control was undertaken in three phases. The procedures were adopted before the survey was begun. The first phase was implemented concurrent with data collection. We phoned about 80% of the interviewed subjects, re-asking them certain questions. For no particular reason other than the simplicity of the questions, the subjects were asked to verify their addresses (District, Kebele and House No.), the gender distribution of household members, and the family's monthly food budget. The telephone interviews revealed that less than 3% of the questionnaires contained some errors: in a few cases, deceased members were recorded as family members, and certain respondents had initially reported a non-resident member as part of their family. About 20% of the respondents either could not be reached by telephone despite repeated attempts, or did not provide their telephone numbers. Questionnaires completed by three enumerators in

¹ As incentive for participation in the survey, three members of the treatment, control and Lottery non-participating households were invited to attend a concert by prominent Ethiopian artists at Addis Ababa University. The concert was very successful, thanks to the University officials, particularly its president, Professor Andrias Eshete, who not only allowed me to use the University-hall for the event, but also provided security, free of charge.

particular made up a bulk of this group. Although this could be a cause for concern, it was not entirely alarming that this was happening, because these results were coming from districts on the lower end of the income distribution. Nonetheless, we took note of the anomaly in order to properly address it in phases II and III of the QC procedures. However, even if 100% of the respondents were reachable by phone and the above questions checked perfectly, additional checks were needed to make sure that the interviews were conducted with integrity.

In phase II, the enumerators were ranked and divided into two groups – groups A and B - based on the quality of their work.² We then randomly selected 10% and 20% of the Questionnaires completed by group A and B enumerators respectively to check their accuracy in person. We knocked on about 100 doors to do this. All but four of the randomly selected completed Questionnaires passed this check. The only major problem encountered during this phase was that we could not trace one of the non-participating household in *Arada* district. Although this person may have disappeared for any number of reasons, we took note of this to address the issue in phase III appropriately.

In phase III, we randomly selected about 25% of the surveys by one enumerator, whose work had turned up additional errors, such as coding deceased or non-family members as part of the household. We then launched the survey again to make sure this was not a common occurrence. At the end, we were satisfied that the minor errors were not common enough to pursue other methods. Most importantly, we checked, door to door, 50% of the Questionnaires completed by the enumerator who had gathered information on a person we could not trace during phase II. Finding that these questionnaires were remarkably accurate, we were satisfied with the quality of the data gathered and concluded the QC procedures.

² Group B enumerators are those whose works have turned up minor errors as well as those with higher proportion of interviewed subjects with no phone numbers.

Appendix 2: The Ethiopian DV Lottery Applicants and Winners Survey	Respondent Household Identification				
	_____ - _____ - _____ - _____ - _____	Treatment	Woreda	Kebelle	House Number
PART A: BASIC BACKGROUND INFORMATION					
i	Enumerator Name:				
ii	Respondent Household Identification:				
	Woreda (district): _____				
	Woreda name				_____
	Woreda number				
	Kebelle: _____				
	Kebelle name				_____
	Kebelle number				
	House Number: _____				
	Treatment Status: 1 <input type="checkbox"/> Treatment (won lottery) 2 <input type="checkbox"/> Control (did not win lottery) 3 <input type="checkbox"/> Did not participate in lottery				
	Date Survey Conducted: _____ / _____ / _____				
	DD	MMM	YY		
	Comments:				
STUDY OBJECTIVE					
To study the effects of international migration on developing countries					

The Ethiopian DV Lottery Applicants and Winners Survey	Respondent Household Identification				
	_____ - _____ - _____ - _____ - _____	Treatment	Woreda	Kebele	House Number

BASIC DEMOGRAPHIC INFORMATION OF HOUSEHOLD RESIDENTS

Record demographic details for all household residents

Status	Age	Height (cm)	Weight (kg)
<input type="checkbox"/> Father			
<input type="checkbox"/> Mother			
<input type="checkbox"/> Eldest Son			
<input type="checkbox"/> Son 2			
<input type="checkbox"/> Son 3			
<input type="checkbox"/> Son 4			
<input type="checkbox"/> Son 5			
<input type="checkbox"/> Eldest Daughter			
<input type="checkbox"/> Daughter 2			
<input type="checkbox"/> Daughter 3			
<input type="checkbox"/> Daughter 4			
<input type="checkbox"/> Daughter 5			
<input type="checkbox"/> Relative 1			
<input type="checkbox"/> Relative 2			
<input type="checkbox"/> Relative 3			
<input type="checkbox"/> Housekeeper 1			
<input type="checkbox"/> Housekeeper 2			
<input type="checkbox"/> Housekeeper 3			

The Ethiopian DV Lottery Applicants and Winners Survey

Respondent Household Identification

____ - ____ - ____ - ____ - ____
 Treatment Woreda Kebele House Number Enumerator Code

PART B: DV LOTTERY STATUS

1. When was the first time you ever applied for the lottery? ____ ____ ____ ____ Exact year
 (indicate whether year provided is exact or approximate) Approximate year

2. To the best of your knowledge, how many times have you or anyone in your family applied for the lottery? (This includes children who have since moved away).
 Once Twice Three times Four or more times

Do you remember the years? Yes If yes, list all years applied: _____
 No

3. For those in the **treatment** group, (a) what year(s) did your son/daughter/brother/sister win the lottery? (b) How old was he or she when he or she won the lottery for the first time? (c) What year did he or she migrate? (d) How old was he or she when he or she migrated?

Treatment Group Family member	<u>Year(s)</u> when he or she <u>won the lottery</u>	<u>Age</u> when first <u>won the lottery</u>	Did he or she migrate?	<u>Year</u> he or she <u>migrated</u>	<u>Age</u> when he or she <u>migrated</u>
<input type="checkbox"/> Son			<input type="checkbox"/> Yes <input type="checkbox"/> No		
<input type="checkbox"/> Daughter			<input type="checkbox"/> Yes <input type="checkbox"/> No		
<input type="checkbox"/> Brother			<input type="checkbox"/> Yes <input type="checkbox"/> No		
<input type="checkbox"/> Sister			<input type="checkbox"/> Yes <input type="checkbox"/> No		
<input type="checkbox"/> Other: _____			<input type="checkbox"/> Yes <input type="checkbox"/> No		

4. For those in the **control** group, (a) what year did your son/daughter/brother/sister move away within Ethiopia, if at all?
 (b) How old was he or she when he or she moved away? Did he or she migrate? If so, (c) What year did he or she migrate? (d) How old was he or she when he or she migrated?

Control Group Family member	Did he or she move away from home?	<u>Year</u> he or she moved	<u>Age</u> he or she moved	Did he or she migrate?	<u>Year</u> he or she <u>migrated</u>	<u>Age</u> when he or she <u>migrated</u>
<input type="checkbox"/> Son	<input type="checkbox"/> Yes <input type="checkbox"/> No			<input type="checkbox"/> Yes <input type="checkbox"/> No		
<input type="checkbox"/> Daughter	<input type="checkbox"/> Yes <input type="checkbox"/> No			<input type="checkbox"/> Yes <input type="checkbox"/> No		
<input type="checkbox"/> Brother	<input type="checkbox"/> Yes <input type="checkbox"/> No			<input type="checkbox"/> Yes <input type="checkbox"/> No		
<input type="checkbox"/> Sister	<input type="checkbox"/> Yes <input type="checkbox"/> No			<input type="checkbox"/> Yes <input type="checkbox"/> No		
<input type="checkbox"/> Other: _____	<input type="checkbox"/> Yes <input type="checkbox"/> No			<input type="checkbox"/> Yes <input type="checkbox"/> No		

The Ethiopian DV Lottery Applicants and Winners Survey	Respondent Household Identification
	_____ - _____ - _____ - _____ - _____ Treatment Woreda Kebelle House Number Enumerator Code
PART C: EXPENDITURE ON FOOD, OWNERSHIP OF CONSUMER DURABLES, AND LEISURELY ACTIVITIES Page 1 of 2	
1. Food budget	Roughly, what is your monthly budget for food? _____ birr per month
2. Teff consumption	How many kilograms of Teff do you consume per month? _____ kg of Teff per month
3. Other grains consumption	How many kilograms of other grains do you consume per month? _____ kg of _____ per month _____ kg of _____ per month _____ kg of _____ per month _____ kg of _____ per month
4. Butter consumption	How many kilograms of butter or cooking oil do you consume per month? _____ kg of butter per month or litre of oil per month
5. Meat consumption	How many kilograms of beef, poultry, lamb and goat do you consume <u>per month</u> ? _____ kg of beef per month _____ kg of poultry per month _____ kg of lamb per month _____ kg of goat per month How many times <u>per week</u> do you have meat? _____ times per week
6. Sugar consumption	How many kilograms of sugar do you consume per month? _____ kg of sugar per month
7. Sofa	Do you own a sofa in the house? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, how much did it cost? _____ birr

The Ethiopian DV Lottery Applicants and Winners Survey	Respondent Household Identification				
	_____ - _____ - _____ - _____ - _____	Treatment	Woreda	Kebelle	House Number

PART C: EXPENDITURE ON FOOD, OWNERSHIP OF CONSUMER DURABLES, AND LEISURELY ACTIVITIES Page 2 of 2

8. Stove / cooking / energy	<p>Do you use (a gas/electric stove or firewood or coal) for cooking? If gas/electric stove, how much did it cost?</p> <p>Gas/electric stove <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, stove cost: _____ birr Gas electric mnthly cost: _____ birr/mth</p> <p>Firewood <input type="checkbox"/> Yes <input type="checkbox"/> No Firewood mnthly cost: _____ birr/mth</p> <p>Charcoal <input type="checkbox"/> Yes <input type="checkbox"/> No Charcoal mnthly cost: _____ birr/mth</p>
------------------------------------	---

9. Consumer durables	<p>Do you own the following items? If yes, what did these items cost?</p> <p>Radio/Tape Recorder <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, radio/ tape recorder cost: _____ birr</p> <p>CD player <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, CD player cost: _____ birr</p> <p>Television <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, TV cost: _____ birr</p> <p>VCD/VCR <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, VCD/VCR cost: _____ birr</p> <p>Mobile phone <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, phone purchase cost: _____ birr Phone monthly cost: _____ birr/mth</p> <p>Computer <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, computer cost: _____ birr</p> <p>Family car * <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, car cost: _____ birr</p> <p style="text-align: center;"><i>* Not including cars used to earn a living, such as a taxi</i></p>
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10. Entertainment	<p>What do you do for fun? (and how many times every 3 months?)</p> <p>Attend cinema <input type="checkbox"/> Yes, _____ times per quarter <input type="checkbox"/> Barely <input type="checkbox"/> Never</p> <p>Attend sporting events <input type="checkbox"/> Yes, _____ times per quarter <input type="checkbox"/> Barely <input type="checkbox"/> Never</p> <p>Attend theatre <input type="checkbox"/> Yes, _____ times per quarter <input type="checkbox"/> Barely <input type="checkbox"/> Never</p> <p>Attend musical shows <input type="checkbox"/> Yes, _____ times per quarter <input type="checkbox"/> Barely <input type="checkbox"/> Never</p>
--------------------------	--

11. Vacation	<p>Do you take a vacation as a family? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>If yes, how often?</p> <p><input type="checkbox"/> Once per year</p> <p><input type="checkbox"/> Twice a year</p> <p><input type="checkbox"/> Once every two years</p> <p><input type="checkbox"/> Once every three years</p> <p><input type="checkbox"/> Other, specify: _____</p>
---------------------	--

The Ethiopian DV Lottery Applicants and Winners Survey	Respondent Household Identification				
	_____ - _____ - _____ - _____ - _____	Treatment	Woreda	Kebelle	House Number

PART D: INFORMATION ON HOUSING UNIT

1. Do you own the home you currently live in? Yes No

If YES,

When did you acquire it? _____ (year)

How much did it cost? _____ birr

If NO,

Who owns the housing unit? The Kebelle
 Landlord
 Housing agency
 Other, specify: _____

How much is the monthly rent? _____ birr per month

2. How many rooms does it have? _____ rooms

3. What materials were used in the construction of the housing unit? *(check all that apply)*

Marble Brick Wood
 Stone Blockets Mud

4. What is the main source of drinking water for the household?

Tap inside the house
 Tap in compound
 Tap shared with other households in the neighborhood (Bono)
 Other, specify: _____

5. What type of bathing facility does the housing unit have?

Bathtub Shower None

6. What type of toilet does the housing unit have?

Flush toilet Latrine None

7. Do you share a latrine with other households? Yes No

8. How does the housing unit dispose of solid waste?

Collected by municipality
 Collected by private individuals
 Dumped in street
 Dumped in river
 Other, specify: _____

The Ethiopian DV Lottery Applicants and Winners Survey	Respondent Household Identification
	_____ - _____ - _____ - _____ - _____ Treatment Woreda Kebelle House Number Enumerator Code
PART F: FAMILY INCOME, SAVINGS AND FAMILY OWNED AND OPERATED BUSINESSES	
1. What is the main source of income for the family? _____	
2. How much do you make every month (excluding remittances for those in the treatment group)? _____ birr per month What is your monthly income including remittances? _____ birr per month	
3. Going back in time, what was your family income the year <u>before</u> anyone in the household applied for the lottery? Year: _____ Family income: _____ birr per month	
4. Do you own a family business? <input type="checkbox"/> Yes <input type="checkbox"/> No 5. Are you a business partner with someone? <input type="checkbox"/> Yes <input type="checkbox"/> No	
<i>If yes to either of the above, answer questions 6-10</i>	
6. What kind of business? _____	
7. Do you run the business? <input type="checkbox"/> Yes <input type="checkbox"/> No	
8. What is the yearly net income of your business? _____ birr per year	
9. Do you employ people? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, how many? _____ people employed What is your monthly payroll expense? _____ birr per month	
10. How long have you owned / operated this business? _____ years _____ months	
11. Do you own stocks? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, what is the worth? _____ birr	
12. Do you have a bank account? <input type="checkbox"/> Yes <input type="checkbox"/> No Do you have savings? <input type="checkbox"/> Yes <input type="checkbox"/> No	