

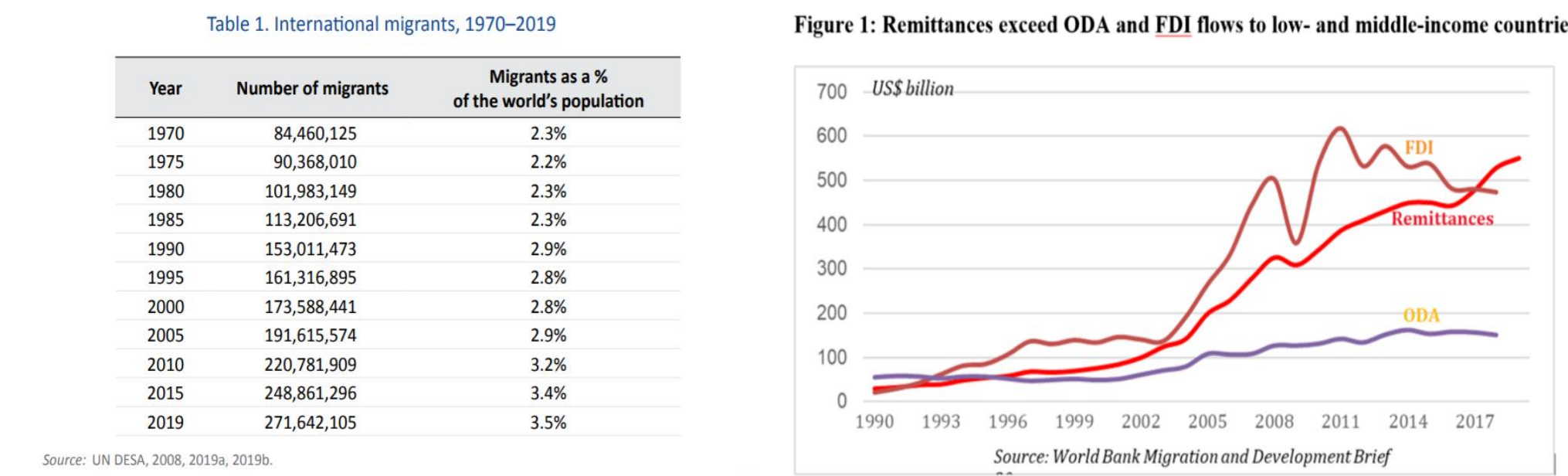
Emigration and Public Finances

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Motivation

➤ According to the World Migration Report 2020, the number of international migrants has increased over the last five decades, from 84 million in 1970 to 272 million in 2019.



➤ Emigrants represent a proportion of the labor force that is usually highly educated (Adams, 2003; Desai et al., 2009; Docquier & Rapoport, 2012), representing the loss of human capital and productivity for the source countries (McAuliffe and Khadria, 2019).

➤ Migration also delivers major economic benefits to home countries. While migrants spend most of their wages in their host countries – boosting demand there – they also tend to send money to support families back home. Such remittances have been known to exceed official development assistance. In 2018, remittances to low- and middle-income countries increased by 11%, reaching \$528 billion, exceeding those countries' inflows of foreign direct investment.

➤ Although there is evidence of the impact of remittances on tax revenue (Asatryan et al., 2017; Ebeke, 2014), little attention has been paid to the total effect of emigration on public finances of the developing countries.

➤ **Research Question:** What is the net effect of emigration on tax revenue in developing countries?

Data

- International Migration Stock 2020,
- International Centre for Tax and Development (ICTD).
- The World Development Indicators (WDI).
- The CEPII database.

Table 2 Summary Statistics

	Obs	Mean	Std. Dev.	Min	Max
tax_inc_sc_pc	395	16.775	7.91	3.807	43.991
tax_income_pc	426	4.790	2.965	0.232	19.722
tax_gs_vat_pc	266	4.513	2.844	0	18.213
tax_g_s_pc	408	6.525	3.742	0	19.033
tax_indiv_pc	422	2.008	1.810	0	10.922
tax_corp_pc	433	2.451	2.494	0	32.416
emigration_rate	433	0.051	0.081	0	0.406
population	433	5.20E+07	1.87E+08	10521	1.37E+09
gdp_pc	430	2834.72	2518.236	172.951	13810.04
trade_openness	433	58.674	29.768	11.623	192.123
ODA	416	7.329	9.513	-0.219	56.961
FDI	425	3.163	3.921	-10.257	33.795
inflation	430	44.434	347.386	-8.81	6261.24
exchange_rate	410	538.047	1972.246	0	21697.57

Empirical Implementation

➤ **Basic Model:** the empirical model features several indicators of tax revenue as dependent variables. The regression equation is as follows:

$$Y_{i,t} = \alpha m_{i,t} + \beta X_{i,t} + \varphi_i + \theta_t + \mu_{i,t} \quad (1)$$

• Where $m_{i,t}$ is the emigration rate, which is calculated by the sum of emigrants from developing countries i to developed countries j at time t , $\sum_j M_{ij,t}$, divided by the native population of country i , $N_{i,t}$ (equal to the sum of the residents and emigrants). $Y_{i,t}$ is one of the following dependent variables in per capita terms to explore the tax revenue response to emigration: (i) total tax revenue, (ii) tax revenue generated from income, profit, and capital gains, (iii) VAT tax base revenue (approximated by a division of VAT/sales tax revenue with the standard VAT rate), (iv) tax revenue generated from goods and services, (v) tax revenue generated from individuals, (vi) tax revenue generated from corporations and other enterprises. $X_{i,t}$ is a set of control variables which covers the main determinants of tax revenue identified in the previous empirical literature. φ_i and θ_t are country fix effect and time fix effect, respectively, $\mu_{i,t}$ is standard error term.

• Control variables include Population, Gross Domestic Product per capita, Trade openness, Net Official Development Assistance, Foreign Direct Investment, Inflation, and Exchange rate.

➤ **Identification Strategy: Gravity-based 2SLS strategy**

• Following Docquier et al. (2016), we try to predict the bilateral emigration stocks from the following pseudo-gravity model:

$$Emigration_{ijt} = a_0 + \alpha_i + \alpha_j + b_1 Distw_{ij} + b_2 Colony_{ij} + b_3 Contig_{ij} + b_4 ComLang_{ij} + \epsilon_{ijt} \quad (2)$$

• Then, following Feyrer (2019), we assume that the $Distw_{ij}$ here is a function of air and sea distance. We assume that all country pairs share the same bilateral distance function for the same period,

$$Distw_{ij} = f_t(airdist_{ij}, seadist_{ij}) = b_{air,t} airdist_{ij} + b_{sea,t} seadist_{ij} + \gamma X_{ij} \quad (3)$$

• Here, the change over time is assumed to be driven by transportation technological progress. In this paper, we consider both air distance and sea distance, and allow the coefficients to be time-varying, the technological changes can be captured by $b_{air,t}$ and $b_{sea,t}$. X_{ij} is a set of control variables that include colonial relationships, share borders, and if speak the same language.

• Finally, the gravity-based prediction of bilateral emigration stocks is obtained from the following pseudo-gravity model:

$$Emigration_{ijt} = a_0 + \alpha_i + \alpha_j + \alpha_t + b_{air,t} airdist_{ij} + b_{sea,t} seadist_{ij} + b_1 Colony_{ij} + b_2 Contig_{ij} + b_3 ComLang_{ij} + \epsilon_{ijt} \quad (4)$$

• We then aggregate bilateral migration stocks over destination countries to obtain the sum of emigration, $\sum_j \widehat{M}_{ij,t}$, and divide $\sum_j \widehat{M}_{ij,t}$ by the native population of country i , $N_{i,t}$, to calculate the predicted emigration rate. We use the predicted emigration rate as the instrumental variable in the first stage of regression.

Results

➤ **Benchmark Regression**

Table 3 OLS

	(1)	(2)	(3)	(4)	(5)	(6)
	tax_inc_sc	tax_income	tax_gs_vat	tax_g_s	tax_indiv	tax_corp
emigration_rate	1,746.959***	-463.305*	1,053.206	1,943.902**	47.179	-493.332***
	(531.430)	(269.787)	(889.834)	(776.128)	(170.533)	(160.049)
Constant	-89.986	-57.378**	-158.565***	-115.047*	-7.042	-43.589***
	(81.155)	(20.068)	(43.729)	(60.774)	(17.774)	(12.866)
Observations	535	482	291	509	395	387
R-squared	0.653	0.710	0.530	0.498	0.388	0.651
Number of id	109	107	84	109	102	98
Control Variables	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

➤ **Instrumental Variable Approach**

Table 4 Gravity Model Estimation

	(1)	(2)
	emigration	emigration
airdist*1(year=1990)	-0.000212***	-0.0001572***
	(0.0000653)	(0.0000465)
airdist*1(year=1995)	-0.0001868***	-0.0001344***
	(0.0000640)	(0.0000454)
airdist*1(year=2000)	-0.0001674***	-0.0001170***
	(0.0000633)	(0.0000446)
airdist*1(year=2005)	-0.0001536***	-0.0001047***
	(0.0000577)	(0.0000377)
airdist*1(year=2010)	-0.0001512***	-0.0001035***
	(0.0000550)	(0.0000363)
airdist*1(year=2015)	-0.0001454***	-0.0000977***
	(0.0000540)	(0.0000374)
seadist*1(year=1990)	-0.0000813**	-0.0000724**
	(0.0000338)	(0.0000343)
seadist*1(year=1995)	-0.0000941**	-0.0000842**
	(0.0000306)	(0.0000308)
seadist*1(year=2000)	-0.0001046**	-0.0000938**
	(0.0000293)	(0.0000296)
seadist*1(year=2005)	-0.0001096**	-0.0000982**
	(0.0000252)	(0.0000295)
seadist*1(year=2010)	-0.0001191**	-0.0001005**
	(0.0000217)	(0.0000311)
seadist*1(year=2015)	-0.0001038**	-0.0000969**
	(0.0000254)	(0.0000345)
Constant	13.813985***	12.6506925***
	(0.2251103)	(0.2464127)
Control Variables	YES	YES
Country FE	YES	YES
Year FE	YES	YES
Observation	21,174	21,174

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5 First-stage Results

	(1)	(2)
	emigration_rate	emigration_rate
emigration_rate_p	0.451***	0.391***
	(0.019)	(0.020)
Constant	0.028***	0.024***
	(0.001)	(0.003)
Observations	714	603
R-squared	0.495	0.573
Number of id	119	113
Control Variables	NO	YES
Country FE	YES	YES
Year FE	YES	YES
F-test	582.4	49.25

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

➤ **Robustness Checks**

Table 6 2SLS

	(1)	(2)	(3)	(4)	(5)	(6)
	tax_inc_sc	tax_income	tax_gs_vat	tax_g_s	tax_indiv	tax_corp
emigration_rate	2,468.346***	-938.862**	10,215.858	4,588.468***	-123.479	-1,218.004***
	(891.010)	(415.544)	(6,553.725)	(942.629)	(446.439)	(391.752)
Constant	-125.417	-35.692	-488.902**	-232.001***	0.470	-13.026
	(78.439)	(24.796)	(248.171)	(66.398)	(27.699)	(21.345)
Observations	535	482	291	509	395	387
Number of id	109	107	84	109	102	98
Control Variables	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7 Robustness Check I

	(1)	(2)	(3)	(4)	(5)	(6)
	tax_inc_sc	tax_income	tax_gs_vat	tax_g_s	tax_indiv	tax_corp
emigration_rate	3,810.378***	-406.378	33,153.223	6,733.050***	25.400	339.066
	(1,364.644)	(916.137)	(52,750.692)	(2,060.101)	(470.275)	(1,112.406)
Constant	-275.808*	-195.318	-2,120.044	-522.438**	-29.270	-20.332
	(142.594)	(123.168)	(3,370.851)	(207.732)	(39.200)	(56.900)
Observations	615	564	340	591	452	456
Number of id	136	133	102	135	122	121
Control Variables	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8 Robustness Check II

	(1)	(2)	(3)	(4)	(5)	(6)
	tax_inc_sc	tax_income	tax_gs_vat	tax_g_s	tax_indiv	tax_corp
emigration_rate	2,532.806***	-962.675**	9,850.783	4,665.871***	-154.615	-1,251.206***
	(887.787)	(425.768)	(6,632.787)	(950.706)	(454.393)	(415.083)
Constant	-129.578	-49.100*	-469.623*	-215.079***	-0.086	-21.033
	(81.754)	(25.785)	(265.481)	(65.748)	(29.897)	(22.474)
Observations	520	467	281	494	381	373
Number of id	106	104	81	106	99	95
Control Variables	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Conclusion

➤ This paper empirically investigates the overall impact of emigration on the tax revenue of sending countries in a large sample of developing countries.

➤ We find that the overall effect of emigration on the tax revenue is always positive and significant, and the effects are varied from different kinds of tax revenue.

➤ Specifically, emigration decreases tax revenue generated from income, profit, and capital gains, and also tax revenue generated from corporations and other enterprises; while it increases tax revenue generated from goods and services.

➤ Overall, the results appear robust over specifications and estimation methods. In addition, the results also robust when we use the sample of all countries that emigrate to developed countries, and sub-samples of countries (e.g., excluding socialist countries).

➤ Finally, we note that our results are driven by migration from the developing countries to developed countries, which suggesting that the effect of emigration on original countries' public finances is destination specific.

➤ We therefore conclude that emigration to developed and rich countries played an important positive role in promoting tax revenue in developing countries.

Reference

Aggarwal, R., Demirgüç-Kunt, A., & Peria, M. S. M. (2011). Do remittances promote financial development? *Journal of Development Economics*, 96(2), 255–264.

Angrist, N., Goldberg, P. K., & Jolliffe, D. (2021). Why is growth in developing countries so hard to measure? *Journal of Economic Perspectives*, 35(3), 215–242.

Asatryan, Z., Bitschi, B., & Doerrenberg, P. (2017). Remittances and public finances: Evidence from oil-price shocks. *Journal of Public Economics*, 155(Sepember), 122–137.

Besley, T., & Persson, T. (2009). The origins of state capacity: Property rights, taxation, and politics. *American Economic Review*, 99(4), 1218–1244.

Besley, T., & Persson, T. (2013). Taxation and Development. In *Handbook of Public Economics* (Issue Volume 5, pp. 51–110).

Besley, T., & Persson, T. (2014). Why do developing countries tax so little? *Journal of Economic Perspectives*, 28(4), 99–120.

Castro, G. Á., & Ramírez, D. B. (2014). Determinants of tax revenue in OECD countries over the period 2001–2011. *Contaduría y Administración*, 59(3), 35–59.

Desai, M. A., Kapur, D., McHale, J., & Rogers, K. (2009). The fiscal impact of high-skilled emigration: Flows of Indians to the U.S. *Journal of Development Economics*, 88(1), 32–44.

Docquier, F., Lodigiani, E., Rapoport, H., & Schiff, M. (2016). Emigration and democracy. *Journal of Development Economics*, 120, 209–223.

Docquier, F., & Rapoport, H. (2012). Globalization, brain drain, and development. *Journal of Economic Literature*, 50(3), 681–730.

Ebeke, C. H. (2014). Do international remittances affect the level and the volatility of government tax revenues? *Journal of International Development*, 26, 1039–1053.

Feyrer, J. (2019). Trade and income-exploiting time series in geography. *American Economic Journal: Applied Economics*, 11(4), 1–35.

Filipski, M., Lee, H. L., Hein, A., & Nischan, U. (2020). Emigration and Rising Wages in Myanmar: Evidence from Mon State. *Journal of Development Studies*, 56(5), 946–963.

Mishra, P. (2007). Emigration and wages in source countries: Evidence from Mexico. *Journal of Development Economics*, 82(1), 180–199.

Uprey, D. (2020). Does Skilled Migration Cause Income Inequality in the Source Country? *International Migration*, 58(4), 85–100.

Woodruff, C., & Zenteno, R. (2007). Migration networks and microenterprises in Mexico. *Journal of Development Economics*, 82(2), 509–528.

Wouterse, F., & Taylor, J. E. (2008). Migration and Income Diversification: Evidence from Burkina Faso. *World Development*, 36(4), 625–640.