



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

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Summary. — About a million people have migrated to the US via the Diversity Visa (“DV”) lottery. The DV was instituted by an Act of the United States Congress to diversify the U.S. population through a lottery made available to people from countries with historically low rates of immigration to the country. In any given year, the probability of winning the lottery is less than 1%, with millions of people from around the world competing for a maximum of 55,000 immigrant visas that can be obtained through this migration channel. Using Ethiopian DV participants, which have consistently made up between 6% and 8% of all DV immigrants, I study the causal effects of emigration on the well-being of the migrant sending families. I infer that migration contributes positively to the welfare of the source families. Overall, migration increases consumer expenditure, but has no effect on savings and business ownership of the senders. The positive treatment effects do not diminish with duration of emigration. Migrant men contribute more to the increase in their families’ standard of living than their female counterparts do: while expenditure on food and energy are invariant to the migrants’ gender, the gains in terms of durable ownership, access to clean water, and sanitation facilities occur almost entirely in families where the emigrants are men. I find that DV participants are favorably selected relative to the overall population.
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1. INTRODUCTION

Remittances are arguably the principal channel through which migrant sending families benefit from emigration.¹ 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.

The theoretical literature on remittances, which outlines the mechanisms by which migration could impact the welfare of migrant senders, identifies several reasons why migrants send money to their source countries, the common reasons being altruism, exchange, inheritance, strategic, insurance, and investment. Docquier and Rapoport (2006) offer detailed analyses of these motivations and the implied mechanisms. A number of empirical studies have also identified a few factors that vary with remittances, further clarifying our understanding of the link between migration and the senders’ economic outcomes. The key variables that determine the amount remitted by migrants include the sender’s socio-economic background (chiefly their pre-transfer income) and the migrants’ schooling and income. An unambiguously inverse relationship between the long-run income of the migrant senders and the amount of remittances they receive suggests that migrants could be altruistic or behaving strategically; whereas positive associations between remittances and the migrants’ income or education are consistent with altruistic, exchange, inheritance, strategic and investment motivations (Docquier & Rapoport, 2006). Typically, observed positive relationships between migration and the senders’ consumption are associated with

altruistic rather than self-interested motivations. Adams (2008) argues that remittances are inversely related to the skill of migrants.

Remittance behavior is also anticipated to vary with many other factors including: whether there are multiple or single emigrants from a family (Agarwal & Horowitz, 2002), the migrant’s gender, and social variables such as community membership and social prestige. Some studies have found that women remit more to their families (Kaufmann & Lindauer, 1986; Lucas & Stark, 1985), although a more recent observational study conducted on African migrants in the OECD countries appears to contradict this finding (Bollard, McKenzie, & Morten, 2010). The potential nexus between remittances and social context is still largely underexplored, but a few studies have found that social environments may influence remittances: Azam and Gubert (2002) claim that social-prestige plays a role in remittance behavior; with Massey and Basem (1992) finding that the propensity to repatriate varies with indicators for community membership.

This study explores the effects of international migration on sending households by focusing on migrants from a poor country—Ethiopia—who are essentially randomly assigned the

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possibility of migration through the United States' Diversity Visa lottery. It is the first paper—and the only one thus far to the best of my knowledge—that exploits the random nature of the DV lottery to address the selection bias issue (due to the non-randomness of migration decisions) that plagues migration studies. It uses a specially designed survey of previous DV lottery participants (winners and losers) to infer the causal effects of having a family member migrate to the US. 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.

Gibson, McKenzie, and Stillman (2012) and Gibson, McKenzie, and Stillman (2013) are the two other papers which exploit migration lotteries to New Zealand from the Pacific islands of Tonga and Samoa respectively—through schemes known as the Pacific Access Categories (PAC) and the Samoan Quota (SQ)—to study the causal impacts of migration on the sending families. Citizens of over 160 countries have consistently participated in the DV program since its inception in 1995, making it a truly global program; whereas, the PAC and SQ schemes are significantly smaller in scope, in which only the citizens of the small islands of Tonga, Samoa, Fiji, Tuvalu, and Kiribati enter lotteries for the opportunity to migrate to New Zealand.

Because of their limited coverage, the PAC and the SQ studies were constrained in one major respect—in terms of their sample sizes. Whereas the current paper, the DV study, examines about 500 households (determined on the basis of power calculation) to study the impacts of migration, the PAC studies relied on sixty and eighty households in Tonga and Samoa respectively to reach their conclusions. To the extent that small sample size poses a threat to the internal validity of a research, therefore, the current study represents an improvement in the empirical literature on the impacts of international migration on the sending families.

The DV study's conclusions are more likely to be generalizable to other pertinent contexts than the aforementioned PAC and SQ studies, given its more relevant setting. Ethiopia is the second most populous, low-income African country, with steadily increasing diaspora population in recent times. Tonga and Samoa, on the other hand, are middle income small island nations in the Pacific, with population sizes not exceeding those of small villages in Ethiopia. The various background factors in the Ethiopian context on the one hand and the Tongan and the Samoan settings on the other, which are unlike, interact differently with migration and the outcome variables of interest. Hence, to the extent that context is a relevant factor in identifying the developmental impacts of migration, the DV study can claim a more apposite setting, with more generalizable conclusions.

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 are better-fed, spending nearly 22% more on food (total and per-capita).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 access to clean drinking water and sanitation facilities. They, however, have about the same savings and business ownership rates as DV losers. The positive treatment effects do not diminish a

migrants spend more time abroad, at least within the first five years of their migration.

The conclusion that a typical household's consumption expenditure (particularly food) rises with emigration of an immediate family member is consistent with the proposition in the theoretical literature that migration (thus remittances) could augment the living standards of migrant-sending poor families. Recall that remittances are predicted to vary inversely with the living standards of migrant senders if migrants behave altruistically or strategically, or both, with observed positive association between migration and the senders' consumption linked with altruistic rather than self-interested motivations. The majority of the treatment households in Addis Ababa are the urban poor, whose expenditure on the necessities of life (such as food) cannot sustain the human body at a healthy level. Therefore, it would be logical if, as conjectured in the theoretical literature, the living standards of these migrant senders improved, as measured by the uptick in their consumption of food, cleaner water, and other essentials of life.

That the sender's consumption expenditure improves, while their savings and business ownership remains invariant to migration, is also consistent with the bulk of the empirical literature on migration which find in similar contexts as Ethiopia that remittance receipts are used mainly to increase household consumption, with negligible effects on physical capital accumulation (Brown & Ahlburg, 1999; Fransen & Mazzucato, 2014). Migration-related physical capital accumulation has occurred largely in middle-income developing countries (e.g., Adams, 1998; Woodruff & Zenteno, 2007), and where "institutions... favor policies that encourage savings and investment so that at the margin, household income that exceeds [basic needs] can be saved or invested" (Catrinescu, Leon-Ledesma, & Piracha, 2009). Indeed, income levels and institutional qualities might be binding constraints limiting the effectiveness of migration (and remittances) in promoting physical capital accumulation (Adams & Cuecuecha, 2010, 2013).

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 findings are inconsistent with the bulk of empirical research showing that women commonly invest more in their families and communities than men do (See for instance, Thomas, 1990).

That migrant women in this context contribute less to increases in their families' standard of living is thus unexpected, and might be a potential subject of further inquiry. It is possible that women migrants might be remitting less because their labor-market outcomes in the US are inferior to those of men even after controlling for the observable determinants of wage and employment. Research has shown that there are "unexplained factors" associated with the gender-gradient of labor market outcomes (e.g., Altonji & Blank, 1999). The fact that the impacts of migration on consumption of the basic necessities of life are invariant to gender, whereas improvements in sources of drinking water and sanitation facilities take place entirely in households with male emigrants, might mean that migrant men could be getting higher-paying and/or steadier jobs than their otherwise similarly situated gender counterparts, limiting the amount of remittances sent to their families by the latter.

Ethiopian DV migrants are positively selected relative to the overall population, with DV non-applicants occupying the lowest socio-economic status of the three groups analyzed—DV

migrants, DV losers, and DV non-applicants. Whereas DV applicants (winners and losers) are comparable along certain pre-intervention characteristics, 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. These findings are consistent with conclusions of similar studies that migrants are indeed generally favorably selected, in terms of both observable and unobservable characteristics (see, for instance, [Chiquar & Hanson, 2005](#); [Chiswick, 1999](#)), accentuating the significance of the few experimental studies such as this one.

The vast majority of the studies on the impacts of migration and/or remittances use observational micro-data, and measure specific household expenditure on consumption and investment goods. Most of these papers report robust correlations between emigration/remittances and outcomes, without making explicit causal claims. Others employ a variety of estimation techniques aiming to tease out the causal effects of emigration. The methods used include instrumental variables estimation (e.g., [Lopez-Cordova, 2005](#); [Mansuri, 2006](#); [McKenzie & Rapoport, 2007](#); [Woodruff & Zenteno, 2007](#)), propensity-score matching (e.g., [Esquivel & Huerta-Pineda, 2007](#)), and parametric selection correction models (e.g., [Acosta, Fajnzylber, & Lopez, 2007](#)).

A main methodological concern of the studies that aim to measure the effects of migration is the non-randomness of the causal variable of interest. Since migrants are typically positively selected both in terms of their observable and unobservable characteristics, non-experimental estimates of the effects of migration may be biased if there are concerns with the identifying assumptions. [Antman \(2012\)](#) offers a succinct review of many of these studies, with critical evaluation of their identification strategies.

A few recent papers have tried to substantially address the causality issues in different ways, and that includes the PAC and the SQ studies described above. [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. [Yang \(2008\)](#) argues that remittances have positive effects on family members who remain at home. [Gibson et al. \(2011\)](#) finds negative overall effects of emigration in the short run in Tonga, with [Gibson et al. \(2013\)](#) inferring that migration reduced poverty in Samoa, but the effect is short lived.

In light of the discussions above regarding the theoretical literature on remittances, the differences in the inferences of the lottery-based studies might be attributable to the variations in the motivations for remittances, which happen to be different in different circumstances. According to the World Bank, the Pacific island nations of Tonga and Samoa—populations 106,000 and 192,000 respectively—are middle income countries, the latter being slightly more prosperous with a per-capita income of approximately \$4,500 compared to Tonga's \$4,000. They both have near/perfect school enrollment ratios, improved access to water, and literacy rates.³ On the other hand, Ethiopia is a low income country with a per-capita income of \$470. Its literacy rate is low (39%) with about half of its population having no access to improved source of drinking water. Roughly a third of the Ethiopian population lives below the poverty line. Consequently, the fact that the DV study finds substantial and durable improvements in consumption expenditure by migrant senders in Ethiopia, whereas the PAC studies find either no improvement (Tonga) or a slight, but short-lasting improvement in the living standard

(Samoa) of the senders, can be reconciled in terms of the differences in the underlying socio-economic circumstances in Tonga, Samoa, and Ethiopia, which ultimately explain why and how much migrants from these nations remit.

This paper is organized as follows: Section 2 offers some background information on migration from Ethiopia. Section 3 explains the data set and the identification issues associated with the nature of the data collection process, starting with a brief description of the DV lottery. Sections 4 and 5 discuss the empirical frameworks and the main results, respectively. Section 6 checks the robustness of the estimated treatment effects, and Section 7 concludes.

2. MIGRATION FROM ETHIOPIA

International migration is a very recent phenomenon in Ethiopia. During Emperor Haile-Selassie's regime, the very few Ethiopian emigrants were skilled urban technocrats who left the country for advanced education and returned home upon completing their schooling. However, with the subsequent political turmoil and socio-economic crises which have engulfed the country, the character and volume of migration from the country have changed substantially since the mid 1970s, as widely documented by the International Migration Office, United Nations High Commission for Refugees and other organizations. With the possible exception of DV migrants, which constitute the majority of Ethiopian migrants to the US, most Ethiopian migrants are refugees who left their country mainly in the second half of the 1970s, 1980s, and 1990s fleeing political persecution, famine, economic deprivation, and war. They left Ethiopia through the neighboring countries and were resettled in North America, Western Europe, and Australia. The more recent Ethiopian refugees, who come largely from the rural areas, must wait for many years in the various refugee camps in the neighboring countries, or must overcome the deserts and the high-seas to get a chance at sneaking into the more desirable migrant destinations. The other migration channels available to Ethiopians nowadays are the various domestic-worker programs of the oil-rich middle-eastern countries. These programs are ill-reputed among the urban population of the country due to the well-publicized abuses and slavery-like conditions the migrants have been facing in the destination countries. Therefore, the vast majority of women who emigrate via these channels are rural and young impressionable women with no/little information about the brutal working and living conditions of domestic workers in the oil-rich middle-eastern countries.

Reflecting these facts, only less than 1% of the treatment and control households interviewed for this study have a member who emigrated through mechanisms other than the DV lottery. This indicates that the potentials of other migration channels contaminating the results of this study are inconsequential, if any.

3. CONSTRUCTING A NEW SAMPLE OF FAMILIES OF DV LOTTERY WINNERS AND LOSERS

(a) *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 should 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, and 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.

(b) *The sampling frame, DV participants (winners and losers), and DV non-participants* 

I obtained a complete listing of DV lottery winners from Addis Ababa for the years 2006 through 2010 from the Ethiopian Postal Service. The listing contained the contact information of the winners, their telephone numbers and their home addresses—Woreda (district), Kebele (sub-district), and house numbers. Each Kebele has a few thousand households

(homes), which are numbered 1 through N , N being the maximum number of households in a Kebele. Addis Ababa has ten Woredas, with each Woreda further divided into anywhere between eight to eleven Kebeles. Each DV winner, therefore, has a logical unique identifier (their home address), and this made finding them a fairly straightforward task.

Since it was not possible to find a comparable list of DV lottery losers, I used a procedure outlined below to draw 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 popularity of the DV lottery, the low threshold requirements needed to enter it, and the length of time the lottery has been in operation. 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) the proportion of DV winners from Addis Ababa is the same as the city’s share of the country’s urban population; (b) the typical DV applicant from Addis Ababa enters the lottery every other year; and, (c) the probability of winning the lottery is geographically stable. The approximation is consistent with other estimates in other developing countries. The World Bank in its 2007 report had found that between 50% and 90% of the young adults in certain developing countries would like to migrate if offered the option.

At the time the survey was conducted in 2010–11, Addis Ababa had approximately 660,000 households. With nearly half of them estimated to have participated in the lottery, it is determined that just shy of 1% of the city’s DV applicants have won the DV lottery between the years 2006 and 2009. As expected, this figure is in agreement with the global probability of winning the DV lottery which has been in the range of 0.75–1%. Since all Addis residents are either DV participants or DV non-participants, every household in the city is a member of the sampling frame.

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) show that failing to exclude households in which all members would move leads to a downward bias of the estimated treatment effects.

(i) *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 (τ_K) were determined with the goal of proportional representation. τ_K 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. The interval size (i)—the number of proximate DV winning households in a Kebele (in the sense of their municipality provided home 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 (τ_k) for each Kebele. Overall, approximately 38% of the DV winners approached for interviewing participated in the survey.

(ii) *The control group and lottery non-participants*

The following strategy was implemented for the selection of representative samples of the control group and DV lottery non-participants. 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.

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 41% of the control households selected in this manner were willing 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](#).

When unit non-response is an issue, field substitution is used under certain circumstances and might even be preferable over other procedures such as imputation or weighting primarily because, “[it] preserves the optimal structure of the sample”, and makes more precise estimates possible ([Vehovar, 1999](#)). The disadvantages of sampling with substitution are that it is generally difficult to practically implement, and that it might introduce some bias. A concern might arise if some groups are over or underrepresented in the study due to potential differences in the response rates between the treatment and control groups. Nevertheless, the differences in the response rates between the control and treatment groups are marginal (about 3%), and accounting for these differences does not appear to change the study’s results. Most importantly, the aforementioned procedures were implemented with the view of guaranteeing that specific groups are adequately represented within the sample. To the extent each of the sub-districts are different from each other with respect to population size and other socio-economic factors, and these factors may affect non-response, the proportional random sampling procedure implemented in this study ensures that no groups are over/underrepresented in the sample, because the sample sizes from each sub-district are strictly proportional to the total number of winners and losers from each sub-district.

As expected, the DV lottery was by far the only viable channel of migration to the United States for both the treatment and control group of households. During the time covered,

only three individuals from the control households emigrated, and they all went to the United States. As a result, the chances of these possibilities contaminating the results are extremely rare even if unaccounted for, but the IV procedure implemented below addresses this issue.

(c) *The survey questions*

The survey questions were designed taking into serious consideration prior experiences of survey gathering activities in the country, with inputs from experts at the Ethiopian Central Statistical Authority, the Economics faculty members at Addis Ababa University, and the enumerators who had conducted many similar surveys. The survey questions focused mainly on household expenditure on consumption and investment. The former includes expenditure on food (which on, average constitutes around 70% of the household budget in Addis Ababa), durables (e.g., computers, furniture, TV), energy use, wireless telephone bill, and some expenditure on the most common leisure activities. On the investment side, information was gathered successfully re: savings, business ownership, banking practices, access to clean water, sanitation facilities, and their qualities of the households. In terms of health and education, information was gathered on the education levels of the household heads, subjective indicators of the household heads’ wellbeing, and anthropomorphic measures of all household members. As is 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 have 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.

(d) *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).

(e) *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, in addition to the number and average age of school-age children. Stature is biologically set in human populations in the early stages of adulthood, and

Table 1. *Descriptive statistics*

Item	N	Mean	SD	Min	Max
<i>Panel A: Summary Statistics For The Overall Sample</i>					
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
<i>Panel B: Summary Statistics By Treatment Status</i>					
<i>DV Winners</i>					
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
<i>DV Losers</i>					
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
<i>Panel C: Summary Statistics Of Selected Durables</i>					
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
<i>Panel D: Summary Statistics Of DV non-participants</i>					
Food	274	994	632	200	4,000
Durables	274	9,412	21,540	0	217,450
Sofa	177	2,864	1,939	0	10,000
Stove	173	652	1,152	25	7,000

Note. The values in these tables are all in Ethiopian Birr.

virtually none of the family heads were younger than 18 in 2005. No school-age child considered for this analysis was born after the first emigrants had left for the US in 2006. Similarly, it'd be reasonable to assume that no school-age child had exited his/her parental household during the study period other than through death. To the extent the participants 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 study participants 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. 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.

$$y_i = \beta + \alpha D_i + \varepsilon_i \quad (1)$$

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—where the lottery outcome is the instrument for migration—is thus used to estimate the treatment effect, with the LATE as 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 & Imbens, 1994; Angrist, Imbens, & Rubin, 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

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
Mean Age of Fathers	323	58.15	59.42	-1.27	0.26
Mean Age of Mothers	424	49.29	51.91	-2.62	0.01
Mean Fathers' Stature	325	170.74	171.16	-0.42	0.64
Mean Mothers' Stature	425	163.44	162.48	0.96	0.18
No. of School-Age Children	494	0.51	0.43	0.08	0.29
Mean Age of School Children	232	13.76	14.11	-0.35	0.47

Note. The education variables are categorical: 0 = Illiterate; 1 = Less than High School; 2 = High School; 3 = College; 4 = BA/BS or higher.

abroad and perhaps become more successful. See for instance [Brown \(1998\)](#) and [Gibson et al. \(2013\)](#). I will test this hypothesis in the Ethiopian context, 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), 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 household's ownership of business, bank use, and savings.

5. RESULTS AND DISCUSSION

(a) *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 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](#), 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 ([Table 5](#)).

(b) *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 C, [Tables 3 and 4](#)). Families of DV migrants are better fed, spending about 22% more on food (both in terms of expenditure levels and per-capita). 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 likely 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 is yet another measure that suggests that the treatment has improved the living standards of migrant senders.

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 C); 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 C). The significant and recurring inflation in the country, which has left the plurality of the country's population struggling to stay afloat, is likely partly to blame for these outcomes.

The families that actually 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 ([Table 6](#)). On the other hand, 99% of the DV losers

Table 3. *Effects of the DV lottery and migration on important expenditure items and durable ownership*

	Food Budget (Total)	Food (Per Capita)	Value of Durables	Wireless Bill	Energy Expense
<i>Panel A: Reduced Form Estimates</i>					
Effect of DV Lottery	0.13** (2.9)	0.13* (2.42)	0.26** (3.1)	0.04 (0.52)	0.25*** (3.89)
No. of Obs.	494	494	489	448	432
<i>Panel B: OLS</i>					
Effect of Migration	0.13** (2.61)	0.18** (3.23)	0.25** (2.75)	0.12 (1.42)	0.31*** (4.44)
No. of Obs.	494	494	489	448	432
<i>Panel C: Instrumental Variables Estimates</i>					
First Stage	0.61*** (19.45)	0.61*** (19.45)	0.62*** (19.53)	0.61*** (18.16)	0.62*** (18.2)
Effect of Migration	0.22** (2.89)	0.21* (2.48)	0.42** (3.08)	0.07 (0.52)	0.41*** (3.9)
No. of Obs.	494	494	489	448	432

Note. The regressions are log-level. The DV lottery outcome is the instrumental variable in the IV regressions. The standard errors are robust.

Table 4. *Effects of the DV lottery and migration on clean water and sanitation facilities*

	Water	Bath	Toilet	Latrine Share
<i>Panel A: Reduced Form Estimates</i>				
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
<i>Panel B: OLS</i>				
Effect of Migration	0.14* (2.38)	0.15* (2.54)	0.09* (2.02)	-0.07 (-1.45)
Number of Observations	480	486	485	473
<i>Panel C: Instrumental Variables Estimates</i>				
First Stage	0.62*** (19.48)	0.61*** (19.28)	0.61*** (19.07)	0.61*** (18.82)
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 outcome variables are categorical. The DV lottery outcome is the instrumental variable in the IV regressions. The standard errors are robust.

comply with their assignment, indicating that the DV lottery is a key vehicle of legal migration for the overwhelming majority of Ethiopians.

(c) 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.

(d) 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, Abrego, 2009; Lindley, 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.

Table 5. *Effects of the DV lottery and migration on business ownership, saving and bank use*

	Business Ownership		Bank Use		Savings Account	
	<i>Panel A: Reduced Form Estimates</i>					
Effect of DV Lottery	0.02 (0.55)	0.01 (0.37)	0.04 (1.04)	0.02 (0.55)	0.03 (0.63)	-0.01 (-0.17)
Food		0.05* (1.76)		0.13** (3.22)		0.23*** (5.49)
No. of School-Age Children		0.02 (1.12)		-0.05* (-1.76)		-0.06* (-2.36)
Number of Observations	493	493	492	492	491	491
	<i>Panel B: OLS</i>					
Effect of Migration	0.01 (0.28)	0.00 (0.06)	0.00 (-0.09)	-0.02 (-0.46)	-0.01 (-0.21)	-0.04 (-0.84)
Food		0.05* (1.80)		0.14** (3.34)		0.23*** (5.57)
No. of School-Age Children		0.02 (1.10)		-0.05* (-1.78)		-0.06* (-2.34)
Number of Observations	493	493	492	492	491	491
	<i>Panel C: Instrumental Variables Estimates</i>					
First Stage	0.61*** (19.41)	0.61*** (19.41)	0.61*** (19.36)	0.61*** (19.36)	0.62*** (19.47)	0.62*** (19.47)
Effect of Migration	0.03 (0.55)	0.02 (0.37)	0.07 (1.04)	0.04 (0.55)	0.04 (0.62)	-0.01 (-0.17)
Food		0.05* (1.73)		0.13** (3.16)		0.23*** (5.46)
No. of School-Age Children		0.02 (1.10)		-0.05* (-1.79)		-0.06* (-2.35)
Number of Observations	493	493	492	492	491	491

Note. The outcome variables are binary, with one signifying ownership/access, and zero otherwise. The DV lottery outcome is the instrumental variable in the IV regressions. The standard errors are robust. The control variables are household food expenditure and number of school-age children.

Table 6. *Comparison of migrant and non-migrant DV winners' characteristics*

	Number of Observations	Non-Migrant DV Winners (Mean)	Migrant DV Winners (Mean)	Mean Diff.	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
Mean Age of Fathers	150	60.63	58.68	1.95	0.25
Mean Age of Mothers	208	50.28	52.81	-2.53	0.1
Mean Fathers' Stature (cm)	150	170.49	171.57	-1.08	0.43
Mean Mothers' Stature (cm)	207	162.36	162.54	-0.18	0.89
No. of School-Age Children	246	0.34	0.49	-0.15	0.16

Note. The education variables are categorical: 0 = Illiterate; 1 = Less than High School; 2 = High School; 3 = College; 4 = BA/BS or 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
Mean Age of Fathers	150	60.26	58.53	1.73	0.3
Mean Age of Mothers	208	51.7	52.13	-0.42	0.78
Mean Fathers' Stature (cm)	150	170.55	171.81	-1.26	0.34
Mean Mothers' Stature (cm)	207	161.69	163.29	-1.61	0.18
No. of School-Age Children	246	0.5	0.36	-0.14	0.17

Note. The Education variables are categorical: 0 = Illiterate; 1 = Less than High School; 2 = High School; 3 = College; 4 = BA/BS or higher.

6. ROBUSTNESS CHECKS

(a) 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

Table 8. *Duration effects*

	Food Budget (Total)	Food Budget (Per Capita)	Value of Durables	Energy Expense	Water	Bath	Toilet	Latrine Share
Effect of Migration	0.07 (0.47)	0.2 (1.26)	0.17 (0.63)	0.4 (1.87)	0.04 (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)	0.11 (1.56)	0.08 (1.16)	0.02 (0.48)	-0.09 (-1.78)
Number of Observations	494	494	489	432	480	486	485	473

Note. The two endogenous variables (Migration Status and Migration Status interacted with Duration Abroad) are instrumented for by DV lottery Status and DV lottery Status interacted with Duration Abroad. The standard errors are robust.

Table 9. *Gender effects*

	Food Budget (Total)	Food (Per Capita)	Durables	Energy	Business	Bank	Saving	Water	Bath	Toilet
Effect of Migration	0.25* (2.54)	0.19 (1.62)	0.1 (0.56)	0.4** (2.8)	-0.01 (-0.14)	0.04 (0.38)	-0.02 (-0.17)	0.03 (0.27)	0.01 (0.09)	-0.04 (-0.42)
Gender Effects	-0.05 (-0.43)	0.03 (0.26)	0.51* (2.54)	0.01 (0.1)	0.06 (0.81)	0.06 (0.58)	0.1 (0.95)	0.42** (3.1)	0.44** (3.22)	0.31** (2.98)
No. of Obs.	494	494	489	432	493	492	491	480	486	485

Note. The two endogenous variables (Migration Status and Migration Status interacted with Gender) are instrumented for by DV lottery Status and DV lottery Status interacted with Gender (Male = 1, Female = 2). The standard errors are robust.

Table 10. *Lee bound estimates*

	Food Budget (Total)	Food Budget (Per Capita)	Value of Durables	Energy	Water	Bath	Toilet	Latrine Share
<i>Panel A: Lower Bound Estimates</i>								
Effect of DV Lottery	0.097* (2.04)	0.087 (1.63)	0.175* (2.13)	0.18** (2.73)	0.148** (2.58)	0.163** (2.9)	0.058 (1.29)	-0.142** (-3.05)
Number of Observations	502	502	497	440	488	494	493	481
<i>Panel B: Upper Bound Estimates</i>								
Effect of DV Lottery	0.163*** (3.44)	0.168** (3.13)	0.33*** (3.98)	0.303*** (4.47)	0.216*** (3.77)	0.226*** (4.17)	0.125** (2.79)	-0.107* (-2.34)
Number of Observations	502	502	497	440	488	494	493	481

Note. The Lee-Bound regressions were run with a trimming proportion of 3%. The standard errors are robust.

survey, resulting in biased treatment effects. Using the procedure outlined in (Lee, 2009), bounds for the DV effects are estimated (Table 10), assuming monotonic effect of treatment on truncation, which is plausible in this case because treatment tends to increase non-response. The table indicates that even with the worst-case scenario bound, the Lottery effects remain statistically significant for the most part.

Additionally, the procedure that is adopted to select the study subjects from each Kebele minimizes the chances of non-response contaminating the estimates. With the strategy of proportional random sampling used for the survey, chances are indeed very small that attrition can be caused by differences in the socio-economic characteristics of the various Kebeles.

(b) *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 3–5 with Table 11). 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.

(c) *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 half 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, nearly 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 Work Authorization Cards and their Green Cards within a few months of arrival in the US. Most of them live in cities like Washington DC, Minneapolis, Los Angeles, Dallas, New York, and Seattle, 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,

Table 11. *Effects of the DV lottery with lottery non-participants as a comparison group*

	Food Budget (Total)	Value of Durables	Energy Expense	Water	Bath	Toilet	Latrine Share
Effect of DV Lottery	0.36*** (7.48)	0.74*** (7.59)	0.47*** (7.67)	0.32*** (5.67)	0.29*** (5.38)	0.15*** (3.59)	-0.15*** (-3.4)
Number of Obs.	520	508	432	498	501	503	489

Note. The outcome variables are regressed on a binary indicator variable, which assumes the value of one for lottery winners, and zero for lottery non-participants. The Standard Errors are robust.

entertainment, recreation, accommodation and food services (11.5%); Professional, Scientific, Management, and Administrative

Services (10.4%). 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. Close to 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 2% and 3% 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, quality of consumer durables, quality of drinking water, and access to modern sanitation facilities.

7. 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, Clemens (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 in the second most populous country in Africa. 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 use, and savings. 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. 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.

NOTES

1. Remittances are a significant source of income for several developing countries, in some cases overtaking Official Development Assistance and Foreign Direct Investment flows. According to the World Bank, official remittances to the developing world are in the range of 400 million dollars.

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.

3. The numbers come from the World Bank published reports, with the exception of literacy rates that are obtained from CIA World Factbook.

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. $\tau_k = \frac{\omega_k}{W} * 300$; where W = Total number of [2006, 2009] DV winners from all districts.

6. $i = \frac{\omega_k}{\tau_k}$; ω_k & τ_k are as defined above.

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

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

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APPENDIX A. 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. 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.

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.

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 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. 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. 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.

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