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Shocks, Remittances and Household Consumption

A Dynamic System GMM Analysis

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Shocks, Remittances and Household Consumption: A Dynamic System GMM Analysis*

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Abstract

We use a dynamic system GMM regression on five rounds of panel data to estimate the impact of international remittances on consumption of urban Ethiopian households, who spend more than 70% of their consumption budget on food. Results suggest that international remittances play a significant role in augmenting household consumption. A 1% increase in remittances from abroad leads to a 0.10% increase in household consumption. Taking advantage of the detailed nature of the panel data, we also show that households that experienced idiosyncratic shocks are likely to send a member abroad and receive international remittances. The paper sheds light on the magnitude of the impact of international remittances and the characteristics of the socio-economic groups who take advantage of a rapidly changing economic environment, such as access to international migration.

Keywords: Remittances, Shocks, Household Consumption.

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1 Introduction

Households in developing countries face considerable variation in their income streams due to shocks, but most do not have access to formal credit and insurance institutions to smooth their income. Instead, households engage in informal risk mitigation and consumption smoothing strategies (Jacoby and Skoufias, 1997; Paxson, 1992; Rosenzweig, 1988; Rosenzweig and Wolpin, 1993; Udry, 1994). Sending a household member abroad to receive international remittances is one income diversification and consumption smoothing strategy, which has attracted increasing attention in recent years. The value of international remittances transferred into the developing world in 2015 reached US$432 billion, which was equivalent to more than three times the size of official development assistance provided by the west in that year to the region (WorldBank, 2016). In urban Ethiopia, the set-up we consider in this paper, the proportion of households receiving international remittances increased by about 145% during 2004-2009. At the macro-level, international remittances reached a record high of US$3.7 billion, exceeding export earnings in the country in 2015.[1] Given the unprecedented increase in the amount of international remittances, it is natural to ask what the impacts on household welfare are and what factors explain their rapid increase.

In this paper, we estimate the impact of international remittances on household consumption. We also investigate whether households use international migration and remittances to cope with shocks and augment consumption. In order to estimate the impact of remittances on consumption, we take advantage of a five-wave panel dataset spanning 15 years - the Ethiopian Urban Socioeconomic Survey (EUSS) - and estimate a dynamic system Generalized Method of Moments (GMM) estimator. The dynamic system GMM estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998) is the most robust linear dynamic panel data estimator; it uses two or more period-lagged values of variables or their differences as valid instruments to consistently identify the impact of an endogenous variable in a two-equation framework. We show that a 1% increase in international remittances leads to a 0.10% increase in per capita household consumption. Taking advantage of the detailed nature of the panel data, we also shed light on the motives for international migration and remittances. Households in urban Ethiopia send a member abroad in response to idiosyncratic shocks and receive international remittances. This suggests that migration and remittances are used as coping mechanisms in response to shocks. We also show that those who migrate out have distinct observable characteristics.

Our study makes two contributions. First, it provides a causal estimate of the impact of remittances from abroad on consumption of recipient households. A significant body of literature on this topic has investigated the impact of international remittances on consumption in recipient

[1] See http://www.ebc.et/web/ennews/-/ethiopia-remittances-from-abroad-jump-by-2-billion.

households.[2] Most previous studies (e.g., Adams and Cuecuecha, 2010; Adams, 2006; Adams and Cuecuecha, 2013; Lokshin et al., 2010; Taylor et al., 2005) used cross-sectional data, which makes it difficult to deal with the key sources of endogeneity of remittances - simultaneity, reverse causality, sample selection, and omitted variables bias - and identify its impact.[3] Ethiopia in recent years experienced one of the highest rates of food price inflation in the world, which in July 2008 was 92% higher than 12 months earlier (CSA, 2008,0). The food price shock had significant effects on nutritional intake of urban households who don't normally produce food and who allocate more than 70% of their budget to it (Alem and Söderbom, 2012).[4] Given the well-documented long-term impacts of shocks, it is worth investigating the role of international remittances in stabilizing consumption by households. This is particularly important for Africa, where the impact of remittances from migrants has been understudied (de Brauw et al., 2013). The rich nature of the panel data allows us to compute real household consumption per capita for five rounds and to estimate the impact of international remittances using robust linear dynamic panel data estimators.

Second, individuals and households in low-income countries are subject to considerable risk and shocks. However, due to lack of access to modern financial institutions, households rely on informal mechanisms to mitigate risk and cope with shocks. Previous studies have investigated the informal strategies households in developing countries adopt to cope with risk and shocks. Households, for example, form informal risk-sharing agreements (Fafchamps and Lund, 2003; Ligon et al., 2002; Townsend, 1994; Udry, 1994; Weerdt and Dercon, 2006), draw on savings and other assets (Fafchamps et al., 1998; Paxson, 1992; Rosenzweig and Wolpin, 1993; Udry, 1994), increase child labor (Beegle et al., 2006), and engage in other extra income earning opportunities (Harrower and Hoddinott, 2005). Receiving remittances from former members of households who have migrated abroad is one such strategy. Supporting this empirically, Yang and Choi (2007) and Dillon et al. (2011) document that rural households in the Philippines and Nigeria mitigate and cope with weather-related risk and shocks through migration and remittances. According to the new economics of migration (Stark, 1991; Stark and Bloom, 1985), households consider the benefits and costs of sending a migrant and decide to maximize household income or reduce its variability. We take advantage of the panel nature of the data and the detailed information on the socio-economic characteristics of all household members to explore the individual and household-level factors that

[2] See Adams (2011), for a survey of the recent literature on the household-level impact of international remittances in developing countries. Two earlier literature reviews were undertaken by Page and Plaza (2006) and Ruiz and Vargas-Silva (2009).

[3] The only exceptions to this are the studies by de Brauw and Harigaya (2007); Yang (2008); Yang and Choi (2007); Yang and Martinez (2006). de Brauw and Harigaya (2007) instrument migration using historical and latent network variables and measure the impact on household expenditure in Vietnam. Yang and Choi use rainfall to instrument income of recipient households in rural Philippines and investigate the response of international remittances. Yang (2008) and Yang and Martinez (2006) estimate the impact of international remittances on poverty and investment in the Philippines, using the Asian financial crisis as an exogenous shock on migrant incomes.

[4] Alem and Söderbom (2012) document that, in order to cope with the unprecedented food price shock, 36% of households cut back quantities served per meal, 20% received assistance from relatives and friends, and 16% shifted resources from other consumption items.

explain international migration and remittances, with a particular focus on the role of idiosyncratic shocks in an urban setup. The paper therefore sheds light on some of the motives for international migration and remittances and provides some insights on the characteristics of those socio-economic groups who take advantage of rapidly changing economic environments, such as access to international migration.

The rest of the paper is structured as follows. We first present our conceptual framework, which motivates the risk-sharing aspect of remittances and the Dynamic System GMM estimation strategy we adopt to estimate a model of household consumption. We next provide a description of the Ethiopian Urban Socioeconomic Survey (EUSS) data and the key variables of interest. We then discuss regression results from alternative linear dynamic panel data estimators. We conclude with a discussion of the key findings and their policy implications.

2 Conceptual Framework

This paper contributes to the literature on consumption dynamics and risk-sharing by answering two key research questions: i) what are the impacts of international remittances on consumption by households? ii) are international remittances and migration used as informal insurance mechanisms against shocks? In this section, we lay out the theoretical frameworks that we use to set out the empirical frameworks in the next section.

2.1 *Remittances and Consumption*

We use the standard simple model of consumption growth presented in the life-cycle permanent income hypothesis Hall (1978) to motivate the dynamic consumption function we estimate in the next sections. According to this theory, individuals evaluate future income prospects to determine their current level of consumption in order to smooth consumption over the life-cycle. The individual is therefore assumed to maximise the following inter-temporal (lifetime) utility:

$$U(c_t) = E_t[\sum_{\tau=0}^{T-\tau}(1+\delta)^{-\tau}u(c_{t+\tau})] \tag{1}$$

subject to lifetime budget constraint

$$\sum_{\tau=0}^{T-\tau}(1+r)^{-\tau}(c_{t+\tau} - w_{t+\tau}) = A_t \tag{2}$$

where E_t is a mathematical expectation conditional on all information available at time t, c_t is consumption, δ is the rate of subjective time preference, r is the real interest rate $(r \geq \delta), w_t$

is earnings and A_t is the stock of physical wealth. Earnings are stochastic and the only source of uncertainty in this model.

Maximising the intertemporal utility function above using the method of dynamic optimisation implies the following Euler's equation:

$$E_t u'(c_{t+1}) = [\frac{(1+\delta)}{(1+r)}]u'(c_t). \tag{3}$$

Equation (3) implies that the consumer equates the marginal utility of expected consumption with the marginal utility of current consumption weighted by the rate of the subjective time preference and real interest rates. An important implication of the condition is that, except c_t, no information predicts the level of c_{t+1}. Taking out the expectation-operator, the optimality condition can be shown to follow the regression relation given by:

$$u'(c_{t+1}) = [\frac{(1+\delta)}{(1+r)}]u'(c_t) + \varepsilon_{t+1} \tag{4}$$

where ε_{t+1} is a random erroer term and $E_t\varepsilon_{t+1} = 0$.

Equation (4) has been the basis for most of the empirical studies conducted previously. Several variants of the equation have been suggested and tested empirically depending on the form of the utility function.[5] If one assumes a quadratic utility function (Hall, 1978) and a constant discount rate and real interest rate, the consumption function of the following time-separable and additive form can be derived:

$$c_{t+1} = \beta_0 + \gamma c_t + \varepsilon_{t+1}. \tag{5}$$

Equation 5 can be augmented to include other covariates and wealth variables (X_{it}), which also include international remittances:

$$c_{t+1} = \beta_0 + \gamma c_t + X_{it} + \varepsilon_{t+1}. \tag{6}$$

If the life-cycle permanent income hypothesis is supported, the individual is assumed to be insured from earnings risk, i.e., transitory changes in income will not affect consumption.

2.2 *Remittances and Risk-Sharing*

Are international migration and remittances risk-sharing and coping mechanisms against shocks? Theories of risk and informal insurance indicate that a pareto-efficient allocation of risk is possible among certain groups such as village residents, kinship groups, and other social networks (Bardhan

[5]See Browning and Crossley (2001); Browning and Lusardi (1996); Deaton (1992); Hayashi (1997) for a survey of the literature.

and Udry, 1999). Consider two households, indexed by $i \in \{1, 2\}$, one living in the migrant sender country (urban Ethiopia) and another living abroad, who agree to engage in an informal risk-sharing arrangement. In each time t and state S, household i earns an income of $y_{is} > 0$, consumes c_s^i and enjoys a utility of $U_i(c_s^i)$, which is twice differentiable and maximised subject to the budget constraint. The first order condition for a pareto-efficient allocation of risk across the two households will be given by:

$$\frac{u_1'(c_{1st})}{u_2'(c_{2st})} = \frac{\lambda_2}{\lambda_1} \; \forall \; s, t \tag{7}$$

where λ_1 and λ_2 are the pareto weights for households 1 and 2, $(0 < \lambda_i < 1, \sum \lambda_i = 1,)$. The condition stated in (7) shows that the marginal utilities of consumption levels for the two households move together.

Applying a utility function which takes a constant absolute risk aversion function of the form $u_i(c_{ist}) = -(1/\sigma)e^{-\sigma c_{ist}}$ in the first order condition in (7) and taking logs:

$$c_{ist} = \bar{c}_{st} + \frac{1}{\sigma}\left(ln(\lambda_i) - \frac{1}{2}(ln\lambda_1 + ln\lambda_2)\right). \tag{8}$$

Equation (8) implies that the change in a household's consumption between any two periods is equal to the change in average consumption $\bar{c}_{st}$ of the group in the risk-sharing arrangement. In other words, households insure each other against idiosyncratic shocks through sending remittances.

Following Fafchamps and Lund (2003) and Yang and Choi (2007), let consumption of household i in state s be given as the sum of income and international remittances r_{ist}:

$$c_{ist} = y_{ist} + r_{ist}. \tag{9}$$

Plugging this into Equation (8) gives:

$$r_{ist} = -y_{ist} + \bar{c}_{st} + \frac{1}{\sigma}\left(ln(\lambda_i) - \frac{1}{2}(ln\lambda_1 + ln\lambda_2)\right), \tag{10}$$

The income of households y_{ist} can be decomposed into transitory and permanent components: $y_{ist} = y_{Tst} + y_{Pst}$. States of the world S affect only transitory income y_{Tst}.

In order to capture the relationship between international remittances and idiosyncratic shocks by households in urban Ethiopia, a version of Equation (10) can be specified as follows:

$$r_{ist} = y_{Pst} + Shocks + \alpha_i + \gamma_t + \upsilon_{it}, \tag{11}$$

where the permanent income y_{Pst} can be captured by wealth, and the transitory component of income y_{Tst} by *Shocks*. α_i and υ_{it} represent household fixed effects and random error terms

respectively. A statistically significant estimate of the coefficient of *Shocks* would provide some evidence for the hypothesis that international remittances are used as an insurance mechanism.

3 Empirical Framework

In order to estimate the impact of international remittances on household consumption, we specify a dynamic model of consumption consistent with Equation (6) as

$$c_{it} = \gamma c_{it-1} + \theta r_{it} + x'_{it}\beta + \eta_i + u_{it} \tag{12}$$

where c_{it} is the dependent variable; the log of real consumption per aeu (adult equivalent units) for household i at time t; c_{it-1} is the lagged value of real consumption per aeu; r_{it} is the real log value of cash from international remittances, which is assumed to be endogenous; x_{it} represents a vector of other control variables, including household head and other household members characteristics; η_i is the individual household fixed effect; u_{it} is an idiosyncratic random error term; and γ, θ, and β are parameters to be estimated. Our key coefficient of interest is θ, which measures the impact of international remittances on consumption by households.

The parameters of 12 cannot be identified consistently using static linear panel data estimators, such as fixed and random effects, which assume strict exogeneity of all right-hand variables because c_{it-1} is correlated with both u_{it} and η_i

First differencing equation (12) to get rid of η_i gives

$$(c_{it} - c_{it-1}) = \gamma(c_{it-1} - c_{it-2}) + \theta(r_{it} - r_{it-1}) + \beta(x'_{it} - x'_{it-1}) + (u_{it} - u_{it-1}) \tag{13}$$

or

$$\Delta c_{it} = \gamma \Delta c_{it-1} + \Delta\theta r_{it} + \Delta x'_{it}\beta + \Delta u_{it}. \tag{14}$$

According to Anderson and Hsiao (1981), Equation (14) can be estimated consistently using instruments for the lagged dependent variable from its second and third lags (either in the form of differences or lagged levels) in a two-stage framework. If u_{it} is i.i.d., those lags of c will be highly correlated with c_{it-1} and Δc_{it-1}, but uncorrelated with Δu_{it}. These lags will therefore be valid instruments. Consistent estimates of the coefficients of other endogenous variables can be obtained in a similar fashion, i.e., using the second or higher-order lags of the variables as instruments.

When $T > 3$, more lags of the endogenous variable (s) will be available as instruments and, thus, a more efficient IV estimator of (14) can be obtained using the Generalized Method of Moments, provided the Δu_{it} are serially uncorrelated (Arellano and Bond, 1991). The resulting estimator is what is commonly known as the Arellano and Bond or Difference GMM estimator. Later on,

a more robust estimator - the System GMM estimator - was proposed by Arellano and Bover (1995) and Blundell and Bond (1998). This estimator also uses lags as instruments, but identifies the parameters using a two-equation model (the level equation and a differenced equation) in a GMM framework. The Sargan overidentification test can be performed to test the validity of the instruments. In this paper, we use the system GMM estimator to consistently estimate a dynamic model of consumption and to identify the impact of international remittances on welfare of households in urban Ethiopia.

4 Data and Descriptive Statistics

In this section, we provide a description of the Ethiopian Urban Socioeconomic Survey (EUSS) and the key variables related to international remittances and migration.

4.1 *Data*

In order to investigate the dynamics of consumption and estimate the impact of remittances on consumption, we use five rounds of EUSS, collected in 1994, 1997, 2000, 2004, and 2009.[6] The first four rounds of the panel data were collected by the Department of Economics of Addis Ababa University in collaboration with the Department of Economics, University of Gothenburg. The survey originally covered seven major cities of Ethiopia - the capital Addis Ababa, Awassa, Bahir Dar, Dessie, Dire Dawa, Jimma, and Mekelle - which were believed to represent the major socio-economic characteristics of the Ethiopian urban population. In the original sampling, around 1500 households were allocated to each city in proportion to each city's population, following a multi-stage sampling.[7] The dataset is one of the longest panel data sets in Africa and is comprehensive in documenting information on household living conditions, income, consumption expenditure, demographics, health, education, labor market status, remittances and other variables at the household and individual levels for a fairly long period of time.

The author conducted a sixth round survey in late 2008 and early 2009 from a sub-sample of the original sample covering four cities - Addis Ababa, Awassa, Dessie, and Mekelle - and comprising 709 households.[8] The cities were selected carefully in order to represent major urban areas of the country and the original sample. All panel households were surveyed in three of the cities - Awassa, Dessie and Mekelle. In the capital Addis, which constituted around 60 percent of the original sample, about 350 households were tracked and surveyed. In order to check whether the panel households exhibit a systematic difference from the rest of the urban population, we surveyed an

[6] Data was also collected in 1995. We dropped the 1995 round in order to maintain even spacing between rounds.
[7] See Bigsten et al. (2003) for a detailed description of the sampling strategy.
[8] Households in the other cities were not covered due to limited resource.

additional 128 randomly selected new households. Alem and Söderbom (2012), who investigated this in an earlier work, did not find a major difference between the newly surveyed and the original panel households in consumption expenditure, the key outcome variable of interest in the current paper. To run linear dynamic regressions of consumption, we use information from around 3,000 observations with about 600 households observed at least three times in the period 1994 - 2009. Alem (2014) performs a detailed test on the possible impact of attrition using attrition probits Fitzgerald et al. (1998) and a BGLW test Becketti et al. (1988) and shows that attrition did not make the data unrepresentative.

Following the standard practice in developing countries, we use consumption expenditure as a measure of welfare. We first computed total household-level consumption expenditure by adding up reported household expenditure on food and non-food items. The non-food component of consumption includes expenditures on items such as clothing, footwear, energy, personal care, utilities, health and education. In order to adjust for household size and composition, we converted total household consumption expenditure into adult equivalences using standard adult equivalent units. Finally, to take care of spatial and temporal price differences, we converted consumption per adult equivalent units from nominal to real by deflating the former using price indices carefully constructed from the survey.

4.2 *Descriptive Statistics*

Table 1 presents descriptive statistics on the amount of both international and domestic remittances over time in real terms and the proportion of households receiving them.[9] Both the amount of international remittances and the proportion of recipient households increased continuously in the decade 1994 - 2004. The real value of remittances declined from 411.22 ETB in 2004 to 207.65 ETB in 2009, but the proportion of households receiving them almost doubled. This is the period during which Ethiopia experienced a rapid food price inflation, which in the summer of 2008 was 92% compared to the summer of 2007 (CSA, 2008,0). Survey data indicates that 94% of urban Ethiopian households considered the rapid price increase as a shock and 87% described it as the most influential shock to affect their welfare. This, coupled with the descriptive statistics in the next paragraph on what international remittances have been used for, highlight their importance in stabilizing food consumption and in coping with food price shocks. Remittances from domestic sources appear to be negligible during the period under analysis.

Table 1 about here

Descriptive information on what international remittances have been used for during the period

[9] In order to adjust for spatial and temporal price differences, nominal values of both international and domestic remittances have been converted to 1994 prices using price indices carefully constructed from the survey. In 1994, 1 USD≈ 5 ETB.

under analysis is presented in Table 2. The table shows that, on average, around 85 percent of the international remittances recipients used them to augment consumption. The figure reached 91% in 2009, the period of food price shock. A very small proportion of recipients used international remittances for investment purposes (4%) or to finance the education of children (3%) in the last round of the survey.

Table 2 about here

Table 3, Panel A, shows information on how often households in urban Ethiopia received international remittances during 2004 and 2009.[10] Fifty-seven percent of recipients receive international remittances regularly, while 25 percent receive them during holidays in 2009. Both these facts underscore the role international remittances play in household consumption. However, only about 9 percent of recipients receive international remittances during times of social occasions/ceremonies and when facing difficulties. In Panel B, we present information on who sent international remittances to households in urban Ethiopia in the most recent rounds. In 2009, around 46% of remittances from abroad were sent by children of the household head, while 36% were sent by other relatives of the household head. These two sources constitute around 83% of the transfers from abroad in the form of remittances. This provides additional evidence that former household members who send remittances are very likely motivated by consumption insurance motives.

Table 3 about here

We take advantage of the panel nature of our data to investigate the socio-economic characteristics of household members who migrated abroad and those who stayed during 2004-2009, the period when the proportion of households receiving international remittances increased substantially. Column 1 of Table 4 shows the socio-economic characteristics of all adult members of the 550 balanced panel of households which were surveyed in both 2004 and 2009. Ten percent of members work as own-account workers and 11% are employed in the civil/public sector. The proportion of casual workers and out-of-the-labor-force members is 11% and 13% respectively. The remaining household members are students (28%) and unemployed (12%). In terms of marital status, 24% are married, while 65% are single. The majority of urban household members are Orthodox Christians (74%), 7% are Protestants, and 12% are Muslims. On average, urban Ethiopian household members attended 8.5 years of schooling. The average age is 30,42 among the adult population. In terms of gender, 48% of household members are female, while the remaining 52% are males.

Table 4 about here

Column 2 of Table 4 presents socio-economic characteristics of individuals who migrated abroad during 2004-2009.[11] Individuals who migrated abroad show distinct characteristics. In terms of

[10] This question was not asked prior to 2004.

[11] Unfortunately, the Ethiopian Urban Socioeconomic Survey data document whether or not members migrated abroad, but not to which country.

occupation, 32% were casual workers, 24% were in school, and 16% were unemployed. These three categories of occupations sum up to 72% of migrant individuals. These facts imply that most migrants are individuals with a lower labor market status in urban Ethiopia and migrate abroad for better livelihood search.[12] In terms of marital status, consistent with findings in earlier studies, a large proportion of migrants in urban Ethiopia (82%) are single, the proportion of those married being only 16%. Table 4 also shows that 65% of migrants are daughters/sons of the household head, while 24% are other relatives of the household head. Finally, international migrants are relatively younger, with an average age of 26 years, and are relatively more educated, with average years of schooling of about 10 years.

Table 4 about here

5 Regression Results

This section investigates the impact of international remittances on household consumption using alternative linear dynamic panel data estimators. It also examines whether households in urban Ethiopia use international migration and remittances as mechanisms to cope with shocks.

Remittances and Consumption

Table 5 presents the key parameter estimates of the impact of international and domestic remittances from our dynamic model of consumption for households in urban Ethiopia. The regression results with the full set of control variables are presented in table A.1 in the appendix. Column [1] presents estimates from the standard fixed effects estimator (DYFE), which treats lagged consumption and remittances as exogenous. Column [2] presents the Arellano and Bond one-step dynamic GMM estimator (DIFF), which corrects for endogeneity of the lagged dependent variable and international remittances using lags as instruments. The last column presents the same model with the two-step optimal system GMM framework (SYS). The null hypothesis of validity of the over-identifying restrictions performed using the Sargan test is not rejected in either of the dynamic regressions, supporting validity of the instruments. AR(1) and AR(2) are the Arellano-Bond test for first-order and second-order autocorrelations respectively. The null hypothesis that there is no second-order serial correlation is rejected in the Arellano and Bond difference GMM estimator, but not in the system GMM estimator. Consequently, the regression results from the Arellano and Bond estimator will likely be biased and we won't discuss them further. All regressions control for socio-economic characteristics and for household, time, and city fixed effects.

[12] Fransen and Kuschminder (2009) show that migrants with these types of profiles mostly migrate to Gulf and Middle Eastern countries such as Lebanon, Saudi Arabia, Yemen, and the United Arab Emirates, to engage in domestic work.

Results from the fixed effects regression in Column [1] show that previous consumption negatively affects current consumption. This effect is statistically significant at the one percent level. The estimator shows such a counter-intuitive result because it does not address endogeneity of the lagged dependent variable, other than taking care of time-invariant household fixed effects. Consequently, it severely biases the coefficient of the lagged dependent variable downward. The fixed effects regression, however, shows a positive effect of international remittances on per capita household consumption. A one percent increase in international remittances increases consumption by 0.023 percent. The point estimate of international remittances is likely to be biased as well due to endogeneity.

Table 5 about here

The system GMM regression results presented in Column [3] of Table 5 are dramatically different from the fixed effects results presented in Column [1.] Lagged consumption is positive and significant at the five percent level, supporting the dynamic specification of household consumption. This indicates that household consumption is fairly stable and households recover from shocks, but it takes time for the recovery. The results also show that international remittances have a significant positive impact on household consumption. A one percent increase in international remittances increases per capita household consumption by about 0.094 percent and the effect is statistically significant at the five percent level. Both these results highlight the significant estimation gains from the system GMM estimator, which identifies the parameters using a two-equation model (the level equation and the differenced equation) in an instrumental variable set-up. The results also show that a one percent increase in domestic remittances leads to a 0.068 percent increase in per capita consumption. However, the effect is not statistically significant at conventional levels in any of the regressions.

The regression results are consistent with the descriptive information presented in the previous section, which shows the rapid increase in the proportion and amount of international remittances during the most recent rounds of the survey. The results in general highlight the important role of international remittances in augmenting households' consumption in urban Ethiopia. Given that more than 70% of the household budget is allocated to buying food, these results also highlight that international remittances play significant role in filling the nutritional gap of urban Ethiopian households, who have also been affected severely by the recent food price shocks.

Shocks, Migration and Remittances

Do households cope with shocks by sending a migrant abroad and receiving international remittances? In order to shed light on this question, we take advantage of the panel nature of the data and run two regressions consistent with Equation (11): a linear model of international remittances

and a binary model of migration regressed on shocks and on key pre-migration individual and household characteristics. The regression results are reported in Tables 6 and 7.[13]

Table 6 explores the association between experiencing shocks and receiving remittances. Consistent with the predictions in Equation (11), households who experienced idiosyncratic shocks received more remittances from abroad. More specifically, households who experienced illness of a member and other idiosyncratic shocks received more international remittances. The variable "other idiosyncratic shocks" captures adverse events such as loss of assets; imprisonment for political reasons; divorce, separation and abandonment; etc. Both these coefficients are statistically significant at the one percent level.

Table 6 about here

Finally, results in Table 7 show that households who experienced other idiosyncratic shocks were more likely to send a member as a migrant abroad. This effect is statistically significant at the one percent level. The result is in line with the findings in Table 6 suggesting that households in urban Ethiopia respond to idiosyncratic shocks by sending a suitable household member as a migrant abroad. Table 7 also shows other correlates of international migration. Consistent with existing literature, international migrants abroad have distinct personal characteristics. They are more likely to be daughters of the household head, single, engaged in unstable casual jobs, and relatively more educated. However, the association with education as measured by years of schooling is non-linear. This seems to be consistent with the existing large amount of migration to engage in domestic work in the Gulf and Middle Eastern countries, as discussed above (Fransen and Kuschminder, 2009). Among the household-level variables we control for, as expected, economic status as measured by the log of real consumption per capita in adult equivalent units is positively and strongly associated with international migration. Households with higher economic status are more likely to send a member abroad.

Our results are consistent with previous findings, (e.g., Yang and Choi, 2007), who document that international remittances are insurance against income shocks in the rural Philippines. These authors show that households in the rural Philippines send a migrant abroad for insurance purposes and cope with a fall in income due to rainfall shocks by receiving international remittances. However, because our regressions are based on cross-sectional and observational data (i.e., given the shocks variables were collected only in the last round) we acknowledge the possible limitations in our empirical strategy in this section. First, although it is plausible to argue that idiosyncratic shocks can exogenously happen to households, it is equally plausible to argue that certain households are prone to such types of shocks due to unobserved characteristics. Consequently, the results

[13] We run cross-sectional regressions to explore the risk-sharing role of international remittances and migration because the questions on shocks were asked only in the last round of the Ethiopian Urban Socio-economic Survey, i.e., in 2009. However, all individual and household characteristics controlled for in the regressions are measured as of 2004, i.e., before migration and remittances.

should be interpreted with caution as the variables are likely to be endogenous and the coefficients are likely to be biased. Second, standard theoretical models of migration in the New Economics of Migration (Stark, 1991; Stark and Bloom, 1985) usually consider migration as an ex-ante strategy to mitigate risk and remittances as an ex-post response to shocks.[14] Unfortunately, given urban focus of the data and its cross-sectional nature, we're not able to construct a more convincing measure of risk for households in urban Ethiopia that we can control for in our migration equation. Instead we use idiosyncratic shocks as proxies for risk.[15] Nevertheless, the results at least highlight the strong association of international migration, remittances, informal risk-sharing and shocks-coping strategies of households in urban Ethiopia.

Table 7 about here

6 Conclusion

International remittances are important risk-sharing and consumption smoothing mechanisms that have attracted increased attention in the past decade. This paper uses five rounds of rich panel data, which tracks households for 15 years, to investigate the role of international remittances on household consumption in urban Ethiopia. It also investigates whether households use international remittances and migration to cope with shocks. Urban Ethiopia is a valuable setting to investigate the role of international remittances in household consumption. The country experienced one of the highest rates of food price inflation in the past decade (CSA, 2008,0). The food price inflation had adverse welfare impact on nutritional intake of urban households who normally don't produce food and who allocate more than 70% their budget to food (Alem and Söderbom, 2012). Following this event, the proportion of households who regularly receive remittances to augment consumption, mostly food consumption, more than doubled. The long panel data at hand enables us to address endogeneity of remittances using the most robust linear dynamic estimator, the system GMM estimator (Arellano and Bover, 1995; Blundell and Bond, 1998) and to consistently identify the impact of remittances on consumption. We also take advantage of the panel nature of the data to trace back the socio-economic characteristics of migrant members and households and shed light on some of the possible motives for international migration.

System GMM regression results suggest that international remittances play a positive role in stablizing consumption of households in urban Ethiopia. A 1% increase in international remittances leads to about a 0.10% increase in household consumption. Over 80% of international remittances are sent by close family members and over 75% of households receive remittances regularly and

[14] Other recent studies (e.g., Groger and Zylberberg, 2016; Nikoloski et al., 2018) document migration as an ex-post strategy to cope with shocks as well.

[15] Dercon (2008) points out that the key challenge in analyzing the household-level consequences of risk in developing countries, especially in urban areas, is constructing a credible exogenous measure of risk.

during holidays. This shows that informal transfers in the form of remittances from close family members abroad are important consumption augmenting strategies among households in urban Ethiopia. International migration and remittances also appear to serve as coping mechanisms against shocks. We estimate a binary model of international migration by former household members and show that households that experienced idiosyncratic shocks respond by sending a member abroad. Households that experienced idiosyncratic shocks are also more likely to receive remittances from abroad. This finding provides some evidence on the role of international migration in serving as a risk mitigation and shocks-coping strategy. However, we do not find any statistically significant effect of domestic remittances on household consumption. This is not unexpected, as the magnitude of domestic remittances and the proportion of households receiving them is much lower than international remittances.

The paper provides robust evidence on the positive impact of international remittances on improving welfare of households in recipient countries, using a long panel dataset from Africa. Households send a migrant abroad in response to idiosyncratic shocks and to improve the welfare of the remaining members. Although the data did not exactly document which countries the migrants left for and which countries the remittances came from, other studies in urban Ethiopia (Fransen and Kuschminder, 2009) show that most unskilled migrants leave for the Middle East and the Gulf countries, mainly for domestic work, and a significant proportion of them travel through illegal human traffickers. As a result, migrants very often are exposed to exploitation and human rights abuses. The recent crackdown on migrants by the government of Saudi Arabia is one important example where tens of thousands of Ethiopian and migrants from other developing countries have been victims of human rights abuses, being detained, beaten, harassed and deported.[16] In view of this, the positive impacts of international remittances reported in this paper do not take into account these costs of migration and the results should therefore be interpreted with caution. Nevertheless, the results provide an important addition to the literature on the possible role informal transfers in the form of remittances play in stabilizing consumption and improving households' ability to cope with shocks in recipient countries.

[16] See a 2015 report by Human Rights Watch: https://www.hrw.org/news/2015/05/09/saudi-arabia-mass-expulsions-migrant-workers.

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Table 1: Trends in remittances over time

	1994	1997	2000	2004	2009
Real value of international remittances received	123.95	265.68	345.10	411.22	207.65
	785.80	2239.78	1814.02	1590.19	942.45
Received international remittances (dummy)	0.05	0.2	0.13	0.16	0.28
	0.22	0.40	0.34	0.37	0.45
Real value of domestic remittances received	73.61	95.04	80.98	107.74	53.68
	398.59	577.88	480.59	557.09	177.15
Received domestic remittances (dummy)	0.07	0.21	0.11	0.12	0.21
	0.26	0.41	0.31	0.32	0.41
Observations	797	799	834	777	498

Source: Own calculation from the Ethiopian Urban Socioeconomic Surveys 1994-2009.

Table 2: What international remittances have been used for: 1994-2009

	1994		1997		2000		2004		2009	
	Freq.	Percent	Freq.	Percent	Freq.	Percent	Freq.	Percent	Freq.	Percent
Consumption (food, clothing, health exp.)	112	0.87	136	0.83	157	0.88	174	0.88	238	0.91
Investment on land, house, business	7	0.05	13	0.08	6	0.03	5	0.03	11	0.04
Children schooling	5	0.04	3	0.02	6	0.03	13	0.07	7	0.03
Other spending	5	0.04	12	0.07	10	0.06	6	0.03	5	0.02
Total	129	1.00	164	1.00	179	1.00	198	1.00	261	1.00

Source: Own calculation from the Ethiopian Urban Socioeconomic Surveys 1994-2009.

Table 3: How often international remittances are received by households

	2004		2009	
	Frq.	Percent	Frq.	Percent
Panel A: How often are international remittances received?				
Regularly	86	0.44	146	0.57
During holidays	77	0.39	63	0.25
At times of social occasions/ceremonies	23	0.12	24	0.09
When facing difficulties	10	0.05	23	0.09
Total	196	1.00	256	1.00

	2004		2009	
	Frq.	Percent	Frq.	Percent
Panel B: Who sends international remittances?				
Children abroad	88	0.44	121	0.46
Relatives abroad	78	0.39	94	0.36
Spouse abroad	23	0.12	9	0.03
Friends abroad	5	0.03	5	0.02
Others	4	0.02	32	0.12
Total	198	1.00	261	1.00

Source: Own calculation from the Ethiopian Urban Socioeconomic Surveys 2004-2009.

Table 4: Socio-economic Characteristics of Adult Household Members - 2004

	[1]		[2]	
	All Members		Migrant Members	
	Frq.	Percent	Frq.	Percent
Occupation				
Employer/own-account worker	353	0.10	3	0.02
Civil/public sector employee	392	0.11	7	0.06
Private sector employee	481	0.14	19	0.16
Casual/domestic worker	386	0.11	39	0.32
Out-of-the-labor-force	456	0.13	5	0.04
Student (at school)	954	0.28	29	0.24
Unemployed	425	0.12	19	0.16
N	3447	1.00	121	1.00
Marital Status				
Married	836	0.24	19	0.16
Single	2233	0.65	99	0.82
Widowed/divorced	378	0.11	3	0.02
N	3447	1.00	121	1.00
Relation to head				
Head	550	0.16	1	0.01
Wife/husband/partner	304	0.09	3	0.02
Son/daughter	1822	0.53	79	0.65
Other relative	572	0.17	29	0.24
Other unrelated person	199	0.06	9	0.07
N	3447	1.00	121	1.00
Religion				
Orthodox Christian	2561	0.74	90	0.74
Protestant	236	0.07	7	0.06
Other Christian	76	0.02	1	0.01
Muslim	417	0.12	9	0.07
Other religion	157	0.05	14	0.12
N	3447	1.00	121	1.00
Migrated abroad				
Yes	121	0.04	-	-
No	3326	0.96	-	-
N	3447	1.00	-	-
Other socio-economic characteristics				
Average years of schooling	-	8.5	-	9.98
Average age	-	30.42	-	26.00
Proportion of Female	-	0.48	-	0.44

Source: Own calculation from the Ethiopian Urban Socioeconomic Surveys 2004-2009.

Table 5: Consumption Regression Results: Dynamic Estimators

	[1]		[2]		[3]	
	DYFE		**DIFF**		**SYS**	
	Coef.	SE	Coef.	SE	Coef.	SE
Lagged real consumption (log)	-0.218***	0.023	0.148***	0.045	0.094**	0.040
Real value of international remittances (log)	0.023***	0.006	0.020	0.055	0.095**	0.040
Real value of domestic remittances (log)	0.001	0.007	0.105	0.082	0.068	0.080
Control Variables						
Socio-economic variables	Yes		Yes		Yes	
Household fixed effects	Yes		Yes		Yes	
Time fixed effects	Yes		Yes		Yes	
City fixed effects	Yes		Yes		Yes	
AR(1)	-	-	0.000		0.000	
AR(2)	-	-	0.044		0.172	
Sargan	-	-	0.455		0.214	
Observations	3152		2937		2937	

Notes: DYFE is the standard fixed effects estimator. DIFF is the Arellano-Bond One-Step (Difference) GMM estimator. SYS is the One-step System GMM estimator. The dependent variable is the log of real consumption per adult equivalent units. AR(1) and AR(2) represent the Arellano-Bond test for first and second-order autocorrelation respectively. Sargan test refers to the overidentification restrictions test on the instruments.
$***p < 0.01, **p < 0.05, *p < 0.1$.

Table 6: Idiosyncratic shocks and international remittances - OLS results

	[1]		[2]		[3]		[4]	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Shocks								
Experienced death of a member	0.129	0.201	0.135	0.200	0.135	0.209	0.078	0.201
Experienced job loss of a member	0.111	0.291	0.141	0.289	0.180	0.296	0.125	0.285
Experienced serious illness of a member	0.846***	0.223	0.885***	0.221	0.936***	0.214	0.898***	0.207
Experienced other idiosyncratic shocks	1.488***	0.349	1.498***	0.346	1.076***	0.321	1.143***	0.300
Migrant Characteristics								
Daughter			0.002	0.138	0.044	0.133	0.070	0.132
Single			0.120	0.126	0.024	0.120	0.009	0.118
Casual worker			0.569***	0.147	0.366**	0.144	0.261*	0.141
Years of schooling			0.085**	0.042	0.075*	0.041	0.059	0.040
Years of schooling squared			-0.001	0.003	-0.004	0.003	-0.003	0.003
Household Characteristics								
Real consumption per capita (log)					0.167***	0.031	0.168***	0.031
Real value of assets (log)					0.548***	0.042	0.516***	0.042
Head, Female					0.629***	0.116	0.639***	0.114
Head, primary schooling completed					0.260*	0.138	0.165	0.135
Head, secondary schooling completed					0.585***	0.157	0.465***	0.155
Head, tertiary schooling completed					0.316	0.243	0.293	0.238
Head, employer/own-account worker					-0.816***	0.140	-0.641***	0.139
Head, civil/public sector employee					-1.043***	0.176	-0.792***	0.174
Head, private sector employee					-1.125***	0.166	-1.131***	0.163
Head, casual worker					0.142	0.218	0.137	0.214
Intercept	0.254***	0.061	-0.606***	0.159	-4.992***	0.347	-5.724***	0.355
City Fixed Effects	Yes		Yes		Yes		Yes	
R-squared		0.01		0.02		0.11		0.15
Observations	3,450		3,450		3,450		3,450	

Notes: SE = robust standard errors, $***p < 0.01, **p < 0.05, *p < 0.1$.

Table 7: Idiosyncratic shocks and international migration - Probit results

	[1]		[2]		[3]		[4]	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Experienced job loss of a member	-0.157	0.241	-0.087	0.254	-0.139	0.259	-0.192	0.265
Experienced death of a member	0.096	0.138	0.063	0.146	0.081	0.150	0.052	0.153
Experienced serious illness of a member	0.220	0.137	0.259*	0.147	0.233	0.150	0.249	0.152
Experienced other idiosyncratic shocks	0.493***	0.174	0.627***	0.184	0.525***	0.190	0.527***	0.199
Daughter			0.413***	0.092	0.434***	0.092	0.458***	0.096
Single			0.423***	0.118	0.443***	0.121	0.449***	0.119
Casual worker			0.743***	0.115	0.741***	0.119	0.672***	0.117
Years of schooling			0.211***	0.053	0.234***	0.056	0.241***	0.058
Years of schooling squared			-0.009***	0.003	-0.011***	0.003	-0.012***	0.003
Real consumption per capita (log)					0.134***	0.029	0.144***	0.031
Real value of assets (log)					0.066*	0.034	0.042	0.034
Female					0.150	0.095	0.146	0.098
Head, primary schooling completed					0.141	0.116	0.163	0.119
Head, secondary schooling completed					0.134	0.128	0.159	0.134
Head, tertiary schooling completed					0.022	0.198	0.122	0.199
Head, employer/own-account worker					-0.255**	0.116	-0.217*	0.120
Head, civil/public sector employee					-0.062	0.144	-0.018	0.149
Head, private sector employee					-0.237	0.184	-0.280	0.187
Head, casual worker					0.091	0.169	0.082	0.173
Intercept	-1.859***	0.047	-3.559***	0.281	-4.777***	0.423	-5.615***	0.509
City Fixed Effects	Yes		Yes		Yes		Yes	
Pseudo R-squared		0.01		0.11		0.14		0.18
Observations	3,450		3,450		3,450		3,450	

Notes: SE = robust standard errors, $***p < 0.01, **p < 0.05, *p < 0.1$.

Table A.1 Consumption Regression Results: Dynamic Estimators

	[1]		[2]		[3]	
	DYFE		**DIFF**		**SYS**	
	Coef.	SE	Coef.	SE	Coef.	SE
Lagged real consumption (log)	-0.218***	0.023	0.148***	0.045	0.094**	0.040
Real value of international remittances (log)	0.023***	0.006	0.020	0.055	0.095**	0.040
Real value of domestic remittances (log)	0.001	0.007	0.105	0.082	0.068	0.080
Age of head	-0.005	0.007	-0.004	0.010	-0.004	0.011
Age of head squared/100	-0.001	0.007	0.001	0.009	-0.000	0.010
Head, female	-0.148***	0.050	-0.137**	0.069	-0.166***	0.063
Head, primary schooling completed	-0.048	0.036	0.004	0.050	0.006	0.050
Head, secondary schooling completed	0.020	0.040	0.056	0.056	0.064	0.054
Head, tertiary schooling completed	0.025	0.060	0.079	0.097	0.033	0.091
Head, employer or own-account worker	0.025	0.048	0.045	0.065	0.074	0.067
Head, civil/public servant	0.018	0.058	0.032	0.095	0.034	0.089
Head, private sector employee	0.019	0.055	0.059	0.096	0.076	0.085
Head, casual worker	-0.043	0.063	0.051	0.082	0.080	0.089
No. of own-account worker members	-0.048	0.029	-0.062	0.039	-0.059*	0.035
No. of civil/public servant members	-0.030	0.030	-0.061	0.043	-0.066	0.044
No. of private sector employee members	-0.029	0.019	-0.067**	0.031	-0.072***	0.027
No. of casual worker members	-0.125***	0.029	-0.169***	0.037	-0.166***	0.039
No. of unemployed members	-0.116***	0.016	-0.124***	0.021	-0.120***	0.021
No. of out of labor force members	-0.116***	0.012	-0.132***	0.016	-0.132***	0.016
No. of children	-0.104***	0.014	-0.136***	0.018	-0.135***	0.019
No. of elderly	-0.103*	0.056	-0.121	0.079	-0.151	0.096
2000	0.082***	0.031	0.012	0.041	-0.003	0.041
2004	0.163***	0.038	0.064	0.050	0.060	0.047
2009	0.194***	0.050	0.005	0.097	-0.035	0.087
Addis	-	-	-	-	-0.950	0.691
Intercept	6.373***	0.231	4.682***	0.338	5.664***	0.648
AR(1)	-	-	0.000		0.000	
AR(2)	-	-	0.044		0.172	
Sargan	-	-	0.455		0.214	
Observations	3152		2937		2937	

Notes: DYFE is the standard fixed effects estimator. DIFF is the Arellano-Bond One-Step (Difference) GMM estimator. SYS is the One-step System GMM estimator. The dependent variable is the log of real consumption per adult equivalent units. AR(1) and AR(2) represent the Arellano-Bond test for first and second-order autocorrelation respectively. Sargan test refers to the overidentification restrictions test on the instruments.
$***p < 0.01, **p < 0.05, *p < 0.1$.