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THE EFFECT OF REMITTANCES UPON SKILLED EMIGRATION: AN EMPIRICAL STUDY

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This paper empirically examines whether remittance inflows affect emigration. We consider a panel of 133 developing countries as migrant source countries and seven five-year windows between 1980 and 2010. Because inflows of remittances could be endogenous, we employ a dynamic GMM estimation methodology. We find that inflows of remittances are positively associated with subsequent stocks of highly educated migrants living in OECD countries. We find little association between remittance inflows and subsequent changes in stocks of less educated migrants. Although many see the level of migration as influencing remittance flows, our results suggest that causality goes in the other direction as well, implying that the inflow of remittances could be a push-factor for emigration, at least for those with more education.

Keywords: Remittances, Migration
JEL Classification: F22, F24

1. INTRODUCTION

In addition to increasing flows of trade and capital across countries, cross-border migration has also become more prevalent over the last 30 years. According to the United Nations (2013), 232 million migrants live across the world, and the pace of new migrants has increased. During the 1990's, the number of migrants increased on average by 2 million whereas this annual flow more than doubled to 4.6 million between 2000 and 2010. Emigration rates from low income to OECD countries are even higher for those individuals with a tertiary education. In fact, for countries like Haiti and Trinidad and Tobago, more highly educated citizens of these countries were living beyond their borders than within them.

Income flows such as remittances have also greatly increased. Despite a fall in 2009 due to the Great Recession, the annual flow of remittances has almost tripled since 2000, was over $500 billion in 2014, and is estimated to have been $601 billion in 2016 (World Bank, 2015). Remittances account for 8% of GDP in low-income countries and around 2% in middle-income nations according to World Bank data. The World Bank

also states that total remittances to low- and middle-income countries are nearly three times the amount of foreign aid to those countries (Mohapatra et al., 2010).

Explaining links from migration to remittances is not difficult as a greater number of migrant workers increases their aggregate income and so increases the income that they can then remit to their home countries. In examining the determinants of remittances, studies such as Faini (2007) and Niimi et al. (2010) consider to what extent migration impacts remittances and how impacts could differ across different skill levels. But does causality go in the other direction as well? Do remittances affect the level of emigration? Remittances could lower emigration as the potential to receive income from abroad might lower the emigration of entire households as only some members of the household need to emigrate so as to increase household income. To the extent that inflows of remittances spur (curb) economic growth, emigration might also be curtailed (raised) since there is less (more) impetus to move (Buckley and Hofmann, 2012; Czaika and Spray, 2013; Feeney at al., 2014; Uprety, 2017a, b). On the other hand, remittances might also increase emigration. The increase in income that remittances provide could help make migrating easier as families could now afford transportation costs as in Beyene (2014). The example of others remitting income back home could induce further immigration as other families follow in their footsteps. If remittances allow for more education, especially for the credit constrained, and if higher educated individuals are more likely to move out of poor countries then remittances could also influence migration by augmenting human capital within the household (Acharya and Leon-Gonzalez, 2014).

Lahiri and Uprety (2016) consider another possibility and build a two-country model where remittances transfer income from a developed country to a developing country. These changes in income then influence the demand for differentiated goods relative to a homogenous good, the former using higher skilled labor than the latter. This induces high-skilled individuals to migrate to the developed country. The reason is that the loss of income in the developed country lowers the demand for the traditional good less than that for the modern good, thereby causing a relative increase in the production of the traditional good. Since the production of the traditional good now requires more labor and that lower skilled workers produce the traditional good, the marginal worker in the skill distribution moves rightward along the continuum in the developed country. Therefore, the wage for the marginal worker in the modern sector increases, inducing more migration from the developing to the developed country. Not only does this model predict that remittances lead to more emigration from the developing to the developed county but that it is the more highly skilled individuals who migrate. Uprety (2017) sees international trade as another determinant factor of emigration.

The purpose of this paper is to empirically examine whether remittances lead to greater emigration from developing countries and, specifically, whether it leads to greater emigration of higher educated individuals. To the best of our knowledge, this is the first paper that empirically examines whether remittances affect emigration. Using a panel of 133 developing countries and seven five–year windows from 1980 to 2010, we

find that remittances are, indeed, positively associated with subsequent emigration to OECD countries but mainly for higher educated individuals. Our findings certainly have bearing upon the "brain drain" literature and suggest a previously unexamined determinant of brain drain.[1]

The rest of the paper is organized as follows. Section 2 presents the data and empirical methodology. Section 3 shows results. A conclusion follows in Section 4.

2. METHODOLOGY

2.1. Data and Variables

The dataset includes 133 developing countries and seven five-year windows from 1980 to 2010. These countries are listed in Appendix Table A1. Data for the number of migrants comes from the Institute of Employment Research (IAB). Migrants are defined as foreign-born individuals aged 25 years and older. Migrant data is provided in five-year intervals for each of the 20 considered OECD destination countries and is available by gender, country of origin, and educational level. These OECD destination countries are also listed in Appendix Table A1. Education levels are classified as low, medium, and high. Medium-skilled migrants are those that completed upper-secondary education. Low-skilled migrants have completed less than upper-secondary education, including those who did not go to school. Highly skilled migrants have completed a post-secondary education. In the model below, MIG_j will denote the natural log of the number of migrants of education level j (where j will denote one of the three aforementioned education levels of low, medium, or high or some combination of these three).

The key explanatory variable is workers' remittances (REMIT) and is obtained from the World Bank's World Development Indicators. We convert remittances reported in nominal dollars into real U.S. dollars by using price level data from the Penn World Tables (version 8.1).[2] Data are also adjusted for PPP differences across countries. We divide by population to obtain per capita levels and then take natural logs.

Several control variables will also be included. We include a variable of political rights (PR) from Freedom House for the source country since political factors could also be a reason to emigrate. In fact, relatively 'freer' countries are found to be origins of large emigrant flows (Karemera et al., 2000). Data for this variable is obtained from Freedom House and is an ordinal variable from 1 to 7 with lower values denoting greater political rights. We also include the inflation rate from the consumer price index (CPI) and the GDP per capita growth rate (GROWTH). Both variables can account for

[1] See Bhagwati and Hamada (1974), Bollard et al. (2011) and Docquier and Rapoport (2012) for various perspectives on brain drain.

[2] More specifically, we use the PL_GDP series from the Penn World Tables.

business cycle conditions or macroeconomic instability that affects both emigration and the inflows of remittances. Although we also control for the natural log of GDP per person (GDP), such a variable might fail to adequately capture current business cycle conditions. In addition to GDP, we include the natural log of life expectancy (LIFE).

Life expectancy is often used as an indicator of the level of health in a country and provides a more complete picture as to the level of development, especially of lower income groups in countries with high degrees of income inequality.[3] We use the natural log of the urbanization rate (URBAN) as well. Those in urban areas might find it easier to emigrate as well as receive remittance inflows. The natural log of foreign direct investment per capita (FDI) is used to control for other forms of cross-border flows. Finally, we use the natural log of population (POP) since larger countries should have more emigrants.

Unless otherwise stated, all data is from the World Bank's World Development Indicators. Moreover, we take data for the control variables at five year intervals to coincide with the migration data. Descriptive statistics are presented in Table 1. The top row of each cell refers to the level of the variable. The second row corresponds to the descriptive statistics for the natural log of the variable. We report the former since inference is more easily drawn when examining variables in levels; but we also report natural logs for those variables where we use natural logs in the empirical model below. When a second row is not provided, it indicates that level variables are used in the empirical model (for example, with inflation or growth rates which can sometimes be negative precluding the use of natural logs).

For our key variables, remittances and migrants, one sees large differences between the mean and median, indicating the inclusion of a few countries where remittances or migrants are particularly high. The large standard deviations indicate great differences across countries. One also sees a nonmonotonicity in the number of migrants. Those with low education levels are most prominent which is not surprising given that such migrants are emigrating to OECD countries where unskilled labor is less abundant. However, the fewest migrants are associated with medium (and not high) education levels. Such individuals could have insufficient human capital to command high wages in OECD countries but still have enough human capital for relatively high wages in their home country.

A weakness with remittance and migration data is the potential for both to be unreported although this is likely to be less of a problem with highly educated emigrants since they are less likely to enter an OECD country illegally. Remittances can also be informal. Informal remittances include money transfers which occur through private, unrecorded channels such as when individuals physically transport money themselves. This study uses the remittances that enter a country through official banking channels which are only a part of total remittances. To the extent that the two are not positively

[3] Ideally, one could use income distribution data to measure inequality but such data is less available and often inconsistent both across and within countries.

correlated then we are failing to capture the association between total remittances and emigration.

Table 1. Summary Statistics

Variables	mean	median	std. dev	min	max	skewness	kurtosis	N
Per Capita Remittances ($)	167.91	39.98	314.84	0.01	2470.2	3.63	19.89	708
	3.45	3.69	2.3	-5.19	7.81	-0.69	3.39	708
Total Migrants (in thousands)	200.80	43.23	562.51	0	9369.10	9.71	134.14	931
	10.47	10.67	2.2	1.39	16.05	-0.49	3.02	929
High Educated Migrants	66.00	14.55	163.04	0	1899.89	5.99	49.07	931
	9.36	9.59	2.18	0.69	14.46	-0.41	2.91	929
Medium Educated Migrants	51.30	10.74	152.23	0	2664.18	11.28	174.37	931
	8.98	9.29	2.32	0	14.8	-0.46	2.79	927
Low Educated Migrants	83.49	14.93	309.13	0	5322.51	11.34	163.44	931
	9.43	9.63	2.26	0.69	15.49	-0.56	3.41	929
Inflation Rate	55.65	8.65	370.4	-10.63	5398.58	12.14	163.61	744
Population (in millions)	33.60	6.24	13.40	12305	1,340	7.67	64.2	929
	15.42	15.65	2.08	9.42	21.01	-0.38	3.19	929
Urbanization Rate	42.52	40.73	20.04	4.72	94.41	0.33	2.27	929
	3.62	3.71	0.55	1.55	4.55	-0.68	3.05	929
GDP Per Capita	2342	1393	2611	91	22066	2.42	11.58	847
	7.21	7.24	1.08	4.51	10	0.01	2.11	847
Growth Rate of GDP Per Capita	1.71	1.85	4.26	-25.81	50.73	0.93	27.89	846
FDI Per Capita ($)	169.05	35.75	469.83	-500.89	9163.02	10.16	169.49	834
	3.43	3.73	2.4	-7.46	9.12	-0.98	4.8	782
Political Rights	4.19	4.4	1.96	1	7	-0.16	1.7	883
Life Expectancy	62.36	64.76	9.51	28.69	80.57	-0.61	2.51	917
	4.12	4.17	0.16	3.36	4.39	-0.94	3.46	917

Note: For each cell, top row denotes summary statistics of levels. The bottom row denotes the summary statistics of the natural logs. Omission of a bottom row indicates that the variables was measured in levels in the empirical methodology.

2.2 Empirical Specification

We use the following specification:

$$MIG^{j}{}_{it} = \beta_1^j MIG^{j}{}_{i,t-1} + \beta_2^j REMIT_{it} + \beta_3^j PR_{it} + \beta_4^j LIFE_{it} + \beta_5^j CPI_{it} + \beta_6^j GROWTH_{it} + \beta_7^j URB_{it} + \beta_8^j GDP_{it} + \beta_9^j POP_{it} + \beta_{10}^j FDI + \alpha_i^j + \eta_t^j + \varepsilon_{it} \quad (1)$$

where i denotes the country, t denotes the year and j denotes the level of education. We will consider five separate groups of emigrants: all emigrants regardless of education level, only high educated emigrants, only medium educated emigrants, high plus medium (since some might prefer a lower threshold distinguishing upper from lower education levels), and only low educated emigrants. Therefore, we will estimate (1) five separate times, once for each of these five groups of emigrants, and then compare how coefficient estimates differ across the five regressions. This is why we allow the coefficients and the fixed effects to differ across each of the five education groups we will consider. We include both country (α_i) and period (η_t) fixed effects to account for time-invariant country heterogeneity as well as country-invariant changes to emigration over time.

We use GMM to estimate the coefficients because the inclusion of the lagged dependent variable can bias coefficients when cross-sectional fixed effects are included and because of concerns that other right hand side variables are endogenous. Specifically, we use the system GMM estimator from Arellano and Bover (1995) and Blundell and Bond (1998) as described in Roodman (2009).[4] We consider migration, remittances, both the level and growth rate of GDP, life expectancy, and the inflation rate as endogenous. We use the two–step estimator with robust standard errors and employ the small sample correction of Windmeijer (2005).

However, before proceeding we further discuss endogeneity concerns and our choice to use the system-GMM estimator. A potential concern is for remittances to be endogenous since the amount of remittances is likely to increase as more people live outside the country. Other right hand side variables are also likely to be endogenous. For example, both income levels and growth rates could be impacted as people leave the country or income flows into the country. The model in Lahiri and Uprety (2016) shows how inflows of remittances impact prices (and so impact inflation) as well as production. One way to address the concern over endogenous right hand side variables is to find a set of external instruments. One would ideally be able to find some variable that is associated with remittances but is not otherwise associated with emigration. Unfortunately, we believe that finding such variables is difficult. Changes within a country that impact the inflows of remittances into that country are also likely to impact preferences to emigrate. Likewise, a shock in the U.S. for example, that influences how much income can be remitted back to country Z from the U.S. is also likely to impact emigration from Z to the U.S. in the first place.

Given this difficulty in finding external instruments we will use internal instruments, namely lags of the endogenous right hand side variables. We will employ the two-period (or earlier) lags of the endogenous right hand side variables as instruments. The system-GMM estimator estimates both (1) as well as its first difference. In the latter case with the difference equation, the error component becomes $\Delta\varepsilon_{i,t} = \varepsilon_{i,t} - \varepsilon_{i,t-1}$. Since

[4] This estimator is also applicable to panels with many countries and only a few periods, commonly referred to as "large N, small T".

these errors are interpreted as shocks to the dynamic process in (1), neither $\varepsilon_{i,t}$ nor $\Delta\varepsilon_{i,t}$ should be correlated with any of the two-period (or earlier) lags of the right hand side variables nor with the differences in these right hand side variables from time $t-1$ or earlier that we will also use as instruments. In our case, such restrictions imply that the levels of emigrants two or more periods earlier (and so 10+ years given our use of five-year windows) should not be correlated with subsequent shocks that could impact both future remittances and future migrants. Likewise, economic shocks could certainly impact remittances and emigration concurrently; however economic conditions two periods prior to time t should not impact later shocks that could directly drive emigration. Changes in remittances before time t are also assumed not to be correlated with time-t shocks to emigration.[5]

Given this setup, concerns could remain regarding the underlying assumptions of our application. First, problems could arise if two-period lags of remittances or emigrants, for example, serve as poor instruments for their later differences or if the one-period lag of the differences in remittances of emigration serve as poor instruments for their later levels, thereby creating a problem of weak instruments. In the empirical work below, *F*-statistics will strongly reject the null hypothesis that instruments are only weakly correlated with the endogenous variables. Problems could also arise if the ε's show more than first order serial correlation in which case shocks to emigration continue to have direct effects on the number of emigrants after ten years. However, the null of no second order serial correlation will generally not be rejected.[6] Finally, the Hansen overidenification test will never reject the null that the model is appropriately identified. Such diagnostic checks will be presented below.

3. RESULTS

3.1. Baseline Specification

Table 2 presents results across the five different education levels of emigrants we consider. Column 1 considers highly educated emigrants and column 2 considers those with a medium level of education. Column 3 combines these two education levels. Column 4 considers those with low education levels. Finally, column 5 considers all emigrants.

[5] For system-GMM, it is also necessary that the lagged differences of the right hand side variables are also not associated with the country fixed effects. We find this assumption plausible in that permanent distinctions in first differences would imply that countries are increasingly diverging from one another.

[6] We do reject the null of no second order serial correlation with low educated emigrants but not the null of no third order serial correlation. Consequently, we use only the third (and earlier) lags of the endogenous variables as instruments when consider low educated emigrants.

Remittances are positively associated with emigration but only for the highly skilled, supporting the findings of Lahiri and Uprety (2016). Inflows of remittances are not strongly associated with the emigration of those with lesser education levels, perhaps because of offsetting effects. Inflows of remittances could make it easier for people to leave but also lower the necessity of doing so. Perhaps those with higher education are most willing to emigrate and to look for opportunities where their high (relative to their home country) education levels are in greater demand. Remittances might then make their migration more affordable.

Table 2. Impact of Remittances on Emigration across Different Education Levels

Education Level	HIGH	MEDIUM	HIGH & MED	LOW	TOTAL
	(1)	(2)	(3)	(4)	(5)
MIGt-1	0.875***	1.005***	0.935***	0.972***	0.937***
	(28.95)	(28.76)	(34.14)	(27.48)	(25.49)
POP	0.066**	-0.033	0.0324	0.005	0.014
	(2.41)	(-0.97)	(1.27)	(0.09)	(0.45)
REMIT	0.054***	0.03	0.0493***	0.015	0.024
	(3.39)	(1.51)	(3.04)	(0.43)	(1.56)
PR	-0.022**	-0.002	-0.018*	-0.004	-0.014
	(-2.52)	(-0.21)	(-1.95)	(-0.32)	(-1.30)
URB	0.113	0.172**	0.167**	0.058	0.106*
	(1.60)	(2.34)	(2.51)	(0.81)	(1.70)
LIFE	-0.173	-0.356	-0.364	-0.016	-0.293
	(-0.56)	(-1.10)	(-1.25)	(-0.06)	(-1.00)
GDP	-0.043	-0.120**	-0.0685	-0.068	-0.059
	(-0.90)	(-2.56)	(-1.56)	(-1.61)	(-1.48)
GROWTH	0.0187***	0.0174*	0.0179***	0.005	0.018**
	(2.82)	(1.83)	(2.71)	(0.59)	(2.30)
CPI	0.039*	0.048*	0.0396**	-0.061**	0.007
	(1.85)	(1.69)	(2.06)	(-2.07)	(0.27)
FDI	0.021	0.009	0.00364	0.011	0.025
	(0.77)	(0.34)	(0.14)	(0.22)	(0.92)
F-stat	810.2	687.2	1058.3	553.3	810.2
AR(1)	0.021	0.001	0.014	0.297	0.805
AR(2)	0.413	0.799	0.481	0.007	0.007
AR(3)				0.526	0.214
Hansen	0.201	0.325	0.255	0.102	0.321

Note: *t* statistics in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels. Estimations conducted by a system-GMM methodology. *F*-stat denotes the *F*-statistic from a test of instrument relevance. AR(x) denotes *p*-values from a test of serial correlation at lag length x. Hansen denotes *p*-values from the Hansen test of over identifying restrictions. Each regression has 541 observations.

To put these results into context, the use of a log-log specification allows the coefficients upon remittances to be interpreted as elasticities. An increase in remittances

of 10% is associated with a 0.54% increase in the migration of the highly educated. Admittedly, this is not a strong impact although we make three points regarding this magnitude. The first is that we do not claim that remittances are a dominate reason for migration. Factors such as wage differentials between rich and poor countries most certainly play a more important role. In this sense, a large coefficient upon REMIT would be suspicious. The second point is that the mean value for the number of highly educated migrants is 66,000 and so a 0.54% increase from this mean represents an increase of just over 350 people which could still represent an important change in a country lacking human capital. Finally, many of the coefficients on the control variables are not significant and so the significant coefficient on REMIT in column (1) still stands out compared to other factors that could potentially impact the number of emigrants.

As for the control variables, we note the lack of robustly significant coefficients across education levels suggesting that different factors could play more important roles in the migratory decisions of different types of individuals. One example is inflation as increases in the price level lower emigration of low educated individuals but increase it for the other two education levels. Perhaps macroeconomic stability pushes those with greater education out of the country but makes lower educated agents less able to leave. Then again, faster growth rates appear to increase emigration for the high and medium educated. The coefficients on GDP and LIFE are not significant, again possibly because of offsetting effects. Incentives to emigrate could be greater in poorer countries but opportunities to emigrate could be less available. For highly educated migrants, the coefficient on PR is negative, suggesting less emigration in countries with fewer political rights. Perhaps such countries make it more difficult for those with higher levels of human capital to leave the country.

Finally, the diagnostic checks appear to be satisfied. The Hansen test is never significant at the 10% level. Because the AR(2) test reports a very low p-value in column four for low educated emigrants, we run the specification for low educated migrants using lags three and four of the endogenous variables and the AR(3) *p*-value is above 0.5.

3.2. Subsamples and Robustness Checks

Table 3 considers other samples. Although the specifications are the same as those used in Table 2, we only present the coefficient estimates for REMIT. The first two rows consider male and female emigrants, respectively, showing little difference across gender in the effect of remittances upon migration. One exception is that evidence now arises that remittances do increase migration for women having only a medium level of education. The next four rows imply that the effects of remittances upon emigration are similar for both African and non-African countries as well as for both low and middle income countries. Although the level of statistical significance changes, the estimates themselves remain stable. Of course, these two distinctions overlap in that many African countries are also low-income countries. Another exception, however, is for low

educated migrants from low income countries. Some evidence now arises (albeit, only at the 10% level) that remittances increase the number of low educated migrants as well.

In the above specifications, REMIT is measured as the natural log of per capita remittances. Table 4 replaces this measure of remittances with the natural log of remittances taken as a percentage of GDP. Results are robust in that a positive association arises for high educated migrants but not for those of other education levels. Finally, Table 5 includes another control variable, the natural log of the level of per capita foreign aid (AID). Foreign aid is another type of income flow into poor countries. Moreover, Berthelemy et al. (2009) report that foreign aid increases the emigration of highly skilled workers and so could be the true catalyst behind our findings. Data for foreign aid comes from the World Bank and is taken to be official development assistance per capita (measured in real terms). The findings from Table 5 show that the inclusion of foreign aid does not qualitatively alter previous results, although the coefficient on REMIT in column 1 falls somewhat in magnitude. The coefficient on AID, however, is never significant. One reason that foreign aid might not be that strongly associated with migration is that the benefits of aid might not reach directly to households. For one, corruption could siphon off official aid. Second, foreign aid that allows for greater provision of healthcare could certainly be welfare enhancing but also fail to greatly increase household income and so not providing greater resources to migrate.

Table 3. Coefficient Estimates upon REMIT for Gender and Country Subsamples

Education Level	HIGH	MEDIUM SKILL	HIGH & MED	LOW	TOTAL
	(1)	(2)	(3)	(4)	(5)
Males	0.0423**	0.0228	0.0461**	0.0295	0.018
	(2.39)	(0.95)	(2.32)	(1.11)	(1.05)
Females	0.051**	0.050**	0.049***	0.014	0.026
	(2.49)	(2.45)	(2.66)	(0.40)	(1.47)
Africa	0.045**	0.024	0.036*	-0.005	0.011
	(2.02)	(0.72)	(1.98)	(-0.16)	(0.57)
Non-Africa	0.051*	0.036	0.055**	0.034	0.043*
	(1.92)	(1.52)	(2.41)	(1.11)	(1.96)
Low Income	0.049**	0.024	0.061*	0.066*	-0.008
	(2.21)	(0.63)	(1.90)	(1.97)	(-0.21)
Middle Income	0.047*	0.013	0.029	0.012	0.009
	(1.88)	(.34)	(.92)	(.28)	(.29)

Note: *t* statistics in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels. Estimations conducted by a system-GMM methodology with the same control variables as those given in Table 1.

Table 4. Impact of Remittances on Emigration Taking Remittances as a Percentage of GDP

Education level	HIGH	MEDIUM SKILL	HIGH & MED	LOW	TOTAL
	(1)	(2)	(3)	(4)	(5)
MIG_{t-1}	0.885***	0.994***	0.932***	0.987***	0.929***
	(30.12)	(27.79)	(33.08)	(30.98)	(24.37)
POP	0.043	-0.032	0.017	-0.004	0.007
	(1.58)	(-0.94)	(0.66)	(-0.08)	(0.21)
REMIT	0.039**	0.021	0.037**	0.004	0.015
	(2.51)	(0.98)	(2.40)	(0.14)	(1.06)
PR	-0.019**	-0.002	-0.015	-0.005	-0.011
	(-2.16)	(-0.15)	(-1.63)	(-0.47)	(-1.05)
URB	0.108	0.164**	0.152**	0.068	0.094
	(1.58)	(2.41)	(2.46)	(0.99)	(1.55)
LIFE	-0.083	-0.271	-0.308	-0.021	-0.144
	(-0.28)	(-0.94)	(-1.13)	(-0.09)	(-0.46)
GDP	-0.026	-0.097**	-0.0416	-0.066	-0.054
	(-0.56)	(-1.98)	(-1.01)	(-1.36)	(-1.20)
GROWTH	0.02***	0.014	0.017**	0.005	0.017**
	(3.07)	(1.63)	(2.43)	(0.65)	(2.20)
CPI	0.041**	0.039	0.037*	-0.059*	0.002
	(2.06)	(1.54)	(1.75)	(-1.90)	(0.08)
FDI	0.0331	0.0181	0.019	0.007	0.036
	(1.25)	(0.67)	(0.81)	(0.14)	(1.25)
F-stat	833.6	640.4	957.6	611.2	760.5
AR(1)	0.018	0.0005	0.00783	0.298	0.737
AR(2)	0.459	0.538	0.776	0.011	0.007
AR(3)				0.449	0.187
Hansen	0.212	0.229	0.204	0.147	0.286

Note: *t* statistics in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels. Estimations conducted by a system-GMM methodology. *F*-stat denotes the *F*-statistic from a test of instrument relevance. AR(x) denotes p-values from a test of serial correlation at lag length x. Hansen denotes *p*-values from the Hansen test of over identifying restrictions. Each regression has 543 observations.

Table 5. Impact of Remittances and ODA on Emigration across Different Skills

Education Level	HIGH	MEDIUM	HIGH & MED	LOW	TOTAL
	(1)	(2)	(3)	(4)	(5)
MIG_{t-1}	0.886***	0.985***	0.934***	0.968***	0.933***
	(32.32)	(32.89)	(30.61)	(32.53)	(25.27)
POP	0.053*	-0.014	0.025	0.028	0.012
	(1.69)	(-0.52)	(0.87)	(0.45)	(0.30)
REMIT	0.038**	0.018	0.033**	0.016	0.016
	(2.61)	(0.91)	(2.46)	(0.50)	(1.14)
PR	-0.022**	-0.0002	-0.0147	-0.0037	-0.014
	(-2.33)	(-0.02)	(-1.50)	(-0.30)	(-1.59)
URB	0.109*	0.156*	0.13**	0.027	0.088
	(1.68)	(1.79)	(2.19)	(0.32)	(1.52)
LIFE	-0.189	-0.09	-0.242	0.072	-0.106
	(-0.68)	(-0.28)	(-0.85)	(0.22)	(-0.29)
GDP	-0.036	-0.076*	-0.0520	-0.044	-0.047
	(-0.71)	(-1.74)	(-1.21)	(-0.78)	(-1.07)
GROWTH	0.021**	0.018*	0.019**	0.009	0.019**
	(2.61)	(1.85)	(2.47)	(0.81)	(2.56)
CPI	0.027	0.041	0.03	-0.05	0.009
	(1.36)	(1.48)	(1.43)	(-1.45)	(0.45)
FDI	0.023	-0.013	0.009	0.001	0.012
	(0.83)	(-0.53)	(0.34)	(0.02)	(0.46)
AID	0.009	-0.019	-0.006	0.023	-0.03
	(0.02)	(-0.63)	(-0.21)	(0.47)	(-0.60)
F-Stat	906.3	660.5	976.6	550.8	1041.2
AR(1)	0.029	0.001	0.02	0.329	0.867
AR(2)	0.343	0.847	0.37	0.007	0.006
AR(3)				0.525	0.239
Hansen	0.388	0.443	0.328	0.141	0.485

Note: *t* statistics in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels. Estimations conducted by a system-GMM methodology. *F*-stat denotes the *F*-statistic from a test of instrument relevance. AR(x) denotes *p*-values from a test of serial correlation at lag length x. Hansen denotes *p*-values from the Hansen test of over identifying restrictions. Each regression has 516 observations.

4. CONCLUSION

Our paper finds that the amount of remittance inflows influences the level of emigration but mainly for those with more education. Moreover, this finding is robust across various subsamples and so is not entirely driven by a few cases. Such a result suggests that remittance inflows could be a determinant of brain drain where higher educated individuals leave a lower income country for a higher income one. To the extent that brain drain slows economic development then such inflows could impede economic growth. Nevertheless, we do not blithely suggest that such inflows should be curtailed. For one, remittances presumably raise household utility (or else households would not remit income back to the home country). Second, these remittances could even promote "brain gain" as they possibly allow households to obtain more education for their children than they could have attained without them. Instead, we hope these results motivate further examination on this topic by showing a possible impact of remittances that has not been previously explored.

As we report above, we do not find evidence of a strong association between remittances and the emigration of low educated individuals. One explanation, of course, is that remittances do not impact emigration for this group. However, a second possibility arises from our remittance variable and its focus upon "formal" remittances. Remittances that do not transit through the financial system but are physically carried back to the home country are not reported. If these types of remittances are most relevant for low educated households, then a competing explanation for our finding of a lack of any effect from remittances to the emigration of these individuals could merely stem from a weakness of our data. Further work will attempt to address this possibility more thoroughly.

Finally, our results also have bearing upon how researchers examine associations between remittances and migration. Previous work has considered the impact of migration upon remittances. But by showing that causality could go in the opposite direction, then our findings hold implications for how researchers examine this issue, suggesting that a potential of reverse causation arises.

APPENDIX

Table A1 lists the 133 migrant sending developing countries (panel A) and 20 OECD migrant receiving countries (panel B). The maximum possible number of developing countries are included in this study based on the availability of data.

Table A1. Migrant Sending and Migrant Receiving OECD Countries

Panel A. Migrant Sending Countries			
Afghanistan	Dominican Rep	Libya	Serbia and Montenegro
Albania	Ecuador	Macedonia	Seychelles
Algeria	Egypt	Madagascar	Sierra Leone
Angola	El Salvador	Malawi	Solomon Islands
Argentina	Eritrea	Malaysia	Somalia
Armenia	Ethiopia	Maldives	South Africa
Azerbaijan	Fiji	Mali	Sri Lanka
Bangladesh	Gabon	Marshall Islands	St. Kitts & Nevis
Belarus	Georgia	Mauritania	St. Lucia
Belize	Ghana	Mauritius	St. Vincent and Grenadines
Benin	Grenada	Mexico	Sudan
Bhutan	Guatemala	Micronesia, Fed States	Suriname
Bolivia	Guinea	Moldova	Swaziland
Bosnia and Herzegovina	Guinea-Bissau	Mongolia	Syria
Botswana	Guyana	Morocco	Tajikistan
Brazil	Haiti	Mozambique	Tanzania
Bulgaria	Honduras	Namibia	Thailand
Burkina Faso	Hungary	Nepal	Timor Leste
Cambodia	India	Nicaragua	Togo
Cameroon	Indonesia	Niger	Tonga
Cape Verde	Iran	Nigeria	Trinidad and Tobago
Central African Rep	Iraq	Oman	Tunisia
Chad	Jamaica	Pakistan	Turkey
China	Jordan	Palau	Turkmenistan
Colombia	Kazakhstan	Panama	Uganda
Comoros	Kenya	Papua New Guinea	Ukraine
Congo, Dem. Rep.	Kiribati	Paraguay	Uruguay
Congo, Rep.	Korea	Philippines	Uzbekistan
Costa Rica	Kyrgyzstan	Romania	Vanuatu
Cote d'Ivoire	Laos	Rwanda	Venezuela
Cuba	Lebanon	Samoa	Vietnam
Djibouti	Lesotho	Sao Tome and Principe	Yemen
Dominica	Liberia	Senegal	Zambia and Zimbabwe
Panel B. OECD Migrant Receiving Countries			
Australia	Finland	Luxembourg	Spain
Austria	France	Netherlands	Sweden
Canada	Germany	New Zealand	Switzerland
Chile	Greece	Norway	United Kingdom
Denmark	Ireland	Portugal	United States

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