Remittances and Tax Structure in Developing Countries

Seung-hun Lee*

Columbia University

March 15th, 2024

Click here for the latest version

Abstract

This paper investigates the relationship between a country's reliance on remittances from abroad and its ability to collect taxes from various domestic sources. Despite the increasing flow of remittances in volume and proportion, particularly among developing countries, their role in determining the state's capacity to collect taxes has received little attention. This chapter explores the link between remittances and various tax revenue categories using country-level data. Two-way panel regressions suggest that a 1 percentage point (pp) increase in the inflow of remittances explains a 0.12 pp rise in consumption tax revenues. The same estimate derived from IV methods proxying for migrant network strength and openness of borders increases to 0.9 pp. Decomposing this result reveals that the increase in household consumption expenditure explains all of the statistical association, not the efficient tax-collecting mechanisms such as VAT. Subsample regressions by income category suggest that the association between remittances and consumption tax revenue is stronger in countries with lower income.

Keywords: Remittances, consumption tax, developing countries, state capacity

JEL Codes: F24, H11, H71, O23

*Contact: sl4436@columbia.edu.

This paper is to be submitted in order to fulfill the second-year paper requirement of the Economics department at Columbia University. I am greatly indebted to Michael Best, Suresh Naidu, for continuous encouragement and productive feedback. I thank the participants at the Development Colloquium at Columbia University for useful suggestions in improving the empirical strategy used in the paper. I also appreciate Kyung Woong Koh for providing useful suggestions and relevant articles for robustness checks. Any remaining errors are mine.

1 Introduction

The flow of remittances, defined as funds sent by migrants living abroad, has grown over the last four decades (World Bank 2019). In particular, the growth of remittances has been steady since the 1990s, as shown in Figure 1. The total amount of flow of remittances surpassed that of official development aid (ODA) since the mid-1990s. The size of remittances within countries is second only to foreign direct investment (FDI). This is especially the case for developing countries, demonstrated in the bottom panel in Figure 1. These countries have consistently relied on remittances since the 1990s, receiving an amount equivalent to 2-6% of their GDP on average (Figure 2). In extreme cases, some countries receive an amount equal to more than 30% of their GDP as remittances (Figure 2).

Despite such trends, little attention has been paid to how the reliance on remittances relates to the fiscal capacities of the governments, especially tax collection. Given that various taxes - income taxes, taxes on consumption, and customs - are based on household spending, remittances may be associated with higher taxes through increasing household income. Furthermore, remittances may explain how the structure of taxation differs country by country (Salanie 2011; Gordon and Li 2009; Besley and Persson 2014b). Many developing countries rely on consumption taxes and customs taxes (Gordon and Li 2009; Besley and Persson 2013). However, they lag in implementing more equitable and efficient tax collection mechanisms such as income tax and value-added taxes (Salanie 2011; Gordon and Li 2009). Remittances may provide an answer to this difference if there is evidence that they increase household consumption, inducing developing countries to further rely on consumption taxes.

This paper attempts to bridge the gap in the remittances and the taxation literature. I explore whether cross-country differences in taxation patterns can be explained by differential receipt of remittances and how governments make use of the inflow of remittances in collecting taxes. I use country-level data on remittances, consumption tax, customs, individual income tax, and payroll tax. I estimate the association using two-way fixed effects and instrumental variables to address possible measurement errors in remittances (Freund and Spatafora 2008). The instrumental variables exploit the strength of migration networks and the openness of borders, as they are relevant for remittances (Mayda et al. 2019). For categories of taxes where I find a nonzero statistical association with remittances, I check whether this is due to the implementation of efficient tax-collecting practices such as value-added taxes or a rise in household's expenditure related to that category(Keen and Lockwood

2010). Lastly, I explore whether the relationship between taxes and remittances is more evident in some groups of countries by regressing on a split sample of countries categorized by income levels.

I find evidence of a robust, and positive statistical association between tax revenues from goods and services (consumption tax) but not for other taxes. Two-way fixed effects results show that a 1 pp rise in the share of remittances in the economy is correlated with a 0.12 percentage point (pp) rise in the share of revenues from consumption taxes. IV estimates are larger, which report that the same rise in the share of remittances explains from 0.73 pp to 0.9 pp rise in tax revenues depending on the instruments used. For all other categories of taxes, the results are volatile and statistically indistinguishable from zero in most cases. Results are robust to including different controls and the qualitative implications of the results are still valid in a dynamic panel regression.

Furthermore, I find that the increases in consumption taxes are attributable to the increase in household expenditures and are driven by countries with lower incomes. The decomposition method based on Gelbach (2016) reveals that the positive statistical association found in consumption tax revenues is mostly due to the rise in household expenditures. There is no statistical association with the implementation of efficient mechanisms such as value-added taxes. Lastly, disaggregating the sample observations by income categorization of the World Bank reveals that this observation is much more profound in countries with lower income.

This paper builds upon the literature that highlights the impact of remittances on a country's macroeconomic performance. The existing works focus on three aspects - economic growth, financial development, and labor supply. The literature finds mixed evidence of the impact of remittance inflow on economic growth. Giuliano and Ruiz-Arranz (2009) argue that remittances can boost growth in countries even if they have underdeveloped financial systems. Rao and Hassan (2011) finds that remittances contribute indirectly to growth through the development of the financial sector while the direct effect is minimal. As for the development of the financial sector, various works in the literature generally agree that growth in remittance inflow builds up the financial sector in developing countries. Aggarwal et al. (2011) and Demirgüç-Kunt et al. (2011) measure the phenomenon through the increase of the activities of banks in the local level[1]. Acosta et al. (2009) and Finkelstein Shapiro and Mandelman (2016) finds that inflow of remittances shifts the allocation of labor supply away from

1. Aggarwal et al. (2011) finds that remittances are associated with increased amount of credit and deposit that local banks oversee. Demirgüç-Kunt et al. (2011) uses municipality-level data in Mexico and finds that remittances are correlated with a greater number of bank branches and bank accounts per capita.

certain sectors[2]. However, the impact of remittances on the government's fiscal policy that could have effects on the macroeconomic performance has been understudied.

This paper also contributes to the remittance literature focusing on households' spending patterns by studying how remittances affect tax collection through changes in the expenditure decisions of a household. Insights on how individuals make decisions on what to do with remittances are summarized in Yang (2011). Other existing works document that investment spending within households increases with the inflow of remittances. Adams and Cuecuecha (2010) shows that households spend less at the margin on key consumption goods but increase investment in housing and education as they receive more remittances, whether from domestic or international sources. Alcaraz et al. (2012) and Ambler et al. (2015) conclude that households spend more on education, school attendance of children rises, and child labor supply decreases with the inflow of remittances[3]. Some works identify that remittance receipt softens the impact of the sudden income loss caused by exogenous external shocks(Clarke and Wallsten 2003; Yang and Choi 2007)[4]. However, despite ample evidence that a household's decision on remittances changes its expenditure pattern, which can affect bases for different types of taxes, there is a limited number of works addressing the role of remittances in this context.

Lastly, this paper aims to bridge the remittances literature to the state capacity literature by identifying how remittances and tax collection decisions, which determine state capacity, interact. Previous works on the state capacity literature generally agree that more developed economies gather their tax revenues through income tax rather than those with narrow tax bases and regressive burdens such as consumption tax and import customs(Gordon and Li 2009; Besley and Persson 2013). Moreover, the size of tax revenues relative to the GDP is significantly lower for developing countries (Besley and Persson 2014b). Determinants in such disparities in tax collection include the existence of internal and external conflicts (Besley and Persson 2010, 2009), lack of a common-interest state (Besley et al. 2013), and low per capita income (Besley and Persson 2014a). While these works compare dif-

2. Acosta et al. (2009) finds that increase in flows of remittance leads to decreasing labor supply in the tradable sector and an increase in labor supply for the non-tradable sector. Finkelstein Shapiro and Mandelman (2016) shows that countercyclical inflow of remittances leads to a decrease in employment in the salaried sector.

3. Ambler et al. (2015) implements a randomized experiment that involves matching funds for educational remittances and finds that for every U.S. dollar of increase in the amount received by the beneficiaries, educational expenditures rise by $3.72. Alcaraz et al. (2012) utilizes a difference-in-difference strategy to identify that negative shock on remittance receipts leads to a rise in labor supply by children and a decrease in school attendance.

4. Both Clarke and Wallsten (2003) and Yang and Choi (2007) use external weather shocks - hurricane and rainfall - to show that remittance receipt partially offsets the loss of income.

ferent tax structures in different countries, some works analyze how countries transition to different tax systems over time. Jensen (2019) exploits the variation in the implementation of the programs aimed at transitioning the employment structure to find that income tax intake and tax base expand as a country develops. Keen and Lockwood (2010) studies the historical causes and consequences of the adoption of value-added taxation (VAT). These works highlight how government policy changes affect the intake of different types of taxes, not taking into account the role of households. This paper differs from these works by i) considering whether and how changes in household expenditure patterns can affect tax revenues and ii) identifying whether the government is taking advantage of such changes.

The rest of the paper will be organized in the following manner. In Section 2, I will introduce the conceptual framework that guides the empirical prediction. I explain the dataset and the empirical strategy I use in Section 3. The main results - fixed effects and the instrumental variables specification - are reported in Section 4. Section 5 includes a robustness test on the regression results. I discuss the possible mechanism behind the results and break down the results according to income categories in Section 6. Lastly, I summarize and conclude in Section 7.

2 Conceptual Framework

In this section, I lay out the conceptual framework that provides an idea of how remittance affects household decisions and how this affects choices of tax structure by the government. I provide a theoretical justification for the empirical prediction I make about the association between the remittance inflow and the choice of tax structure for the government.

The conceptual framework employed in this paper is based on that of Besley and Persson (2011, 2013). The key difference between the model in Besley and Persson (2011, 2013) and in this paper is that the framework I employ explicitly includes remittance as the income from working in a foreign country. In addition, households have choices on domestic and foreign goods that are taxed and priced differently.

The model includes households and the government. Households have two sources of income. They can receive wage w_s^D from working at the domestic market at time s, They can receive wage w_s^F from working overseas at time s. The amount of labor households can provide to each of the labor markets is L_s^D, L_s^F. Remittances will be represented by the income from working abroad, which

will be $w_s^F L_s^F$. There are exogenous forces that also determine the amount of remittances available - the strength of the migrant network at the foreign country N^F and how open the foreign country is when it comes to receiving workers not from their country, denoted as O^F. Households can choose to consume two types of goods. One of them is the domestic good x_s^D, priced at p_s^D. The other is the foreign good x_s^F, which has a price p_s^F. Both types of goods are assumed to be normal goods.

The government in this economy can choose to tax on consumption of domestic goods, consumption of foreign goods, and domestic labor income. The tax rate on each of these categories will be t_s^D, t_s^F, and t_s^L. The tax rates that governments can use to collect tax revenues will be the domestic consumption $Z_s^D = p_s^D x_s^D$, consumption of imported goods $Z_s^F = p_s^F x_s^F$ and labor income from domestic labor markets $Z_s^L = w_s^D L_s^D$. The assumption that I will make here is that domestic governments cannot claim taxes on a household's foreign labor income. I will also assume that the government spends all its tax revenue on public expenditures, denoted as E.

Similar to the approach of Besley and Persson (2011), I utilize the backward induction framework in laying out the choice of the government. There will be two time periods, so $s \in \{1, 2\}$. In each period, households and the government make the following decisions

Assumption 1 (Timeframe)**.** *Households and the government make the following decisions at each* $s \in \{1, 2\}$ *time period.*

1. *At* $s = 1$*, factors determining remittances (and the incoming foreign labor income) available at the beginning of* $s = 2$ *time period is known. The government then decides the tax rates that will be applied at* $s = 2$

2. *At* $s = 2$*, households choose consumptions* x_2^D, x_s^F *and labor supply* L_2^D, L_2^F *based on tax rates determined at* $s = 1$ *and prices at* $s = 2$*. Households take both as given.*

2.1 Defining the Optimization of the Household and Government

Households maximize utility characterized by

$$U(x_2^D, x_2^F, L_2^D, L_2^F) \tag{1}$$

where equation (1) satisfies $\frac{\partial U}{\partial x_s^j} > 0, \frac{\partial^2 U}{\partial (x_s^j)^2} \leq 0$ and $\frac{\partial U}{\partial L_s^j} < 0, \frac{\partial^2 U}{\partial (L_s^j)^2} \geq 0$ for $j \in \{D, F\}$. The households maximize utility against a budget constraint defined as

$$p_2^D x_2^D (1 + t_2^D) + p_2^F x_2^F (1 + t_2^F) \leq w_2^D L_2^D (1 - t_2^L) + w_2^F L_2^F \tag{2}$$

As for the choice of employment in the foreign labor market, it is affected by the factors exogenous to household decisions. Let N^F denote the strength of the migrant network present in a foreign country. This could be a network based on families, friends, or nationalities (Amuedo-Dorantes and Mundra 2007). Numerous empirical works, such as Munshi (2003) and Amuedo-Dorantes and Mundra (2007) and Patel and Vella (2013), find that migrant network has a positive effect on wages[5]. Another exogenous factor affecting labor supply decisions is how the foreign country accepts workers from abroad, captured by the O^F parameter. For instance, countries that have a nationalistic or right-wing government are less likely to accept foreign workers and thus have low O^F in the model (Acemoglu and Yared 2010; Nayyar 2000). Rise in N^F and O^F can increase wages offered at the foreign labor market w_2^F. Workers would be willing to accept working in foreign countries if w_2^F is sufficiently higher than w_2^D[6], so relative wages between the two labor markets affect labor supply decisions. Therefore, the relationship between exogenous factors and domestic/foreign labor supply can be summarized as

$$\begin{gathered} L_2^D = L_2^D \left(\frac{w_2^F}{w_2^D} \right), \; L_2^F = L_2^F \left(\frac{w_2^F}{w_2^D} \right) \\ \frac{\partial L_2^D}{\partial \left(\frac{w_2^F}{w_2^D} \right)} < 0, \; \frac{\partial L_2^F}{\partial \left(\frac{w_2^F}{w_2^D} \right)} > 0 \end{gathered} \tag{3}$$

where

$$\frac{\partial w_2^F}{\partial N^F} > 0, \; \frac{\partial w_2^F}{\partial O^F} > 0 \tag{4}$$

Households choose consumption and labor supply $x_2^D, x_2^F, L_2^D L_2^F$ to maximize utility (1) subject to

5. Patel and Vella (2013) cites two potential sources of the migrant network effect. One of them is that migrant networks serve as internal references for employers and that they help reduce searching and hiring costs. The other source is bargaining power. Specifically, if the network "comprises a sufficiently large share of the occupation", members can benefit through strengthened bargaining power against employers.

6. If $\epsilon > 0$ is a fixed cost of working at a foreign country, then workers will accept foreign jobs if $w_2^F L_2^F - \epsilon \geq w_2^D L_2^D$. In this context, ϵ can be transport costs, time spent on learning the new language, and searching for a network of immigrant workers.

the constraint (2). The resulting first order conditions can be written as below:

$$\frac{\partial U/\partial x_2^D}{p_2^D(1+t_2^D)} = \frac{\partial U/\partial x_2^F}{p_2^F(1+t_2^F)} = \frac{-\partial U/\partial L_2^D}{w_2^D(1-t_2^L)} = \frac{-\partial U/\partial L_2^F}{w_2^F} \tag{5}$$

For comparative statics, suppose that either N^F or O^F rises. This would increase the offer of w_2^F relative to w_2^D, which raises $\frac{w_2^F}{w_2^D}$. This shifts the employment of the household to a foreign country and increases its labor income. Hence, $-\frac{\partial U}{\partial L_2^D}$ falls, representing a decrease in L_2^D. For the first order conditions to be satisfied, both $\frac{\partial U}{\partial x_2^D}$ and $\frac{\partial U}{\partial x_2^F}$ must fall. This implies a rise in x_2^D and x_2^F. Assuming that households take prices and taxes as given, changes in the labor supply and consumption carry directly over to changes in Z_2^L, Z_2^D, and Z_2^F. Thus, I can claim as follows

Proposition 1 (Decrease in labor income tax base)**.** As N^F or O^F rises

1. w_2^F rises, which induces a rise in remittance inflow to a domestic country.
2. $\frac{dZ_2^D}{dw_2^F} > \frac{dZ_2^L}{dw_2^F}$ and $\frac{dZ_2^F}{dw_2^F} > \frac{dZ_2^L}{dw_2^F}$

In the previous setup, prices of foreign goods and domestic goods are treated as a constant. Now, suppose that the price of foreign goods responds to a rise in wages. The increased wages put upward pressure on p_2^F, so that

$$\frac{\partial p_2^F}{\partial w_2^F} > 0 \tag{6}$$

Meanwhile, since labor in the foreign country is not an input in producing domestic goods, p_2^D is unaffected. Therefore, the price of foreign goods rises relative to domestic goods.

If we return to equation (5) with this result, the comparative statics from the rise in N^F and O^F becomes different. The changes to relative wages between domestic and foreign labor markets remain the same. The implied changes to the employment at the domestic and foreign labor markets and the labor income thus are equivalent to the previous setup. However, there will be an increase of p_2^F as a result of rising w_2^F. This means that $\frac{\partial U}{\partial x_2^F}$ decreases less, or x_2^F rises less compared to the setup with constant price of foreign goods. In other words, households shift their consumption towards domestic goods x_2^D. Consequently, the rise in x_2^F will be less than that of x_2^D. While the tax base for the import tax Z_2^F can still rise if p_2^F rises sharply or x_2^F still rises sufficiently, [7], Z_2^F will not rise as

7. The rising labor income due to shifting labor supply to a foreign country, where wages are higher, opens the possibility that the total expenditure on foreign goods still rises.

much as it did for Proposition 1. As for the consumption of domestic goods, the changes in $\frac{\partial U}{\partial x_2^D}$ and $\frac{\partial U/\partial x_2^D}{p_2^D(1+t_2^D)}$ remains intact. Therefore, I claim as follows.

Proposition 2 (Changes in p_2^F and its impact to consumption tax bases)**.** Under the assumption that p_2^F is a function of w_2^F, then $\frac{dZ_2^D}{dw_2^F} > \frac{dZ_2^F}{dw_2^F}$ if reduced consumption of x_2^F, due to the shift in consumption towards x_2^D, dominates the effect of increase in p_2^F.

The government in this model takes tax revenues from expenditure on consumption goods, imported goods, and domestic labor income. Since they spend all their tax revenues on expenditure E, the government budget can be represented by

$$Z_2^D t_2^D + Z_2^F t_2^F + Z_2^L t_2^L \geq E \tag{7}$$

The goal of the government is to select t_2^D, t_2^F, t_2^L that satisfies the budget constraint in equation (7) while minimizing the deadweight loss incurred by taxation. I will discuss this with two types of setup. The first one would assume away cross elasticity between domestic and imported goods. The second approach would incorporate the cross elasticities between two types of consumption goods.

In the first setup, I follow the framework from Ramsey (1927). Assuming that there are no cross elasticities, I can characterize the government's problem of minimizing deadweight loss as follows:

$$\frac{1}{2} Z_2^D (-\eta_2^D)(t_2^D)^2 + \frac{1}{2} Z_2^F (-\eta_2^F)(t_2^F)^2 + \frac{1}{2} Z_2^L (\eta_2^L)(t_2^L)^2 \tag{8}$$

where η variables refer to elasticities. Specifically

$$\eta_2^D = -\frac{\partial x_2^D}{\partial p_2^D} \frac{p_2^D}{x_2^D},\ \eta_2^F = -\frac{\partial x_2^F}{\partial p_2^F} \frac{p_2^F}{x_2^F},\ \eta_2^L = \frac{\partial L_2^D}{\partial w_2^D} \frac{w_2^D}{L_2^D} \tag{9}$$

The elasticities can be written in terms of Z variables using the fact that $Z_2^j = p_2^j x_2^j$ for $j \in \{D, F\}$ and $Z_2^L = w_2^D L_2^D$. Rewriting equation (9) to include Z variables, the following can be obtained

$$\eta_2^D = 1 - \frac{\partial Z_2^D}{\partial p_2^D} \frac{1}{x_2^D},\ \eta_2^F = 1 - \frac{\partial Z_2^F}{\partial p_2^F} \frac{1}{x_2^F},\ \eta_2^L = -1 + \frac{\partial Z_2^L}{\partial w_2^D} \frac{1}{L_2^D} \tag{10}$$

Then, the government selects t_2^D, t_2^F, t_2^L that minimizes equation (8) subject to the government

budget constraint, equation (7). The resulting first order conditions are

$$\frac{t_2^D}{t_2^F} = \frac{\eta_2^F}{\eta_2^D}, \frac{t_2^D}{t_2^L} = \frac{-\eta_2^L}{\eta_2^D}, \frac{t_2^F}{t_2^L} = \frac{-\eta_2^L}{\eta_2^F} \tag{11}$$

which is consistent with the inverse elasticity rule of Ramsey (1927). Combining with the characterization of the elasticities in equation (10) and the two previous propositions, the following can be justified.

Proposition 3 (Choice of taxes)**.** A rise in N^F or O^F, which induces rise in w_2^F and changes to the Z variables in Proposition 1, then $-\eta_2^L$ rises. If prices are the function of wages of its labor, as in Proposition 2, then $\eta_2^F > \eta_2^D$. As a result, t_2^D rises unambiguously.

2.2 Empirical Implications of the Conceptual Framework

As the migrant network gains strength and foreign countries become more open, households are induced to supply more labor to the foreign markets relative to the domestic markets. Households who do so get higher combined labor income. However, the labor income tax base which the domestic government can utilize decreases. This leads to the reduced reliance on labor income tax for these governments (Proposition 1).

If the price of foreign goods responds to changes in foreign wages, a rise in w_2^F as a consequence of higher N^F or O^F induces higher p_2^F. This induces the households to spend less on imported goods than they would have without such changes in p_2^F. Therefore, the growth in Z_2^F could be offset by a rise in p_2^F. This countervailing force does not happen for domestic goods, and Z_2^D rises unambiguously. As such, the tax base for domestic goods expands compared to imported goods (Proposition 2).

The above changes in the tax bases affect how the government sets various tax rates. In particular, tax rates for consumption goods are expected to be higher than that of domestic labor income, according to Proposition 1. Proposition 2 guides whether the consumption tax base will increase further than that of imported goods. According to Proposition 3, goods for which the elasticity is lower are expected to be taxed at a higher rate. Computing the results of the comparative statics using Equation (10) implies that the elasticity of the domestic consumption good is unambiguously lower than before.

Combining all the implications from the propositions, I deduce Proposition 4, to be tested in Section 4.

Proposition 4 (Empirical Prediction)**.** As N^F or O^F rises, remittance inflow will increase. As a result

1. For countries that rely more on the inflow of remittances, they are more likely to collect taxes through domestic consumption.
2. Countries that rely more on the inflow of remittances would raise taxes through consumption taxes rather than income tax.
3. If the price of foreign goods responds to wages, then countries raise taxes through domestic consumption taxes rather than customs.

3 Data and Regression Strategy

3.1 Data

The data utilized for this research is primarily from the World Development Indicators (WDI) dataset of the World Bank unless stated otherwise. WDI contains an extensive amount of data related to share revenues from different categories of taxation and the share of inflow/outflow of remittances in GDP. In addition, I source the real GDP per capita, urban population, share of FDI inflow in GDP, and share of trade in GDP from the same dataset.

While variations of each of these variables at the country level across different years are observed, choices made by the individual migrant are not observed. As such, I intend to analyze the association between the share of remittances to the economy and the share of revenues from different tax categories at the country level. If a nonzero association is observed, I plan to identify whether the relation arises due to the government adopting efficient taxation practices, such as VAT (Keen and Lockwood 2010), or whether it is simply a product of households increasing expenditures serving as the base for such tax category.

For this research, I use the consumption tax, customs, income tax payable by individuals, and payroll, all of which are measured in terms of their shares relative to GDP throughout this paper.[8] The

8. In this paper, I use the terms 'tax' and 'shares of taxation relative to GDP' interchangeably.

source of this data is the Government Finance Statistics (GFS) from the International Monetary Fund[9]. Consumption taxation refers to general taxation of goods and services, which encompasses VAT and sales tax revenues, among others. Customs refer to taxes on imported goods and other relevant duties. I use the term individual income tax (Indiv. Income) in the tables to indicate taxes payable by individuals[10]. Payroll taxes are taxation on the labor force in general. The share of each category of taxation indicates what type of taxation that government relies on to collect its tax revenues, similar to the tax structures observed in Gordon and Li (2009)[11].

As a control variable, I include the real GDP per capita with the base year set at 2010. Similar to Aggarwal et al. (2011), I include the real GDP per capita in terms of levels and the log of real GDP per capita. The former proxies for the level of economic development in a given country. The latter represents the rate of economic growth. The primary rationale for including these variables as controls is that the level of economic development and tax structures are correlated. Gordon and Li (2009) identifies that developing countries rely heavily on consumption and import taxes. Similar arguments are made in Besley and Persson (2013).

The control variables also include the inflation rate, as defined in WDI. Inflation can distort the decision-making of economic agents by reducing consumption in favor of saving. This can affect the household expenditure for consumption.

I include the share of trade in GDP in the control variables as well. Trade in this definition consists of the sum of exports and imports. An increase in the reliance on trade, especially imports, can raise the tax base for customs even without remittances. In addition, trade also represents the openness of the economy and the economic development to some extent (Aggarwal et al. 2011).

The data on the share of remittances to GDP, which is the key independent variable of interest, is available from the year 1972 to 2018. Figure 1 captures the time series of the flow of remittances, FDI, and ODA since the 1990s. As identified by Yang (2011), the flow of remittances has constantly on the rise since the 1990s and surpassed ODA in terms of size in the late 1990s. Figure 1 shows the top ten remittance receivers in terms of amount and share of GDP. Relatively developed countries

9. While WDI also has data on tax revenues from various categories, GFS provides more disaggregated classification. Thus, I chose GFS over WDI for tax revenues.

10. Taxes payable by individuals may include taxes on non-labor income such as property income and pensions (International Monetary Fund 2014).

11. Ideally, it is best to use tax rates on each category directly in the regression. However, due to the lack of sufficient tax rate data from developing countries, I choose to use tax revenues to observe the choice of tax structures, as in Gordon and Li (2009)

such as India, China, France, and Germany are the top receivers of remittances measured in absolute amounts. If measured in terms of the share relative to GDP, countries classified as low-income or lower middle countries appear on the top 10, as observed by Aggarwal et al. (2011). Figure 2, which plots the time series trend of remittances share by 4 classifications of countries by income since 1992[12], confirms that low-income countries and lower middle-income countries are the primary receivers of remittances when measured by their share relative to GDP.

However, the share of remittances to GDP in the WDI definition only takes into account inflows of remittances through official channels such as banks and money-wiring services. It does not take into account informal methods such as *hawala*, *hundi* and *padala* (Yang 2011). These are operated by non-financial firms or brokers and are not captured by the official data. Thus, there is a potential attenuation bias due to the measurement error (Cameron and Trivedi 2005; Hansen 2020). As such, using an instrumental variable is necessary to address this issue.

The instrumental variable chosen in this study is the share of FDI inflows in GDP, at years t and $t-1$ and the measure of policies towards international migration at the country level. For the share of FDI inflows in GDP, many works in the immigration economics literature document significant association - some even causal - between migration flow and FDI inflow to the country of origin (Javorcik et al. 2011; Burchardi et al. 2019; Mayda et al. 2019; Docquier and Lodigiani 2010; Kugler et al. 2018). These works find that the primary mechanism that leads to the increase in the inflow of FDI to the country of origin is the reduction in information friction across borders through the augmentation of migrant networks. Given that official flows of remittances involve money-wiring service providers present in nations that host migrants and their origin countries (Yang 2011), flows of both FDI and remittances involve a network of migrants. Thus, FDI variables are expected to be relevant. Moreover, FDI measures flows of investment involving equity participation and ownership influence (World Bank 2017). As such, FDI itself is not expected to impact household expenditure decisions directly. Thus, the exclusivity condition for the instrumental variables is likely to be satisfied. In addition to the share of FDI at year $t-1$, I use the same share at year t to instrument for the share of remittance inflows to GDP at year $t-1$ in some specifications. The purpose of this is to capture the possibility that some migrants may decide how much remittances to send back home depending on the expectations of the economic performance and the strength of the network between the current

12. The year 1992 is chosen as the starting point as for some categories of countries, remittance data is not available in WDI for certain years before 1992. Starting from 1992, data for all countries are available consecutively.

country and the country of origin.

As for the immigration policy variable, I obtain relevant data from the World Population Policies, which is a report published since 1976 and up to 2015 by the United Nations Department of Economic and Social Affairs (UNDESA) Population Division[13]. The policies on migration in the host countries determine how many immigrants these countries will have and determine the strength of the migrant network. Moreover, the policy target takes into consideration the economic needs and goals of the host countries and not necessarily those of the origin countries. Therefore, relevancy and exclusivity conditions are likely to hold. In this research, I add up the number of countries that either raised or maintained their immigration target at year t and use this variable to instrument remittance inflows to origin countries in year $t-1$[14]. With the host countries expected to accept more immigrants, the number of foreign workers rises and so does the amount of remittances sent to the countries of origin[15]. Since this is defined per year, I am unable to control for year effects directly in the specification where I use this variable.

3.2 Empirical Strategy

The empirical strategy used in this research can be summarized with the following equation.

$$y_{i,t} = \alpha + \beta R_{i,t-1} + \gamma X_{i,t-1} + \delta_i + \phi_t + \epsilon_{i,t} \tag{11}$$

where $y_{i,t}$ is the dependent variable of interest - the share of consumption tax, customs, and payroll taxation in a recipient country's GDP. $R_{i,t-1}$ is the key control variable of interest, the share of remittances in year $t-1$ to recipient country i. $X_{i,t-1}$ is the collection of other control variables - GDP, log of GDP, inflation rate, and share of trade values in GDP at year $t-1$ for recipient country i. Note that all control variables have been lagged by one year to avoid reverse causality. α_i is the recipient country fixed effects and ϕ_t is the year fixed effect.

13. Aggarwal et al. (2011) also brings the immigration policy variable from the same source. However, Aggarwal et al. (2011) designates the value 1 to countries that seek to raise immigration targets, 0 to those who intend to maintain the target, and -1 to those wanting to cut the target. Thus, the way this dataset is used is different in this study.

14. The UNDESA reports the survey of countries from years 1976, 1986, 1996, 2001, 2003, 2005, 2007, 2009, 2011, 2013, and 2015. For all data in the inter-survey years, I extrapolate the earlier response up to the next time period for which a response exists.

15. The similar relation holds when including the immigration target variable at year $t-1$ to instrument remittances at year $t-1$. However, when the immigration policies of years t and $t-1$ are both included, the variable for the year $t-1$ becomes insignificant at the first stage regression. Thus, I primarily use the immigration policy variable from year $t-1$ as an instrumental variable.

In the above regression equation, the parameter of interest is β. Let β_j be the estimated β value for tax category j. Then, from Proposition 4, we are interested in checking for whether $\beta_{\text{consumption}} > 0$ and $\beta_{\text{consumption}} > \beta_{\text{customs}}$ and $\beta_{\text{consumption}} > \beta_{\text{payroll}}$. Given that δ_i and ϕ_t absorbs country-specific and year-specific variations, β captures association between $y_{i,t}$ and $R_{i,t-1i,t}$ at the within-country, within-year level. Therefore β estimates in the two-way fixed effects specification exploit variations of share of remittances within country i, while time-specific unobservable confounders are also abstracted out.

For the parameters to be identified, the share of revenues from different types of taxation should not affect the control variables. This could arise if I use control variables from the same year. For instance, if income tax revenue rises due to an increase in tax rates on income, individuals may choose to remit to country i less to reduce losses to disposable income at home. I address this problem by lagging the control variables by one year. Remittance decision at year $t-1$ is less likely to be affected by tax revenues at year t since the tax rates and tax revenues at year t are unknown in the previous year.

Other identifying assumptions are related to the structure of the dataset. Since I use panel data, this would allow me to address potential concerns related to unobserved country-specific and year-specific confounders. In addition, since I cannot observe responses at the individual level with this dataset, I need to make some assumptions related to how individuals choose which foreign countries to settle in. In particular, I assume that immigrants choose to move to countries where there is a strong network of previous immigrants sharing similar backgrounds[16]. This assumption also justifies the use of the share of FDI inflows to GDP as an instrumental variable.

The threat to identification arises from the fact that $R_{i,t-1}$ in the dataset only captures the inflow of remittances through an official channel. The unofficial inflow of remittances through methods such as *hawala* (Yang 2011) is not captured by the $R_{i,t-1}$ variable. In fact, Freund and Spatafora (2008) estimates that the range of informal remittances can be as low as 50 percent and as high as 250 percent of formal remittances. Such possibility may imply that β estimates without an instrumental variable could suffer from downward bias (Cameron and Trivedi 2005; Hansen 2020).

To address such concerns, I include an instrumental variable for $R_{i,t-1}$. Let $Z_{i,t-1}$ denote such

16. This relates to several papers on immigration decisions and the presence of migrant networks in host countries. Papers such as Abramitzky et al. (2014), Abramitzky and Boustan (2017), and Burchardi et al. (2019) and Mayda et al. (2019) all study the role of migrant networks in decisions on whether and where to migrate and how migrant activities impact their home countries.

instrumental variables, discussed in the previous subsection on the data. Then, I run the 2SLS regression whose first stage and the reduced form equations are

$$R_{i,t-1} = \alpha_0 + \beta_0 Z_{i,t-1} + \gamma_0 X_{i,t-1} + \delta_i + \phi_t + u_{i,t} \tag{12}$$

$$y_{i,t-1} = \alpha_1 + \beta_1 \widehat{R}_{i,t-1} + \gamma_1 X_{i,t-1} + \delta_i + \phi_t + e_{i,t} \tag{13}$$

where $\widehat{R}_{i,t-1}$ is the predicted value of share of remittances from equation (12). For all other variables, the notations are identical to those in equation (11). The parameter of interest is the β_1, which measures how $y_{i,t}$ changes in response to $R_{i,t-1}$. δ_i absorbs unobserved and time-invariant characteristics of country i, while δ_t captures unobserved year-specific shocks. Therefore, β_1 captures the association between $y_{i,t}$ and the predicted $R_{i,t-1}$ while using variations at the within-country and within-year level, as in equation (11). In this setup, β_1 estimate is expected to be higher than β estimates from equation (11) if the measurement error is present.

In some instrumental variable specifications, I also use an over-identified setup. To verify that the set of instrumental variables does not violate over-identifying assumptions, I present results of a Sargan-Hansen test for over-identifying restrictions (Hansen 2020). The null hypothesis of this test states that the over-identified set of instrumental variables is exogenous to the idiosyncratic error terms. In all over-identified specifications, the p-values for the Sargan-Hansen test are all greater than 0.1, implying that the null hypothesis is satisfied at the 10 percent significance level. In all instrumental variable specifications, I also cite the Kleibergen-Papp F statistics to check for possible weak instrumental variables (Kleibergen and Paap 2006). Most of the F statistics are higher than 20, implying that the presence of a weak instrumental variable problem is unlikely.

4 Key Results

4.1 Motivation: Observed partial correlation between remittances and taxes

To provide empirical motivation for the regressions in section 3, I plot the partial correlation between remittance shares and the ratio of various categories of tax revenues in Figure 3. The results in Figure 3 use the data from 2011 to 2018[17]. Both the shares of remittances and the tax revenues are

17. The relation is robust to the selection of the starting period, from 1972 to 2018. Due to presentation issues, I have selected to start from the year 2011.

measured relative to GDP per capita in constant terms. Observations with negative remittance shares imply that a given country in the given year is a net remittance sender. Observations classified in the positive remittance share region can be considered as net remittance receivers.

Figure 3 illustrates that remittance shares and consumption tax revenues (or taxes on goods and services) are positively correlated. Moreover, the observed slope is larger than all other categories of taxation. As for customs, income tax, and payroll tax, the slope is relatively flat. The slope for payroll taxes has the lowest value, while that for customs is slightly higher. Individual income tax seems to have a larger correlation between remittances than payroll tax and customs but is smaller than that of consumption tax.

This observation is largely consistent with the idea that less developed countries rely more on consumption taxes and less on income taxes, stated in Gordon and Li (2009) and Besley and Persson (2013) and Salanie (2011). The discussions made in Section 2, which states that countries with increasing remittances rely more on consumption taxes to exploit a rise in the size of the consumption tax base, are also relatable to the findings of Figure 3. Empirically, it can be expected that the correlation between the consumption tax and remittances will be positive and the largest among all taxation categories. As for the remaining categories, their correlations with remittance shares are not expected to be strongly positive. Given these preliminary results, I confirm the expectations set by Figure 3 with several regressions in the upcoming sections.

4.2 Fixed effects specification

Using countries in Figure 4, I report the estimates and the 95% confidence intervals of fixed effects regression with country and year fixed effects in Figure 5. The share of consumption tax, customs, income tax, and payroll tax relative to GDP are used as dependent variables. The level and log of GDP per capita, inflation, and share of trade in GDP are included as controls. As previously mentioned, all control variables are lagged by one year to avoid endogeneity concerns due to reverse causality. The standard errors are clustered at the recipient country levels.

The key result is that the share of remittances in year $t-1$ has a positive relation with the share of consumption tax in GDP at year t, as stated in the first column. Numerically, one percentage point rise in remittance shares is associated with a 0.12 percentage point (pp) rise in the ratio of consumption tax revenues to GDP. With the inclusion of both country and year fixed effects, this number im-

plies that within a given country and abstracting away year-specific events, a one percentage point rise in the share of remittances from the previous year explains a 0.12 percentage point rise in the share of revenues from consumption tax relative to GDP. This is consistent with Propositions 1 and 4 in Section 2, which state that governments are more likely to increase their reliance on consumption taxes as the inflow of remittances increases. Thus, these results point to the conclusions made in the discussion in Section 2, which states that countries relying more on remittances are more likely to rely on consumption tax than others.

For all other categories, on the other hand, the correlation is statistically zero at the 5% significance level. These results hint that even as shares of remittances rise, there may be countervailing forces that reduce the intake of tax revenues from these categories. From the discussion in Section 2, forces leading to a rise in remittances may induce households to provide less labor to domestic markets, which explains the lack of correlation between income tax and payroll tax shares. As for customs, it could be that the price of foreign goods may have risen due to a rise in w_2^F, discouraging households in home countries from consuming imported goods.

I run similar regressions with only one of the country fixed effects or year fixed effects. I first omit the year fixed effects. The results are qualitatively similar to the two-way fixed effects setup in the sense that only the share of consumption tax revenue in GDP has a statistically significant and positive correlation with the share of remittances at the 5% significance level. The point estimate and the standard error for consumption taxation are largely similar ($0.129(0.0596)$ vs. $0.124(0.0512)$). This result suggests that the baseline results are largely robust to excluding year effects.

I also run a similar regression without country fixed effects. Again, only consumption tax revenue shares are positively correlated to remittance shares at the 5% significance level. However, the point estimates for the association between remittances and consumption taxation changes. The point estimate is now 0.23, whereas the same for the two-way fix effect specification is 0.12. This suggests that half of the point estimates for consumption tax shares found in this setup are explained by the country-specific fixed effects and that this specification may overestimate the true correlation between remittance shares and consumption tax shares.

To summarize, the fixed regression results report that only the share of consumption tax relative to GDP has a statistically significant association with the share of remittances to GDP at year $t-1$. This result holds even in cases where either one of the country fixed effects or year fixed effects are excluded. Specifically, a 1 percentage point rise in remittance share is correlated with at least 0.12

percentage points when both fixed effects are included and up to 0.23 percentage points when only year effects are controlled for. For other categories of taxation, the correlation is statistically not different from 0 in the current specification. The results suggest that a higher share of remittances in the economy is associated with higher reliance on consumption taxation, but not with other categories.

However, one should be cautious not to naively interpret this result as a causal relation. While the current setup addresses endogeneity bias that could arise from reverse causality by lagging all control variables by one year, it does not fully address potential attenuation bias due to measurement errors in the remittance variable. Therefore, to get closer to a causal interpretation, I also look at regressions with the instrumental variables for the share of remittances variable. I report the results from various instrumental variables specifications in the next subsection.

4.3 Instrumental variables specification

I first run the IV specification by instrumenting the remittance share variable from year $t-1$ with the share of FDI inflow variable from year $t-1$. Appendix Table C1 reports the results from the first stage regression[18], while the 2SLS estimators and 95% confidence intervals are in Figure 6. The first stage results show that throughout all four regressions, the share of FDI inflows at year $t-1$ is positively correlated to the share of remittances at year $t-1$. The relevant F-statistics suggest that the instrumental variables are relevant and do not fall under the weak instrumental variable problem.

The second stage results for this specification still show that consumption tax shares are positively associated with the share of remittances, as in Figure 6. The coefficients are larger than what was identified in the fixed effects regression - where the coefficients varied from 0.124 to 0.227 in the fixed effects setup. In this setup, a 1 pp rise in the share of remittances is associated with the 0.915 pp rise in the share of consumption tax revenues relative to the GDP. Dependent variables related to income taxation - individual income tax and payroll tax - show zero statistical relation with the share of remittances. A deviation from the fixed effects regression occurs with the customs revenue, demonstrating a statistically significant negative association.

I also regress the IV specification by using the share of FDI inflow to GDP at year t as an instrumental variable for remittance share at year $t-1$. Using this variable as an instrument suggests that there may be a correlation between the share of remittances and the economic development and the

18. The variables in each of the four columns in Tables C1, C2, C3, and C4 are identical. Since the number of observations and countries differ by columns, I report all first stage results.

growth of the migrant network, as hinted in Section 3. The first stage results in Appendix Table C2 confirm that the share of FDI inflow at year t is positively correlated to the share of remittance inflow in all four specifications. The 2SLS results reported in Figure 6 are similar in terms of the coefficient values and statistical significance. The current set of excluded instruments is also sufficiently relevant to the endogenous variable, as identified by the F-statistics at the end of Appendix Table C2.

The third IV specification includes the share of FDI inflow to GDP at both years t and $t-1$ as instruments. The first stage results in Appendix Table C3 show that while the share of FDI inflow to GDP at year t is positively correlated to the share of remittance at year $t-1$, the FDI share for year $t-1$ has statistically zero correlation to the share of remittance at year $t-1$. This could explain why the F-statistics reported in Appendix Table C3 are lower than those in the first two instrumental variables specifications. However, the F-statistics are still larger than 20, suggesting that a weak instrumental variable problem is unlikely. In the second stage results in Figure 6, coefficients values and statistical significance of the share of remittances variable are similar to the two previous setups. In addition, none of the specifications reject the null hypothesis of the Sargan-Hansen overidentification test, which states that the overidentified set of excluded instrumental variables violates the exogeneity condition.

In the last IV specification, I include the share of FDI inflow to GDP at year t and immigration policy variable from year t to instrument remittance shares at year $t-1$. If both variables are statistically significant, this suggests that the predicted migration policy is also relevant in determining the flow of remittances. Indeed, the first stage results in Appendix Table C4 report that both of the excluded instrumental variables are statistically significant and positively correlated at the 1% significance level. This suggests that if the host countries are expected to either raise or keep their immigration targets, remittance inflows to the countries of origin rise. The F-statistics are all higher than 30 in this set of specifications, as observed in Appendix Table C4[19]. It can also be seen that for all tax categories except consumption tax, the associations between remittance shares and the ratio of the revenues from these taxes to GDP are statistically zero. As for the consumption tax, the association with remittance share is positive and statistically significant. In this setup, a 1 pp rise in remittance share in the economy is associated with a roughly 0.72 pp rise in the share of consumption tax to GDP. The null

19. Moreover, the p-values from the underidentification test, introduced by Kleibergen and Paap (2006), are all less than 0.05 in this setup. Given that the null hypothesis of this test is that the matrix of reduced form coefficients is less than the number of endogenous variables, the rejection of this test suggests that this matrix is full column rank and the model is identified. As such, the current IV specification is the favored setup.

hypothesis of the Sargan-Hansen test is not rejected in all four of the regressions, suggesting that the current set of overidentified instrumental variables does not violate the exogeneity condition.

Overall, the results in this subsection show that the positive association between consumption tax revenue shares and the ratio of remittance to GDP in the fixed effects regression is still observed even with the measures to correct for measurement error implemented. Individual income tax and payroll tax have statistically zero correlation with the share of remittances in all specifications. While customs tax has a negative association with remittances in the setup where only the combination of the share of FDI inflows is used as instrumental variables, the association becomes zero once the immigration policy variable is used. As for consumption taxes, the association is positive in all specifications. While the point estimates differ among the specifications, the confidence intervals almost entirely overlap among all four regressions. Thus, these results provide evidence that the association between the share of consumption tax to GDP at year t and the share of remittances in year $t-1$ is positive.

However, for the relation to be interpreted as causal, rather than correlation, the set of exogenous instrumental variables used should be able to sufficiently capture the measurement error in the remittance variable due to the unofficial flow of remittances. Since the known estimates of informal remittances range from 50 to 250 percent of the official remittance flows (Freund and Spatafora 2008) there may still be uncertainties about the share of remittance variable used in this subsection, which only captures official inflows. While the use of instrumental variables implies that the association documented here has more of a causal element compared to the fixed effects specification in the previous subsection, they may not have captured the measurement error fully. Thus, one should be cautious in interpreting the associations in the instrumental variable setup as fully causal.

5 Robustness Tests

5.1 Dynamic panel specification

One of the robustness tests on the main result that consumption taxation revenue, not others, is positively associated with the share of remittances is to include controls for the shares of tax revenues in the previous year. This comes from the standard practice in papers studying fiscal policies over time and the observation that fiscal policies and the related expenditures/revenues are persistent

over time (Shi and Svensson 2006; Brender and Drazen 2005; Potrafke 2011). If this is also true for the sample included in this study, the fixed effects estimate of the association between shares of remittances and shares of tax revenues may include omitted variable bias. To check for this, I include in the control variable the share of tax revenues from the previous year as a lagged dependent variable and run the dynamic panel regression introduced by Arellano and Bond (1991). The regression specification can be written as

$$\Delta y_{i,t} = \alpha + \rho \Delta y_{i,t-1} + \beta \Delta R_{i,t-1} + \gamma \Delta X_{i,t-1} + \phi_t + \Delta \epsilon_{i,t} \quad (14)$$

[20]

However, the inclusion of the lagged dependent variable causes the typical fixed effect regression estimates to be biased (Hansen 2020; Arellano and Bond 1991). As such, I run the regression using a GMM approach for dynamic panel data, as proposed by Arellano and Bond (1991). The GMM approach can control for the bias caused by the inclusion of the lagged dependent variables, as well as controlling for unobserved fixed effects.

I also run a second specification - bias-corrected least square dummy variables (LSDVC) approach - for the dynamic panel data based on the procedure suggested by Bruno (2005b, 2005a). It is known that typical dynamic panel data regression can suffer from bias in an unbalanced panel and the LSDVC approach has smaller bias and root mean squared error in such situations (Bruno 2005b). In the sample used in the study, the frequency of appearances of a country in the regression ranges from 1 to 40 observations, making the sample unbalanced. As such, I include the LSDVC results to check if the regression results differ drastically in a dynamic panel context.

The results are presented in Figure 7. The figure plots the coefficient and 95% confidence intervals from the regression results from equation (14). The coefficients for the share of remittances of year $t-1$ show different results by specification. Consumption tax and income tax are positively correlated with the share of remittances, with the degree of association being greater for the consumption tax. Customs are negatively correlated with the share of remittances, while payroll tax shows zero association. Key findings from the main result - a positive association between consumption tax and the share of remittances - can still be seen in this specification. The point estimate for the association between consumption tax and remittances does change as a result of including a lagged dependent variable in the set of controls - from 0.129 (the result from fixed effect regressions with year effects

20. Country fixed effects δ_i has been dropped as first-differencing the original specification removes δ_i, which is time-invariant.

only) to 0.043, suggesting that much of the correlation reported in the fixed effects setup could be explained by the relation between tax revenues in year t and year $t-1$.

The LSDVC results are also reported in Figure 7. For taxes other than the consumption tax, the statistical association becomes zero. As for consumption tax, it is still positively correlated and retains its statistical significance with the share of remittances. Compared with the similar results from the fixed effects setup, the point estimate changes to 0.076. This provides evidence that the results on the consumption taxes are robust even when the specification is run in a dynamic panel regression context.

5.2 Including controls for urbanization and share of agriculture in the GDP

As a second robustness test to the specification, I also include controls for urbanization. Studies on urbanization document a positive association between urbanization and economic development (Moomaw and Shatter 1996; Cadena et al. 2012; Glaeser and Gottlieb 2009). Moreover, urbanization variables indicate the number of individuals in a country living in a densely populated urban environment at a given year. Glaeser and Gottlieb (2009) points out that urban agglomeration can impact economic outcomes through higher wages, higher prices, housing supply, and consumption amenities. This suggests that the degree of urbanization can impact consumption expenditure, which affects tax revenues on consumption. Thus, including urbanization variables into the set of covariates would allow for a robustness test on the estimated association between remittances and share of revenues from consumption taxation. This setup would also permit a similar test on the association between remittances and tax revenues from other categories.

Specifically, I include the number of population living in urban areas in a given country in the level form and the logged form[21]. Similar to the GDP per capita variable, the population variable is intended to capture the degree of economic development.

In a similar spirit, I run a separate robustness test with the share of agriculture in GDP as a control variable. I use the data on the share of agriculture, forestry, and fishery in a country's GDP from the WDI dataset. This variable captures the idea that countries with a higher share of agriculture are generally less urbanized. In addition, since tax concession for the agricultural sector is commonplace (Avery et al. 2019), a higher share of agriculture can drive the tax revenues down. If such an

21. The data for urban population is also from the World Development Indicators.

effect does appear in the data, including this control can address omitted variable bias and raise the coefficients for remittance shares.

The results from the regression including urbanization variables are presented in Appendix Figure B1. Panel (a) reports fixed effects results. The results for the consumption taxation are qualitatively equal to the original setup in Section 3 in that in all cases, consumption tax has a positive association with the share of remittances.

Panel (b) of Appendix Figure B1 reports the results from the instrumental variables specifications. Each of the first stage results for the 2SLS regressions are reported in Appendix Tables C5, C6, C7, and C8, all of which show that the excluded instrumental variables satisfy the relevancy condition in a qualitatively similar way as in the instrumental variables specification in Section 3. The 2SLS results are also similar to the setup in Section 3. The association between consumption tax and share of remittances is statistically significant and positive throughout, whereas the same for income tax and payroll tax are statistically zero. The point estimate for the share of remittances in the regression with the consumption tax share as the dependent variable is largely similar between this setup and the one in Section 3. The results for the customs tax are qualitatively similar to those of Section 3 as well.

As for the agriculture variable, the results for all the fixed effects and the instrumental variables specifications are included in Appendix Figure B2. Throughout all these results, the coefficient for the share of agriculture is negative in many regressions and statistically significant at the 5% level in some setups. This confirms what Avery et al. (2019) finds and suggests that the coefficients in the remittance shares could be downward biased without agriculture controls. However, the conclusions on the relation between tax revenues and remittance share do not change. Panel (a) of Appendix Figure B2 reports that the positive association between remittances and the consumption share is preserved in the fixed effects setup while the same for other tax categories is zero. Panel (b) of Appendix Figure B2 shows that even in the instrumental variable specification, the coefficients are qualitatively similar to the IV specification in Section 3. The first stages are also significant and unlikely to display symptoms of weak instrumental variable problems, as reported in Appendix Tables C9 - C12.

From these results, it can be concluded that the key results in the instrumental variables specification part of Section 3 are robust to including urbanization - in terms of levels and log form. In particular, the statistical association between the share of consumption tax in the GDP at year t and

the ratio of remittance to GDP in year $t-1$ remains positive. As such, arguments made in Section 2 about what happens to the relation between the rise in remittance inflows and tax structures are still valid.

6 Discussion

6.1 Possible Mechanism for Consumption Taxation

For this section, I focus the discussion on the association between the consumption tax revenue and the share of remittances to GDP. The positive association between the tax revenues on consumption and the share of remittances can come from different sources in theory. One could be that governments are investing in fiscal capacities, similar to the idea suggested in Besley and Persson (2013), to make more use of the existing consumption tax base. This could be done through raising tax rates or implementing technically more efficient ways to collect taxes. The other is that irrespective of the tax rates or the innovation in tax-collecting mechanisms, households consume more in general and contribute to the expansion of the base for consumption tax.

While the lack of sufficient amount of data on tax rates prevents me from directly testing whether tax rates rise as a response to the increasing inflow of remittances, I can test whether an efficient tax-collecting mechanism is put in place. Specifically, I can check whether countries are gathering nonzero amounts of revenues from tools such as value-added tax (VAT), similar to Keen and Lockwood (2010). The introduction of VAT to the tax system is seen as an innovation for tax reform over the past five decades and helped countries increase tax revenues (Keen and Lockwood 2010). To check whether the implementation of VAT increases as a response to the inflow of remittances, I run what Keen and Lockwood (2010) calls the 'adoption equation' which has the following form in the context of this research:

$$\text{VAT}_{i,t} = \alpha_0 + \beta_0 R_{i,t-1} + \gamma_0 X_{i,t-1} + \delta_i + \phi_t + \epsilon_{i,t} \tag{15}$$

where $VAT_{i,t}$ is 1 for country i at year t if the revenue from VAT is nonzero and 0 if otherwise[22]. I test the adoption equation on the regression equation with GDP, log of GDP, inflation, share of

22. In the WDI dataset on the share of VAT revenues to the economy, 166 observations record 0 revenues. As for observations that do not report VAT revenue at all, I drop them in this exercise.

trade in GDP, and share of agriculture, forestry, and fishery in GDP as $X_{i,t-1}$ variable. Similar to the main equation, all the controls have been lagged by one period to avoid endogeneity concerns due to reverse causality. A positive estimate of β_0 implies that the implementation of VAT has a positive association with the rise in the inflow of remittances from the previous year. In this paper, I run this in a two-way fixed effects regression. However, running this regression in an instrumental variable regression does not change the conclusion qualitatively.

To test for the idea that consumption expenditure itself increases without regard to the implementation of higher tax rates or more efficient tax collection, I regression the same control variables in equation (15) on a dependent variable that captures the share of household consumption expenditure in a country's GDP. The regression takes the following form:

$$\text{consumption}_{i,t} = \alpha_1 + \beta_1 R_{i,t-1} + \gamma_1 X_{i,t-1} + \delta_i + \phi_t + \epsilon_{i,t} \tag{16}$$

$\text{consumption}_{i,t}$ indicates the share of consumption expenditure by households in country i at year t. The other variables are as same as those in equation (15). An association of the consumption expenditure with the rise in remittances is captured by the β_1 coefficient. Similar to equation (15), a two-way fixed effects regression result is reported in this paper. Running this on the IV specification used in this paper does not alter the results drastically.

Table 1 reports the regression results on equations (15) and (16). All standard errors are clustered at the recipient country level (country i). According to column (1), the statistical association between the implementation of VAT and the share of remittances is zero. On the other hand, column (2) documents that there is a positive and statistically significant association between the share of consumption expenditure of households and the share of remittances. Numerically a 1%p rise in remittance shares from year $t-1$ is correlated with a 0.406%p rise in the consumption expenditure by households at year t. This result suggests that the positive association between consumption tax revenues and the share of remittances is driven primarily by the increase in household consumption expenditure. The result is unlikely to be driven by the implementation of efficient tax collection practices such as VAT.

To complete the decomposition of the effects of the VAT and the rise in the share of consumption expenditure, I run separate auxiliary regressions proposed in Gelbach (2016) to numerically calculate the contributions of these variables. While it is possible to sequentially add VAT and consumption

expenditure share variables to the two-way fixed regression and track the changes in the share of remittances coefficient to measure the contribution of each of the added variables, it is a fallible method according to Gelbach (2016). Specifically, the exact numerical values and their numerical signs are sensitive to the order in which the covariates are included. Gelbach (2016) suggests a decomposition method that is robust to the order in which covariates are incorporated into the regression. I choose this method to numerically decompose the effects of implementing VAT and rising consumption expenditure shares on the association between remittance shares and consumption tax revenue.

The idea behind this decomposition is as follows. I run two regressions. One of them will be a 'base' equation where I regress without the two new covariates. X_1 is the vector of 1, share of remittances, GDP per capita in terms of levels and logs, inflation rate, the share of trade in GDP, the share of agriculture in GDP, and dummy variables for each year and country. In regression form, I can write

$$Y = X_1\beta_{1b} + \epsilon_{i,t} \tag{17}$$

The other regression will be a 'full' equation where I include $X_2 = [\text{VAT}_{t-1} \quad \text{consumption}_{t-1}]$ as a regressor. The equation can be written as

$$Y = X_1\beta_{1f} + X_2\beta_{2f} + \epsilon_{i,t} \tag{18}$$

Let $X = [X_1 \quad X_2]$ and β be the coefficient for X. The OLS estimator in the full equation would be $\hat{\beta} = (X'X)^{-1}X'Y$ and the estimator for the base equation would be $\hat{\beta}_{1b} = (X_1'X_1)^{-1}X_1'Y$. The probability limit of the OLS estimate for the base equation can be written as

$$\text{plim}\,\hat{\beta}_{1b} = \beta_{1f} + \text{plim}(X_1'X_1)^{-1}X_1'X_2\beta_{2f} \iff \beta_{1b} = \beta_{1f} + \Gamma\beta_{2f} \tag{19}$$

where Γ can be obtained by projecting X_2 onto the columns of X_1. Gelbach decomposition breaks down $\Gamma\beta_{2f}$ into different components on X_2 variables. Since X_2 has two columns, so does Γ - one for VAT and the other for consumption expenditure shares. As such, equation (19) can be written as

$$\beta_{1b} - \beta_{1f} = \Gamma^{\text{VAT}}\beta_{2f}^{\text{VAT}} + \Gamma^{\text{consumption}}\beta_{2f}^{\text{consumption}} \tag{20}$$

Equation (20) illustrates that one can break down the association between remittance shares and the

consumption tax revenue into the effect from VAT and that from rising consumption expenditures from the households[23].

The result of this decomposition is presented in Table 2. The coefficient column includes the calculations for the estimates of $\Gamma\beta_{2f}$ for VAT and consumption expenditure shares, and $\beta_{1b} - \beta_{1f}$ for the share of remittances. The coefficient for the share of the remittances changes from 0.1534 in the base equation to 0.1169 in the full equation. As such, the difference in the estimates of the remittance coefficients is 0.0365. The estimated values of $\Gamma\beta_{2f}$ for VAT and consumption expenditure shares are -0.0074 and 0.0439, respectively. This suggests that the rise in consumption explains roughly 120% of the change in tax revenues due to the inflow of remittances, while VAT reduces the change by roughly 20%. Given that the estimates for the VAT have relatively large standard errors, changes in tax revenues from consumption tax are mostly due to the rise in share consumption expenditure by the households in GDP. This result shows further support for the regression results of (15) and (16) in Table 1 in that it is the consumption expenditure that responds the more relative to the implementation of the VAT.

The exercises conducted in this section attempt to identify the source of the statistical association between the rise in the inflow of remittances and the corresponding changes to consumption tax revenues. The results of the adoption equation (Keen and Lockwood 2010) in regression (15) show that implementation of VAT and consumption expenditure have statistically zero association. However, regressing shares of consumption expenditure onto the set of controls, as in equation (16) shows that the association between household expenditure and inflow of remittances is positive. The estimated correlation is larger than the estimated association between remittances and tax revenue reported in Figure 5. Finally, the decomposition method from Gelbach (2016) demonstrates that the effect of a rise in consumption expenditure is greater than the degree of change observed in consumption tax revenues, while the effect of VAT moves slightly in the opposite direction. This suggests that the governments are not sufficiently responding to the rise of the consumption tax base by implementing efficient tax-collection mechanisms such as VAT.

However, this conclusion is not yet absolute. One possibility is that the government could be responding by raising tax rates on consumption, without implementing VAT. Other potential sources of a statistical association between remittances and consumption tax shares could be a different tax-

23. The procedures for finding the standard errors for each of the $\Gamma\beta_{2f}$ elements are reported in Appendix B of Gelbach (2016).

collecting mechanism, such as electronic accounting mentioned in Pomeranz (2015), or an increase in the amount of third-party information, as in Naritomi (2019). Further analysis of this issue requires a relevant dataset on the tax practices and tax systems of different countries. This could be studied as part of future research.

6.2 Regression by subgroups: Are the associations between tax revenues and remittances different?

To identify whether the association between tax revenues and remittances appears differently depending on the wealth of the country, I run the regression for each category of income classification set by the World Bank. I run the regression for high-income countries and middle-income countries separately. I further disaggregate middle-income countries to lower-middle-income countries and upper-middle-income countries[24]. Lastly, I regress on the subsample of OECD member nations. The specification that will be used for this exercise is the IV regression with FDI inflow share at year t and immigration policy variable at year t. Since I use the real GDP, in constant 2010 U.S. dollar terms, I use the categorization from the year 2011 which uses the 2010 GDP to categorize countries by income[25]. The countries included in this exercise and their income levels are reported in Appendix Figure B3.

I first disaggregate my sample into high-income countries, whose GDP per capita is higher than $12,275, and middle-income countries with GDP per capita between $1,005 and $12,275. The estimators and 95% confidence intervals are reported in Figure 8, with Appendix Tables C13 and C14 including first stage results. There are two notable features in the results. One is that in the first stage regressions, different instrument variables are relevant. Specifically, in Appendix Table C13, only the immigration policy target variable is relevant and not the share of FDI inflows for the sample of middle-income countries. On the contrary, Appendix Table C14 shows that only the share of the FDI inflow variable is relevant for high-income countries.

I interpret this result as follows. When most developed countries devise their migration policies, they do not seek to discourage the migration of high-skilled workers or individuals from other developed countries. However, the inflow of low-skilled immigrants, who are mostly from developing countries, is usually controlled (Bansak et al. 2015). As such, whether the potential destination

24. Low-income countries are not included in this section as there are fewer than 30 observations that belong in this categorization.

25. The results are robust to using the more recent World Bank classification such as the ones used in 2018.

countries are willing to accept more or less migrants matters to the migrants coming from poorer countries. As for wealthier countries, immigration policies matter less in their decision. However, the strength of the migrant network in place, proxied by the FDI inflow variable, may still affect their decisions. Therefore, for high-income countries, the share of FDI inflow becomes more relevant than the immigration policies of potential host nations.

The second noteworthy result of this exercise is related to the different point estimates of the remittance share variable. Comparing the results of the coefficients on remittance shares in Figure 8, the result for the middle-income countries is higher than that for the high-income countries, at least for the regressions where there exists at least one relevant instrument variable. For middle-income countries, the coefficient values are between 1.56 and 1.71. For the high-income countries, the coefficient values range from 0.46 to 0.58. This result is consistent with the observations made in Gordon and Li (2009) and Besley and Persson (2013) and Salanie (2011) in that countries with lower income rely more on consumption taxation.

I further disaggregate the middle-income country sample into the lower-middle-income countries and upper-middle-income countries, separated by the GDP per capita cutoff of $3,075[26]. For the lower-middle-income countries, as observed in Appendix Figure B4 and Appendix Tables C15 and C16, the immigration policy variable is a relevant instrument. In addition, the association between consumption tax and the remittances is positive. As for the upper-middle-income countries, the point estimate of the coefficient on remittance share is higher, as seen in Appendix Figure B4. However, the estimate is calculated with a large standard error and is statistically significant only at the 10% level. Moreover, all specifications show signs of weak instrumental variables and no excluded instruments are relevant at the 5% level, documented in Table C16. Thus, the results on the upper-middle-income countries should be interpreted with caution. As with other specifications, the statistical association between remittance shares and tax revenues from other sources is zero.

As for the high-income country sample, I select countries that are members of the OECD and run the same regression on this subgroup. For this group of countries, the average GDP per capita is

26. In the regression tables, the number of upper-middle-income countries and the lower-middle-countries do not exactly add up to the number of middle-income countries. This is due to the STATA package, `reghdfe`, used in the regression. Specifically, when a country progresses from a lower-middle to an upper-middle-income country, it could be the case that the observation from that country has a single observation as a lower-middle-income country but has multiple observations as an upper-middle-income country (and vice versa). Correia (2015) reports that singleton observations in fixed effects regression with a cluster-robust standard error setting could lead to exaggeration of statistical significance. As such, the `reghdfe` package drops these singleton observations.

$30,087[27]. The regression results are reported in C17 and Appendix Figure B5. The first stage results in Table C17 show that only the share of the FDI inflow variable is relevant, with a negative association with the share of remittances. 2SLS results presented in Appendix Figure B5, with consumption tax revenues as the dependent variable, report that the association between consumption taxation and remittances is statistically zero. It can be seen that the statistical association between remittances and tax revenues of all other taxation is zero as well.

This may be because the value and the variation of shares of remittances for this sample of countries are low in general. Out of the 752 observations used in the regression, only 12% of these had a share of remittances higher than 2 percent. The average share of remittances for the 752 observations used is 0.77 percent of GDP. Thus, this result reflects the fact that remittances do not take up a significant part of high-income economies (World Bank 2019) and that they do not impact economic activity as much compared to lower-income countries.

Throughout this exercise, one of the notable trends in the data is that poorer countries show a higher association between consumption tax revenues and the share of remittances in their GDP. One of the factors that could be driving this result is that the share of the remittances received by the economy is drastically less for the wealthier countries, as observed in Figure 2. On the other hand, the countries with the highest ratio of remittances to GDP, according to Figure 1, are relatively less wealthy. This implies that countries with lower incomes rely more on remittances. Therefore, the economic impact of remittances would be greater in countries with less wealth.

Another interesting result of this exercise is that for different sets of countries, different instrument variables are relevant. For countries with lower income, the number of countries that intend to either raise or maintain their immigration target was more relevant in explaining the share of remittances to the country of origin. There is cross-country evidence that shows that immigrants who originate in countries with high-income inequality - including low-income or middle-income countries - are relatively less skilled (Borjas 2014; Roy 1951). Moreover, many developed countries favor skilled immigrants by providing more advantages to those individuals in the point-based immigration system (Bansak et al. 2015). Thus, immigrants from these countries, especially those who are relatively less skilled, could be sensitive to the migration policies when it comes to migrating to destination countries, which determines the flow of remittances.

27. I conducted two separate exercises where I regress only on countries whose GDP per capita is higher than $20,000 and $25,000. The results are similar to regressing just on the OECD sample.

For countries with relatively higher incomes, the relevancy between the immigration target variable and the remittance inflow breaks down. Instead, the share of FDI satisfies the relevancy condition. Cross-country evidence from Borjas (2014) shows that positive correlation between per capita income of the country of origin and the immigrant earnings. One possible interpretation provided by Borjas (2014) is that immigrants from high-income countries can easily transfer their skills across different labor markets. So the changes in immigration policy, which favors high-skilled migrants, affect them less. The strength of the existing migrant network, captured by the share of the FDI inflow variable, can still determine their migration decisions and thus the flow of remittances. Thus, different excluded instrumental variables are relevant for different groups of countries.

7 Conclusion

Although remittances have steadily risen over the last few decades and taken up significant portions of low-income and lower-middle-income countries' GDP, their role in the government's fiscal activity has attracted little attention. I fill the gap by finding an association between the inflow of remittances and revenues of various taxes. I find a positive and statistically significant association between consumption taxes and the inflow of remittances across fixed effects specifications and instrumental variables setups. For other types of taxes, the association is negligible. The findings are robust to tests for omitted variable bias and dynamic panel setups. Furthermore, the results are driven by countries in the lower income bracket.

The results are consistent with those in Gordon and Li (2009), Salanie (2011), and Besley and Persson (2013), in that countries that are less developed and lack state capacity rely on taxes that are easy to enforce such as consumption taxes. The relationship between remittances and tax collection is nonexistent in high-income countries. For countries with lower incomes, the relationship is more evident. Furthermore, various decomposition exercises show that the results are driven by increasing household consumption rather than the implementation of efficient tax collection practices. This suggests that countries with lower income do not necessarily respond to increasing remittances by enhancing their state capacity through efficient tax collection. Thus, the increase in the inflow of income does not lead to a better capacity to collect taxes.

This work answers some questions on the role of remittances in the state's fiscal activity using tax collection to represent state capacity. Countries with higher remittance inflows are relying more on

consumption tax revenues, which is generated by the increase in household expenditure rather than the implementation of efficient tax practices. Given that such taxation is less progressive than income taxation, there may be negative implications for redistribution (Gordon and Li 2009). Further studies using disaggregated wealth, income, and expenditure data could uncover the distributional effect of the inflow of remittances through tax collection. The results presented here can serve as a starting point for future works exploring the implication of the inflow of remittances to the distribution of income in countries of origin for migrants.

References

Abramitzky, Ran, and Leah Boustan. 2017. "Immigration in American Economic History." *Journal of Economic Literature* 55 (4): 1311–1345.

Abramitzky, Ran, Leah Platt Boustan, and Katherine Eriksson. 2014. "A nation of immigrants: Assimilation and economic outcomes in the age of mass migration." *Journal of Political Economy* 122 (3): 467–506.

Acemoglu, Daron, and Pierre Yared. 2010. "Political limits to globalization." *American Economic Review: Papers and Proceedings* 100 (2): 83–88.

Acosta, Pablo A., Emmanuel K.K. Lartey, and Federico S. Mandelman. 2009. "Remittances and the Dutch disease." *Journal of International Economics* 79 (1): 102–116.

Adams, Richard H., and Alfredo Cuecuecha. 2010. "Remittances, household expenditure and investment in guatemala." *World Development* 38 (11): 1626–1641.

Aggarwal, Reena, Asli Demirgüç-Kunt, and Maria Soledad Martínez Pería. 2011. "Do remittances promote financial development?" *Journal of Development Economics* 96 (2): 255–264.

Alcaraz, Carlo, Daniel Chiquiar, and Alejandrina Salcedo. 2012. "Remittances, schooling, and child labor in Mexico." *Journal of Development Economics* 97 (1): 156–165.

Ambler, Kate, Diego Aycinena, and Dean Yang. 2015. "Channeling remittances to education: A field experiment among migrants from El Salvador." *American Economic Journal: Applied Economics* 7 (2): 207–232.

Amuedo-Dorantes, Catalina, and Kusum Mundra. 2007. "Social Networks and Their Impact on the Earnings of Mexican Migrants." *Demography* 44 (4): 849–863.

Arellano, Manuel, and Stephen Bond. 1991. "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations." *The Review of Economic Studies* 58 (2): 277.

Avery, Elena, Katherine Baldwin, and Catherine Moreddu. 2019. *Taxation in Agriculture.* Technical report. Organization for Economic Co-operation and Development, Committee for Agriculture.

Bansak, Cynthia, Nicole B. Simpson, and Madeline Zavodny. 2015. *The Economics of Migration.* New York, NY: Routledge.

Besley, Timothy, Ethan Ilzetzki, and Torsten Persson. 2013. "Weak states and steady states: The dynamics of fiscal capacity." *American Economic Journal: Macroeconomics* 5 (4): 205–235.

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

———. 2010. "State Capacity, Conflict, and Development." *Econometrica* 78 (1): 1–34.

———. 2011. *Pillars of prosperity: The political economics of development clusters.* Princeton, NJ: Princeton University Press.

———. 2013. "Taxation and Development." In *Handbook of Public Economics,* edited by **Alan J. Auerbach, Raj Chetty, Martin Feldstein, and Emmanuel Saez,** 5:51–110. Elsevier B.V.

———. 2014a. "The Causes and Consequences of Development Clusters: State Capacity, Peace, and Income." *Annual Review of Economics* 6 (1): 927–949.

———. 2014b. "Why do developing countries tax so little?" *Journal of Economic Perspectives* 28 (4): 99–120.

Borjas, George J. 2014. *Immigration Economics.* Cambridge, MA: Harvard University Press.

Brender, Adi, and Allan Drazen. 2005. "Political budget cycles in new versus established democracies." *Journal of Monetary Economics* 52 (7): 1271–1295.

Bruno, Giovanni S.F. 2005a. "Approximating the bias of the LSDV estimator for dynamic unbalanced panel data models." *Economics Letters* 87 (3): 361–366.

———. 2005b. "Estimation and inference in dynamic unbalanced panel-data models with a small number of individuals." *Stata Journal* 5 (4): 473–500.

Burchardi, Konrad B., Thomas Chaney, and Tarek A. Hassan. 2019. "Migrants, ancestors, and foreign investments." *Review of Economic Studies* 86 (4): 1448–1486.

Cadena, Andres, Richard Dobbs, and Jaana Remes. 2012. "The Growing Power of Cities." *Journal of International Affairs* 65 (2): 1–17.

Cameron, A. Colin, and Pravin K. Trivedi. 2005. *Microeconometrics: Methods and Applications.* Cambridge, UK: Cambridge University Press.

Clarke, George R. G., and Scott J. Wallsten. 2003. "Do Remittances Act Like Insurance? Evidence From a Natural Disaster in Jamaica."

Correia, Sergio. 2015. *Singletons, Cluster-Robust Standard Errors and Fixed Effects: A Bad Mix.* Technical report, Technical Notes. Technical Notes, Duke University.

Demirgüç-Kunt, Asli, Ernesto López Córdova, María Soledad Martínez Pería, and Christopher Woodruff. 2011. "Remittances and banking sector breadth and depth: Evidence from Mexico." *Journal of Development Economics* 95 (2): 229–241.

Docquier, Frédéric, and Elisabetta Lodigiani. 2010. "Skilled Migration and Business Networks." *Open Economies Review* 21 (4): 565–588.

Finkelstein Shapiro, Alan, and Federico S. Mandelman. 2016. "Remittances, entrepreneurship, and employment dynamics over the business cycle." *Journal of International Economics* 103:184–199.

Freund, Caroline, and Nikola Spatafora. 2008. "Remittances, transaction costs, and informality." *Journal of Development Economics* 86 (2): 356–366.

Gelbach, Jonah B. 2016. "When do covariates matter? And which ones, and how much?" *Journal of Labor Economics* 34 (2): 509–543.

Giuliano, Paola, and Marta Ruiz-Arranz. 2009. "Remittances, financial development, and growth." *Journal of Development Economics* 90 (1): 144–152.

Glaeser, Edward L., and Joshua D. Gottlieb. 2009. "The wealth of cities: Agglomeration economies and spatial equilibrium in the United States." *Journal of Economic Literature* 47 (4): 983–1028.

Gordon, Roger, and Wei Li. 2009. "Tax structures in developing countries: Many puzzles and a possible explanation." *Journal of Public Economics* 93 (7-8): 855–866.

Hansen, Bruce E. 2020. *Econometrics.* Unpublished Manuscript.

International Monetary Fund. 2014. *Government Finance Statistics Manual 2014.* Technical report. Washington DC: International Monetary Fund.

Javorcik, Beata S., Çağlar Özden, Mariana Spatareanu, and Cristina Neagu. 2011. "Migrant networks and foreign direct investment." *Journal of Development Economics* 94 (2): 231–241.

Jensen, Anders. 2019. "Employment Structure and the Rise of the Modern Tax System."

Keen, Michael, and Ben Lockwood. 2010. "The value added tax: Its causes and consequences." *Journal of Development Economics* 92 (2): 138–151.

Kleibergen, Frank, and Richard Paap. 2006. "Generalized reduced rank tests using the singular value decomposition." *Journal of Econometrics* 133 (1): 97–126.

Kugler, Maurice, Oren Levintal, and Hillel Rapoport. 2018. "Migration and cross-border financial flows." *World Bank Economic Review* 32 (1): 148–162.

Mayda, Anna-Maria, Han Pham, Christopher Parsons, and Pierre-Louis Vézina. 2019. "Refugees and Foreign Direct Investment: Quasi-Experimental Evidence from U.S. Resettlements."

Moomaw, Ronald L, and Ali M Shatter. 1996. "Urbanization and Development: A Bias towards Large Cities?" *Journal of Urban Economics* 40 (1): 13–37.

Munshi, Kaivan. 2003. "Networks in the Modern Economy : Mexican Migrants in the U. S. Labor Market." *Quarterly Journal of Economics* 118 (2): 549–599.

Naritomi, Joana. 2019. "Consumers as tax auditors." *American Economic Review* 109 (9): 3031–3072.

Nayyar, Deepak. 2000. "Cross-border Movements of People."

Patel, Krishna, and Francis Vella. 2013. "Immigrant Networks and Their Implications for Occupational Choice and Wages." *Review of Economics and Statistics* 95 (4): 1249–1277.

Pomeranz, Dina. 2015. "No taxation without information: Deterrence and self-enforcement in the value added tax." *American Economic Review* 105 (8): 2539–2569.

Potrafke, Niklas. 2011. "Does government ideology influence budget composition? Empirical evidence from OECD countries." *Economics of Governance* 12 (2): 101–134.

Ramsey, F. P. 1927. "A Contribution to the Theory of Taxation." *The Economic Journal* 37 (145): 47–61.

Rao, B. Bhaskara, and Gazi Mainul Hassan. 2011. "A panel data analysis of the growth effects of remittances." *Economic Modelling* 28 (1-2): 701–709.

Roy, A. D. 1951. "Some Thoughts on the Distribution of Earnings." *Oxford Economic Papers* 3 (2): 135–146.

Salanie, Bernard. 2011. *The Economics of Taxation.* Cambridge, MA: The MIT Press.

Shi, Min, and Jakob Svensson. 2006. "Political budget cycles: Do they differ across countries and why?" *Journal of Public Economics* 90 (8-9): 1367–1389.

World Bank. 2017. *World Development Indicators 2017.* World Bank Group.

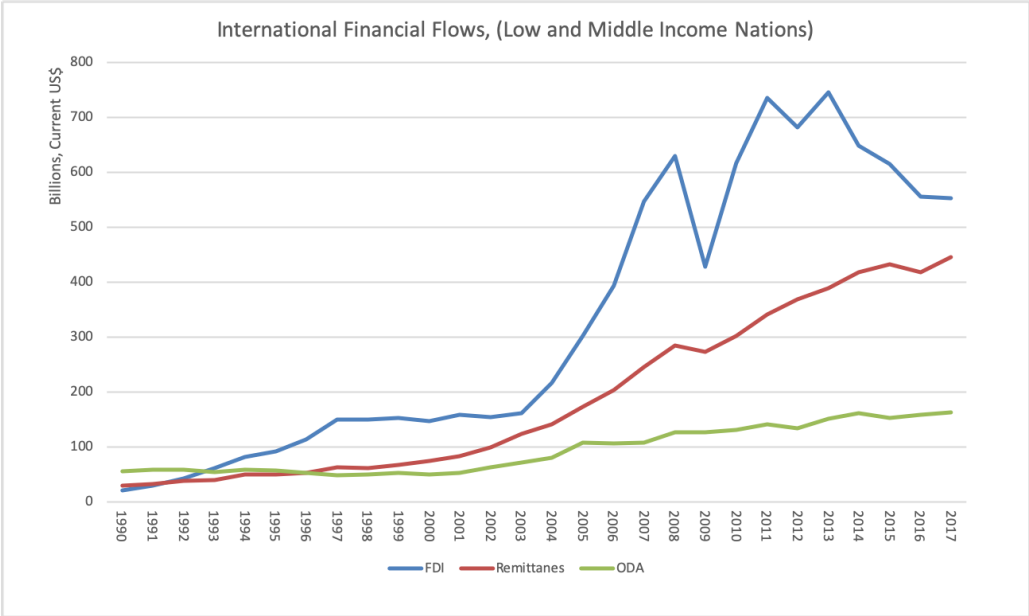
———. 2019. *Migration and Movement: Recent Developments and Outlook.* Technical report 31. Washington DC: World Bank.

Yang, Dean. 2011. "Migrant Remittances Outflows." *Journal of Economic Perspectives* 25 (3): 129–152.

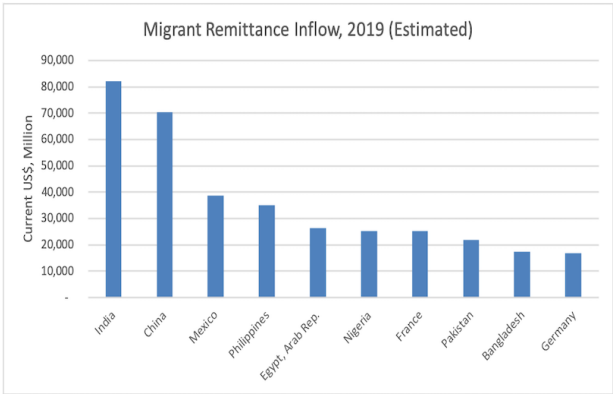
Yang, Dean, and Hwa Jung Choi. 2007. "Are remittances insurance? Evidence from rainfall shocks in the Philippines." *The World Bank Economic Review* 21 (2): 219–248.

Figures

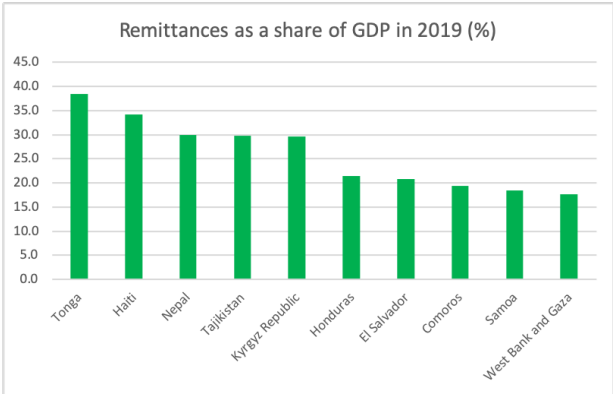
Figure 1: Reliance on remittances



(a) Remittances vs. Foreign Direct Investment vs. Official Development Assistance



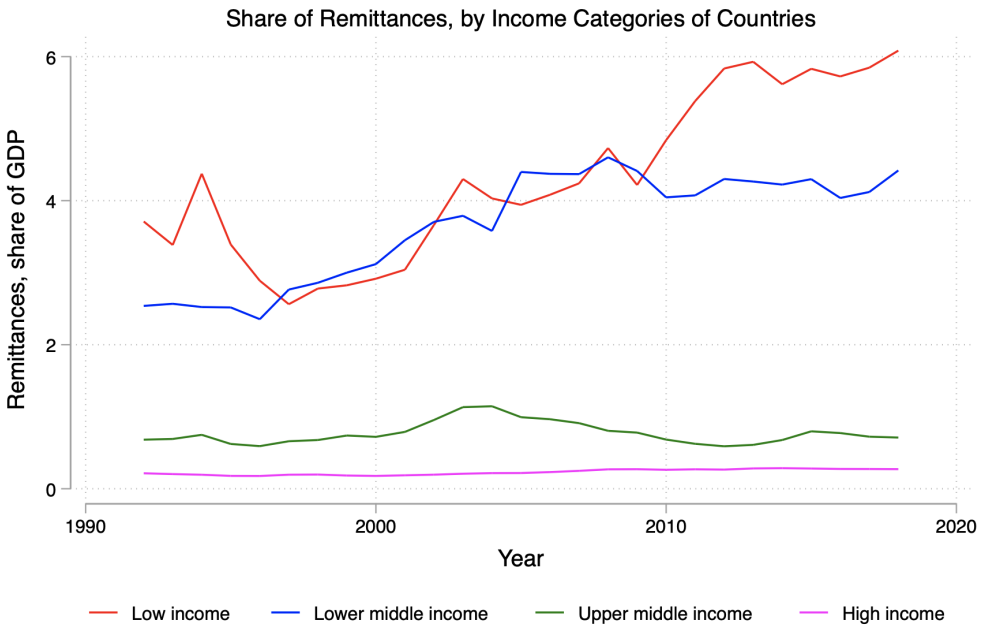
(b) Remittance Rankings by Amount



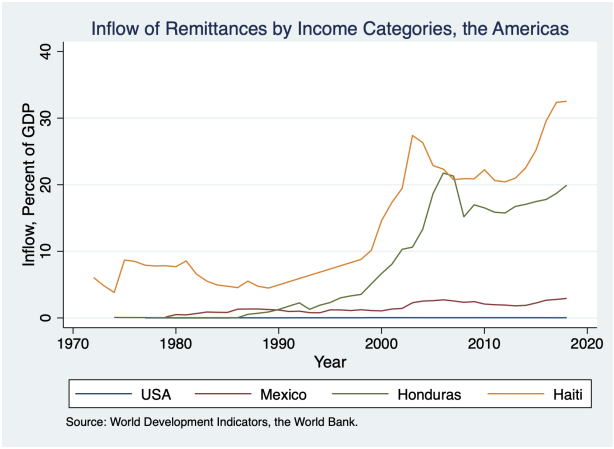
(c) Remittance Rankings by GDP Share

Source: World Bank (2019), World Development Indicators and from World Bank Migration and Remittances Data

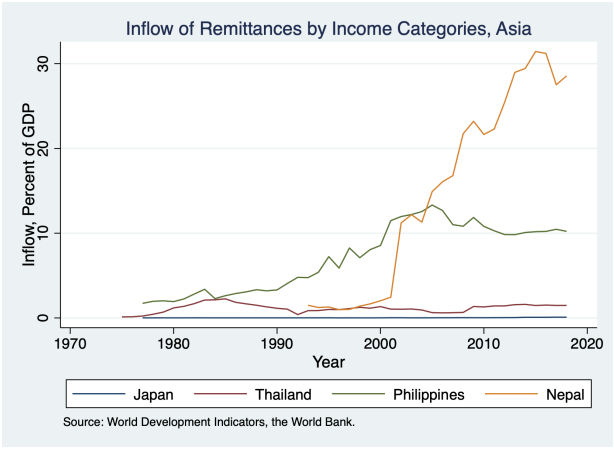
Figure 2: Share of Remittance Inflows



(a) By income levels



(b) Share by country, Americas



(c) Share by country, Asia

Note: Countries that appear in the legend are in the order of high-income country, upper middle-income country, lower middle-income country, and low-income country according to the World Bank classification. (Source: World Development Indicators, the World Bank)

Figure 3: Correlation between remittances and different tax categories

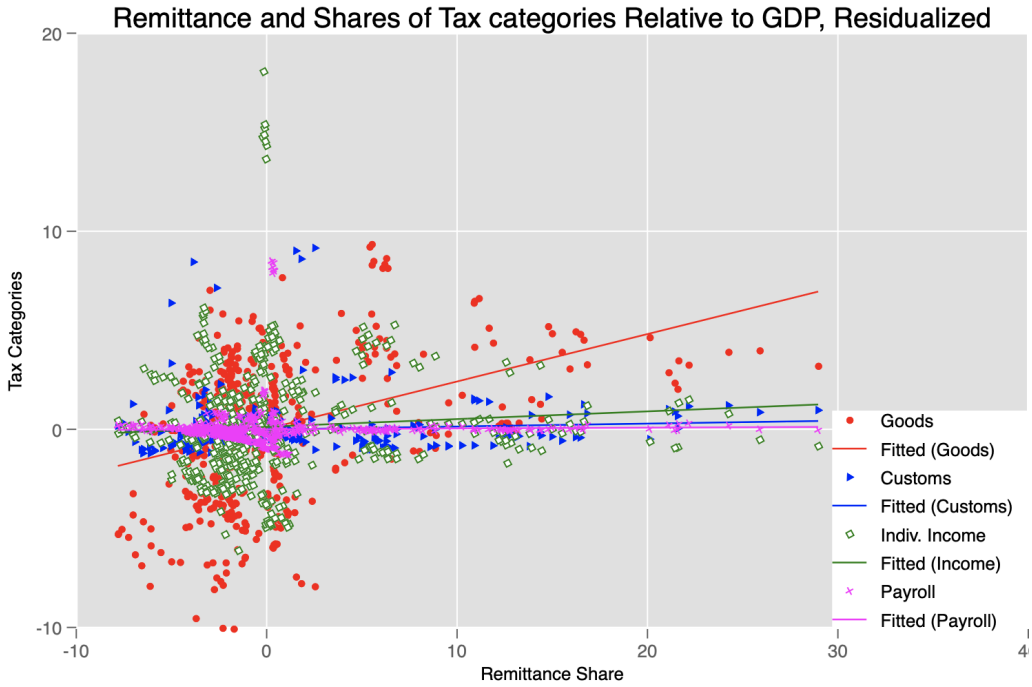
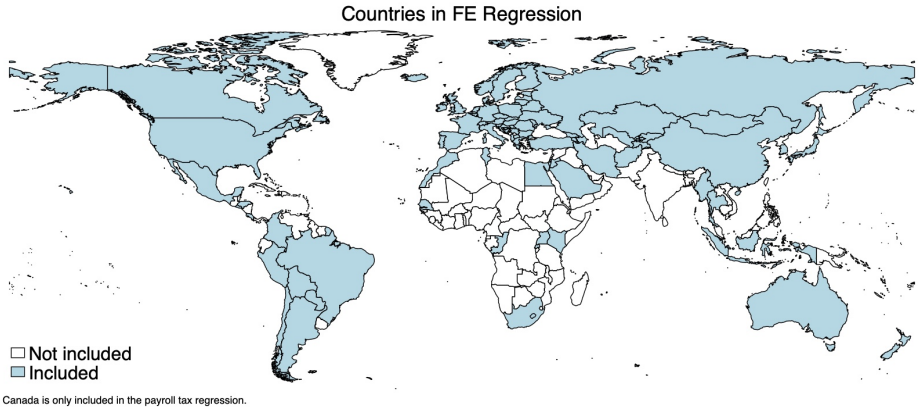
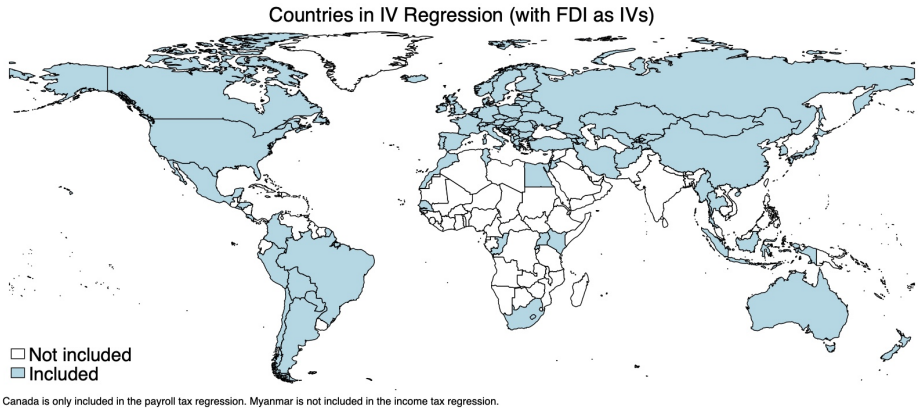


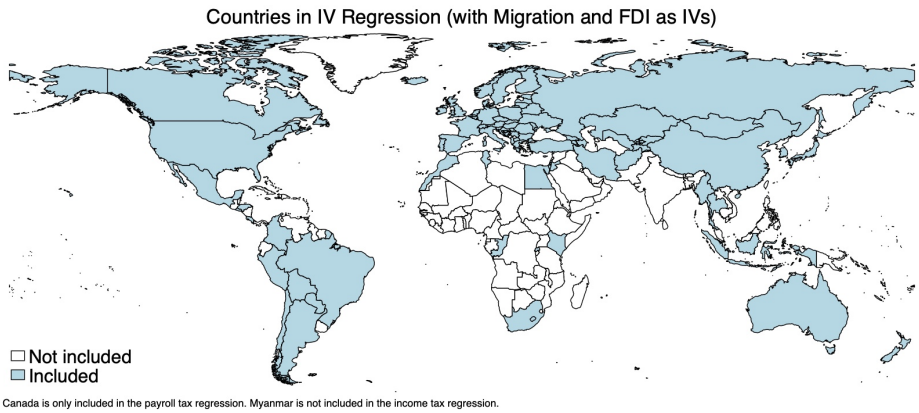
Figure 4: Countries included in the study



(a) Countries included in FE regression

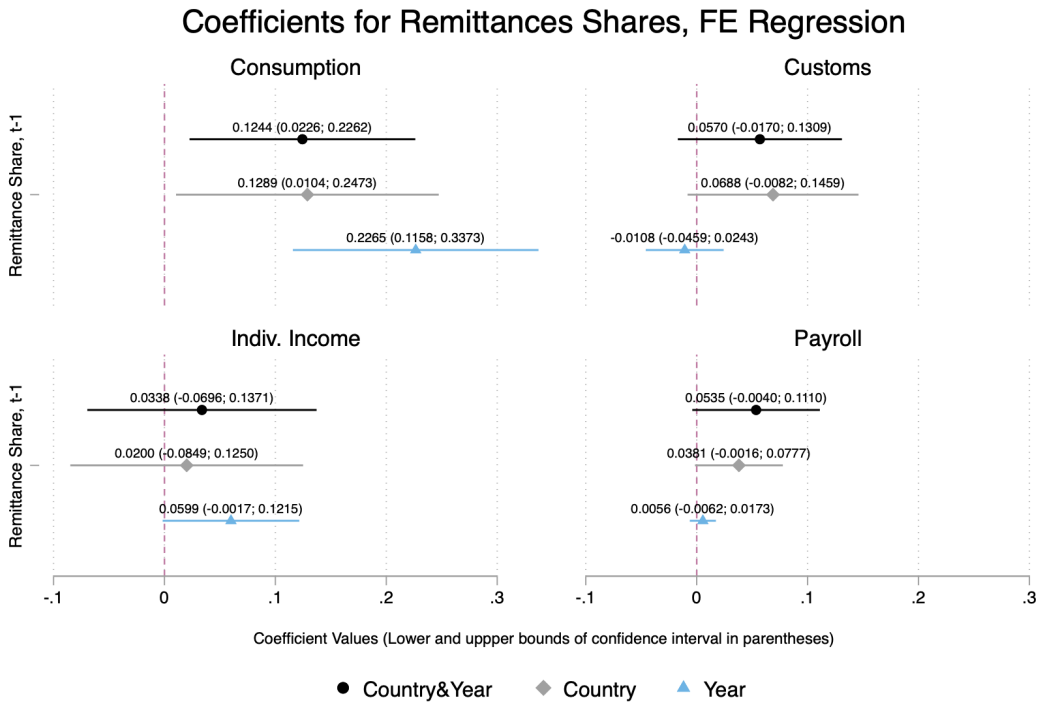


(b) Countries included in IV regression



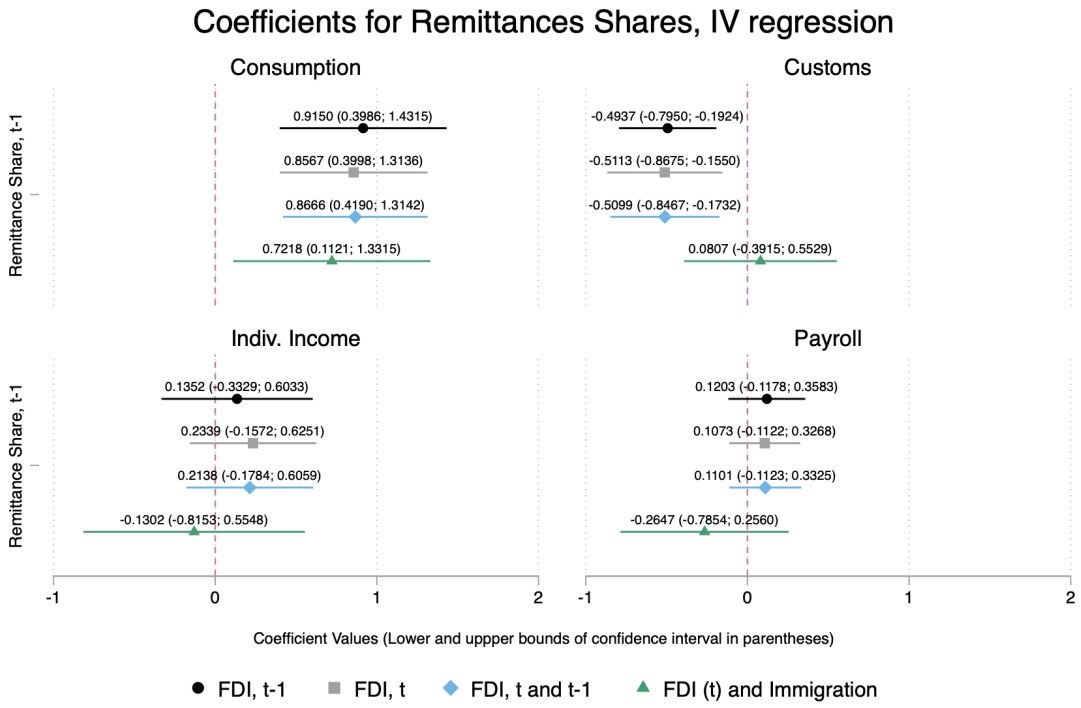
(c) Countries included in IV regression (FDI and migration policy)

Figure 5: Coefficients for Remittance Shares at year $t-1$: Fixed Effects



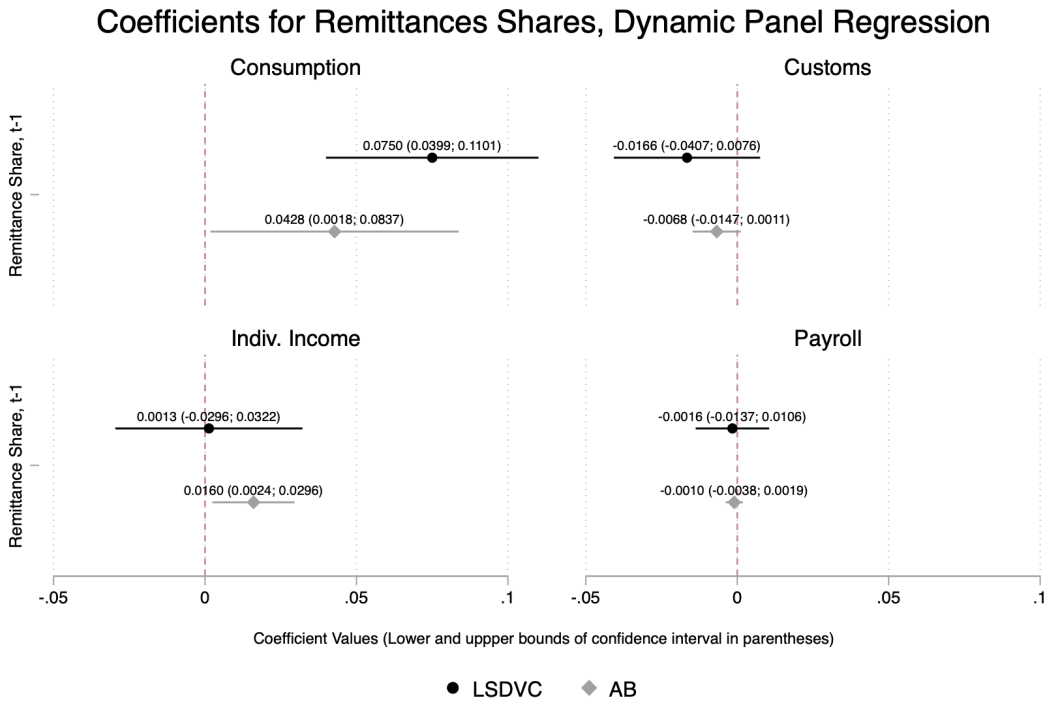
Note: There are 1471 observations for consumption, 1666 for customs, 1597 for income, and 1696 for payroll taxes. All outcomes other than payroll are from 91 countries (payroll: 92 countries).

Figure 6: Coefficients for Remittance Shares at year $t-1$: Instrumental Variables



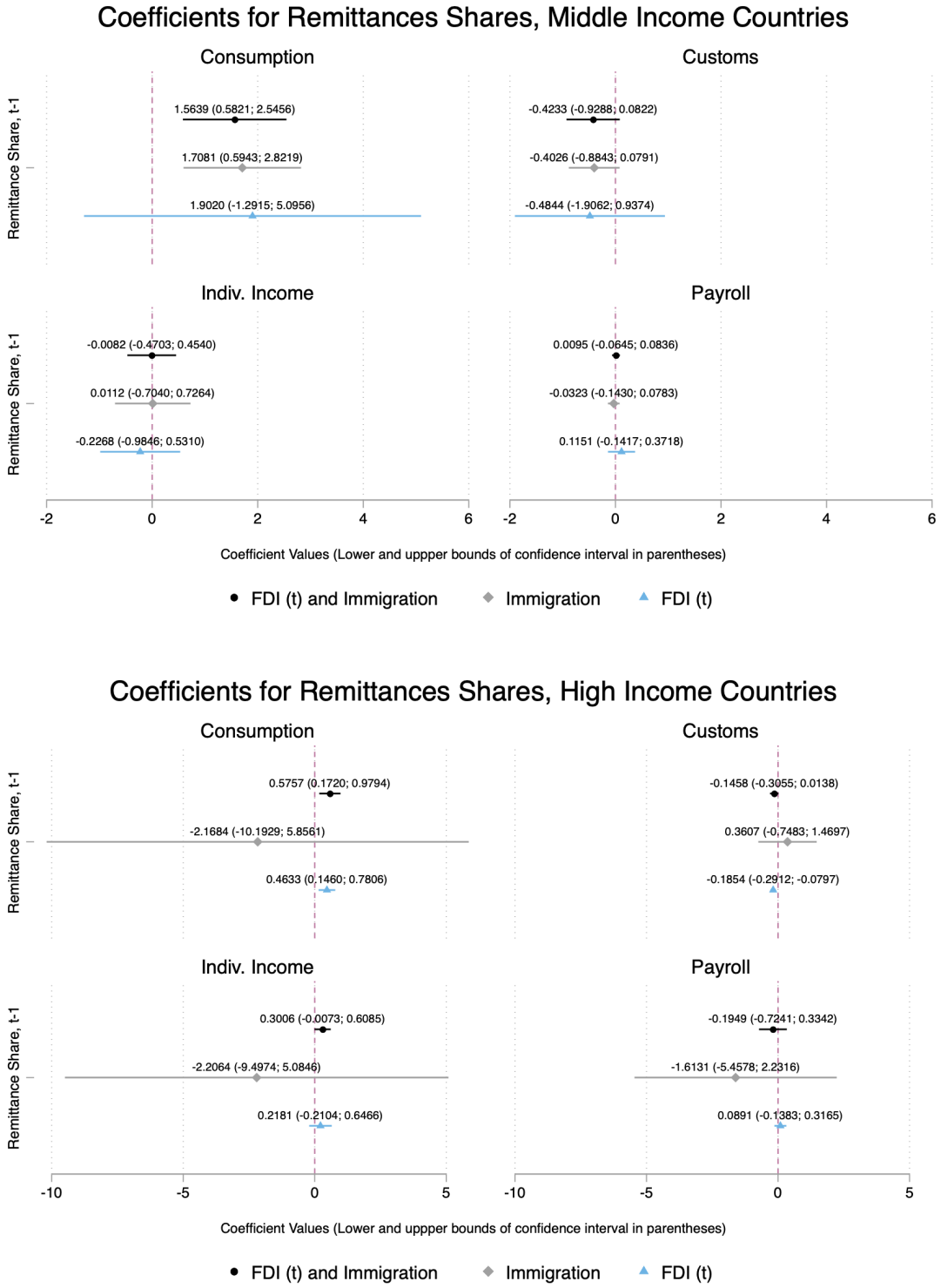
Note: The number of observations and countries included are stated in first stage tables in Tables C1-C4.

Figure 7: Coefficients for Remittance Shares at year $t-1$: Dynamic Panel Setup



Note: The number of observations (countries) included are 1381 (89) for consumption, 1575 (89) for customs, 1500 (88) for income, and 1607 (90) for payroll taxes.

Figure 8: Subgroup Regression by Income Groups: Middle and High Income Countries



Note: The income cutoff used for sorting countries to different categories are from the World Bank definition of middle income countries and high income countries used in 2011. This can be found in https://blogs.worldbank.org/opendata/changes-country-classifications

Tables

Table 1: VATs and Consumption Shares

	(1) VAT	(2) Household Consumption
Remittance Share, t-1	-0.00250	0.406***
	(0.00376)	(0.118)
log(GDP per capita), t-1	0.0620	-4.001**
	(0.0678)	(1.817)
GDP per capita, t-1	-0.00000696	-0.000305***
	(0.00000611)	(0.0000988)
Inflation, t-1	0.000152	-0.0156***
	(0.000122)	(0.00417)
Trade share, t-1	0.00121	-0.0342*
	(0.00137)	(0.0180)
Share of agriculture, t-1	-0.000477	0.348*
	(0.00406)	(0.202)
Obs.	1346	1346
Countries	85	85

* $p < .10$, ** $p < .05$, *** $p < .01$
Standard errors are in the parentheses and are clustered at the recipient country level. All variables are reported yearly and indicators for each year and country are included.

Table 2: Gelbach Decomposition on Share of Remittances at year t-1

	Coefficient	Standard Error	Z	p-value
VAT	-0.0074	0.0129	-0.5780	0.5630
Consumption Share	0.0439	0.0187	2.3418	0.0190
Total	0.0365	0.0216	1.6882	0.0910

Sample size: 1348
Standard errors are clustered at the recipient country level. The regression coefficients are based on the two-way specification that also includes controls for share of agriculture in GDP, among others.

Appendix A Mathematical Proofs

A.1 Proof for Proposition 1

The optimization problem of the households, which maximizes Equation (1) subject to Equation (2) can be characterized as a following Lagrangian problem

$$\max_{x_2^D, x_2^F, L_2^D, L_2^F} U(x_2^D, x_2^F, L_2^D, L_2^F) + \lambda[w_2^F L_2^F + w_2^D L_2^D(1 - t_2^L) - p_2^D x_2^D(1 + t_2^D) - p_2^F x_2^F(1 + t_2^F)]$$

The resulting first order conditions are

- $[x_2^D]$: $\frac{\partial U}{\partial x_2^D} - \lambda p_2^D(1 + t_2^D) = 0$
- $[x_2^F]$: $\frac{\partial U}{\partial x_2^F} - \lambda p_2^F(1 + t_2^F) = 0$
- $[L_2^D]$: $\frac{\partial U}{\partial L_2^D} + \lambda w_2^D(1 - t_2^L) = 0$
- $[L_2^F]$: $\frac{\partial U}{\partial L_2^D} + \lambda w_2^F = 0$

Equalizing all the first order conditions to λ results in Equation (5)

$$\lambda = \frac{\partial U/\partial x_2^D}{p_2^D(1 + t_2^D)} = \frac{\partial U/\partial x_2^F}{p_2^F(1 + t_2^F)} = \frac{-\partial U/\partial L_2^D}{w_2^D(1 - t_2^L)} = \frac{-\partial U/\partial L_2^F}{w_2^F}$$

When N^F or O^F rises, w_2^F rises. By Equation (4), L_2^F rises and L_2^D falls to the extent that Equation (5) holds. Decrease in labor supply decreases $-\frac{\partial U}{\partial L_2^D}$, which represents fall in L_2^D. Subsequently, $\frac{\partial U}{\partial x_2^D}$ and $\frac{\partial U}{\partial x_2^F}$ falls, implying that x_2^D and x_2^F rises. Since the price variables - w_2^D, p_2^D, p_2^F- are constant in this setup, the tax bases Z_2^D and Z_2^F rise due to increasing consumption whereas Z_2^L falls due to lower domestic employment

A.2 Proof for Proposition 2

Start from the first order conditions in Equation (5). The employment aspects do not change. As for the goods, the price of foreign goods rise by Equation (6). We can decompose the effect of change in w_2^F on Z_2^F as follows.

$$\frac{dZ_2^F}{dw_2^F} = \frac{dp_2^F}{dw_2^F} x_2^F + p_2^F \frac{dx_2^F}{dw_2^F}$$

To go further, x_2^F can be considered as p_2^F and w_2^F. Thus, the following equation can be obtained taking derivatives on x_2^F with respect to w_2^F

$$\frac{dx_2^F}{dw_2^F} = \underbrace{\frac{\partial x_2^F}{\partial w_2^F}}_{(A)} + \underbrace{\frac{\partial x_2^F}{\partial p_2^F}\frac{dp_2^F}{dw_2^F}}_{(B)}$$

where (A) represents the change in x_2^F due to w_2^F and (B) represents the change in x_2^F that occurs because of changes to p_2^F through w_2^F. Since x_2^F is a normal good, (A) is positive. As for (B), $\frac{\partial p_2^F}{\partial w_2^F} > 0$ by Equation (6) and $\frac{\partial x_2^F}{\partial p_2^F} < 0$ under most circumstances. Therefore, $(B) < 0$. We can rewrite $\frac{\partial Z_2^F}{\partial w_2^F}$ as

$$\frac{dZ_2^F}{dw_2^F} = \frac{dp_2^F}{dw_2^F}x_2^F + p_2^F\left(\frac{\partial x_2^F}{\partial w_2^F} + \frac{\partial x_2^F}{\partial p_2^F}\frac{dp_2^F}{dw_2^F}\right)$$

If the effect of (B) dominates other terms, it is possible for $\frac{dZ_2^F}{dw_2^F}$ to fall. Since w_2^F do not affect p_2^D, this offsetting effect is absent for Z_2^D. Therefore, $\frac{dZ_2^F}{dw_2^F} < \frac{dZ_2^D}{dw_2^F}$.

A.3 Proof for Proposition 3

First, I show how Equations (9) and (10) are equivalent. From $Z_2^D = p_2^D x_2^D$, take partial differentiation with respect to p_2^D to get

$$\frac{\partial Z_2^D}{\partial p_2^D} = x_2^D + p_2^D\frac{\partial x_2^D}{\partial p_2^D}$$

Divide both terms by x_2^D to get

$$\frac{\partial Z_2^D}{\partial p_2^D}\frac{1}{x_2^D} = 1 + \frac{p_2^D}{x_2^D}\frac{\partial x_2^D}{\partial p_2^D} = 1 - \eta_2^D$$

Therefore, $\eta_2^D = 1 - \frac{\partial Z_2^D}{\partial p_2^D}\frac{1}{x_2^D}$. The processes for η_2^F and η_2^L are similar.

The government minimizes (8) subject to the government budget constraint (7). The Lagrangian can be written as

$$\max_{t_2^D, t_2^F, t_2^L}\left\{-\left(\frac{1}{2}Z_2^D(-\eta_2^D)(t_2^D)^2 + \frac{1}{2}Z_2^F(-\eta_2^F)(t_2^F)^2 + \frac{1}{2}Z_2^L(\eta_2^L)(t_2^L)^2\right) + \lambda[Z_2^D t_2^D + Z_2^F t_2^F + Z_2^L t_2^L - E]\right\}$$

The first order conditions are

- $[t_2^D]$: $t_2^D Z_2^D \eta_2^D + \lambda Z_2^D = 0 \iff t_2^D \eta_2^D = -\lambda$
- $[t_2^F]$: $t_2^F Z_2^F \eta_2^F + \lambda Z_2^F = 0 \iff t_2^F \eta_2^F = -\lambda$
- $[t_2^L]$: $t_2^L Z_2^L (-\eta_2^L) + \lambda Z_2^L = 0 \iff t_2^L (-\eta_2^L) = -\lambda$

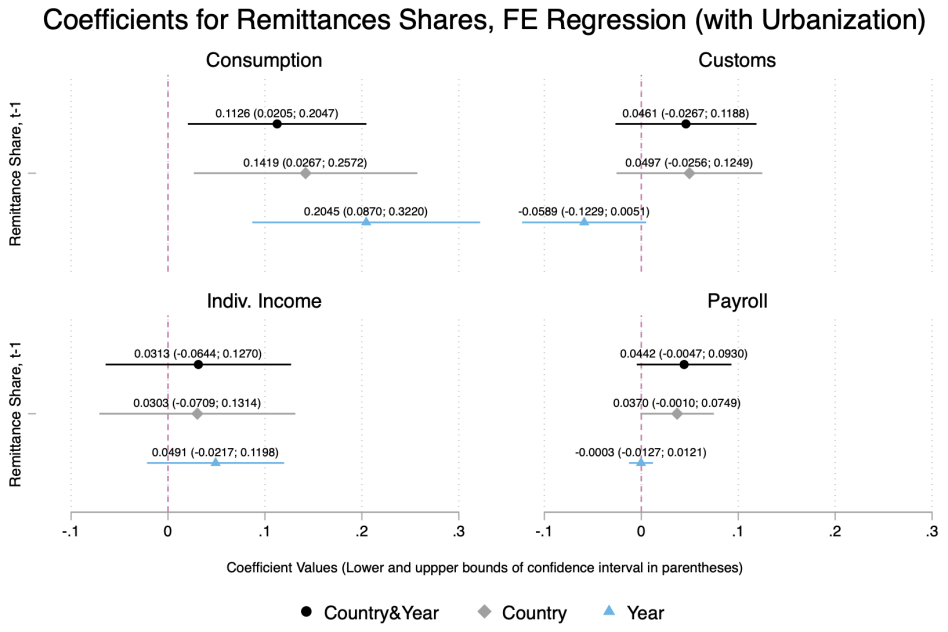
These conditions can be written in the form of Equation (11), in that

$$
\begin{aligned}
t_2^D \eta_2^D = t_2^F \eta_2^F &\iff \frac{t_2^D}{t_2^F} = \frac{\eta_2^F}{\eta_2^D} \\
t_2^D \eta_2^D = t_2^L (-\eta_2^L) &\iff \frac{t_2^D}{t_2^L} = \frac{-\eta_2^L}{\eta_2^D} \\
t_2^F \eta_2^F = t_2^L (-\eta_2^L) &\iff \frac{t_2^F}{t_2^L} = \frac{-\eta_2^L}{\eta_2^F}
\end{aligned}
$$

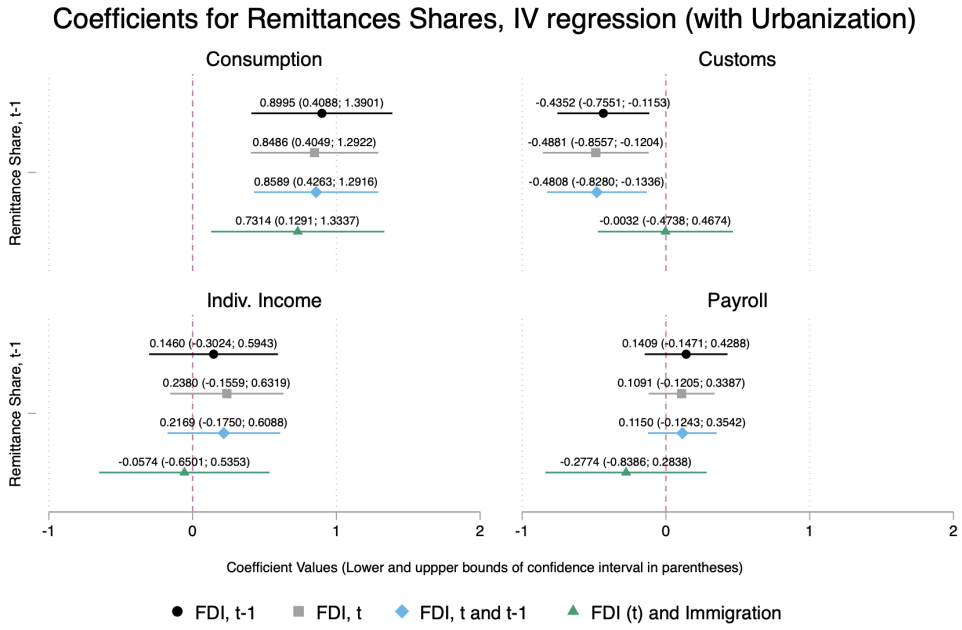
By Proposition 1, Z_2^L falls. This results in largest increase for $-\eta_2^L$, according to Equation (10). By Proposition 2, tax bases for imported good can decrease depending on the strength of the offsetting factors while this is not present for domestic goods. As such, Z_2^D increases further than Z_2^F, resulting in $\eta_2^D < \eta_2^F$ ($\because$ Equation (10)). In all cases, t_2^D rises the most, implying higher reliance on consumption taxes.

Appendix B Additional Figures

Figure B1: Coefficients for Remittance Shares at year $t-1$: With Urban Variables

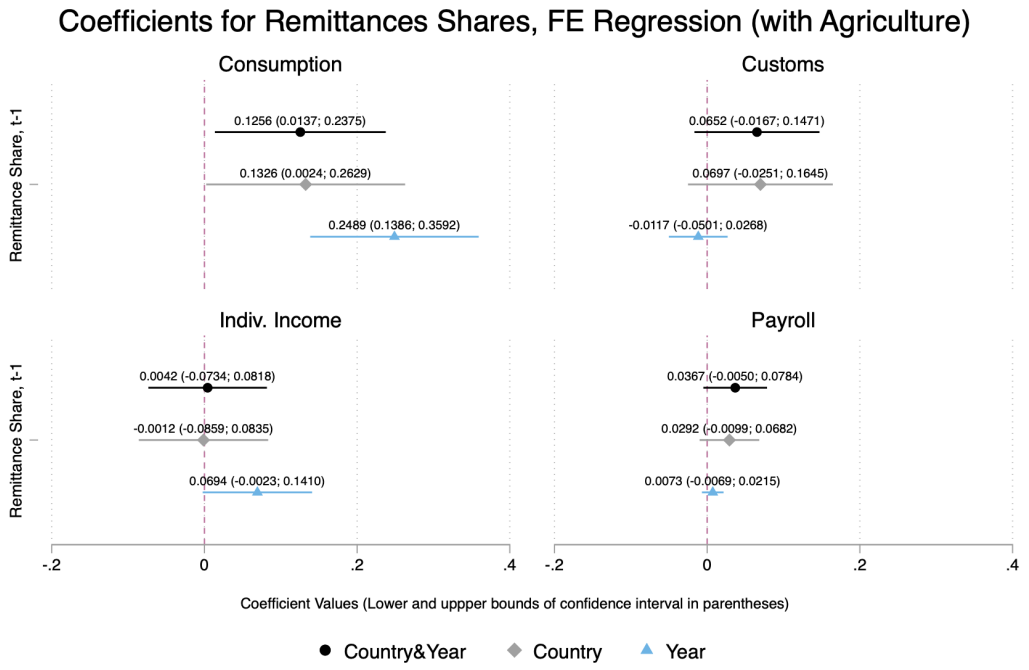


(a) Fixed effects

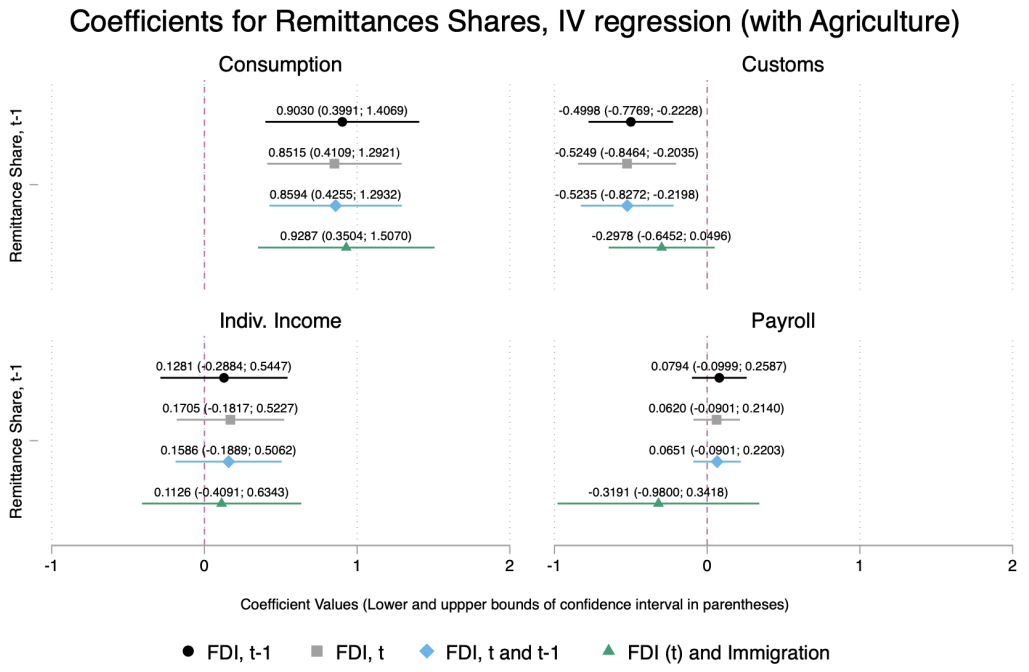


(b) Instrumental variables

Figure B2: Coefficients for Remittance Shares at year $t-1$: With Agriculture Variables

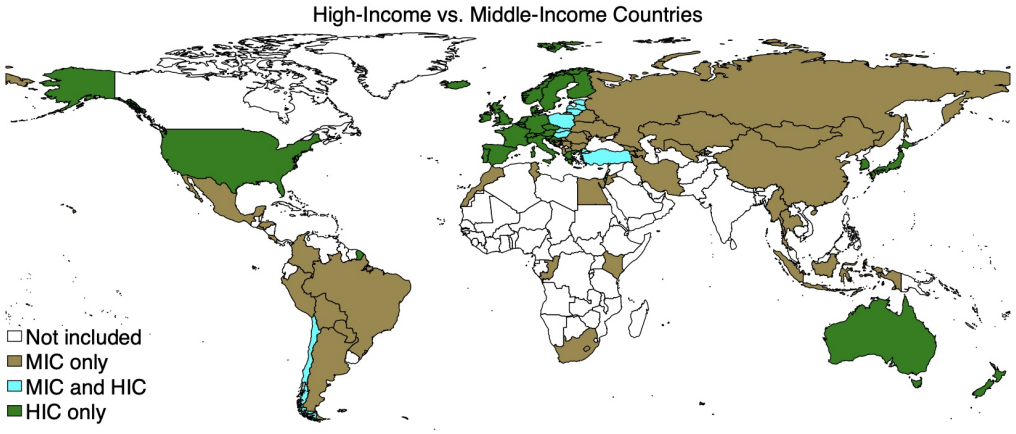


(a) Fixed effects

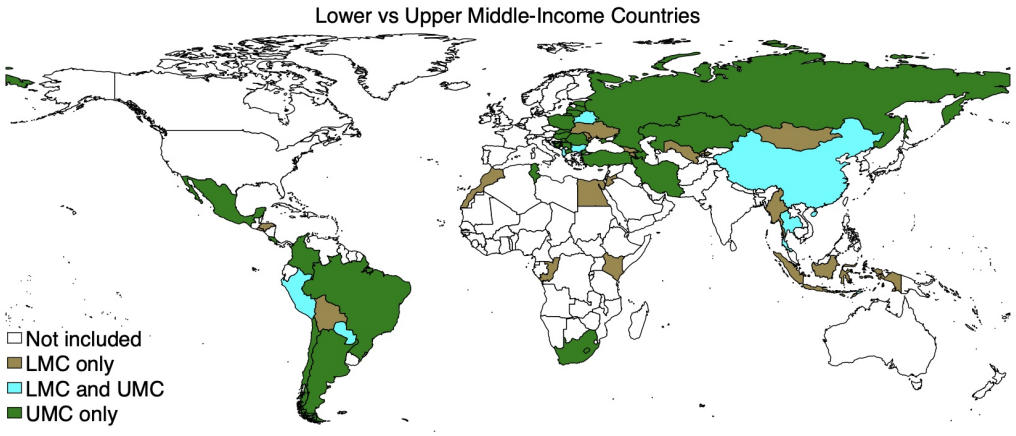


(b) Instrumental variables

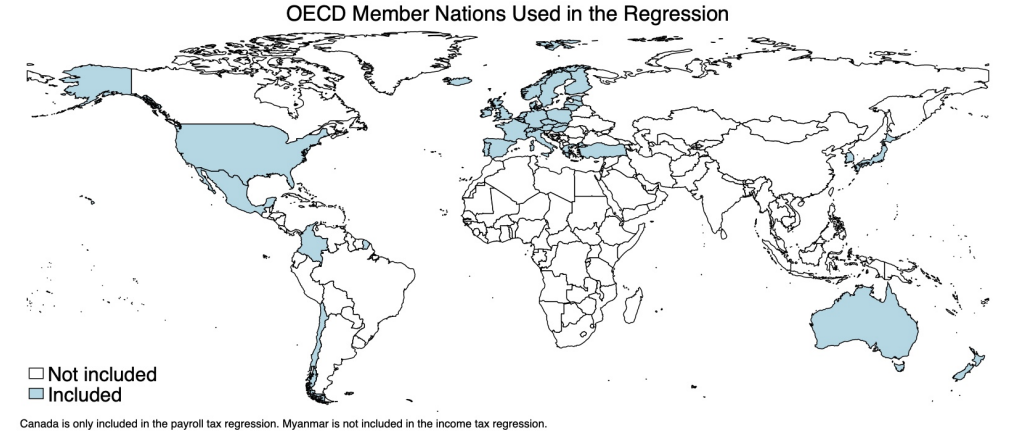
Figure B3: Coutries in the sample, by income levels



(a) High and middle income countries

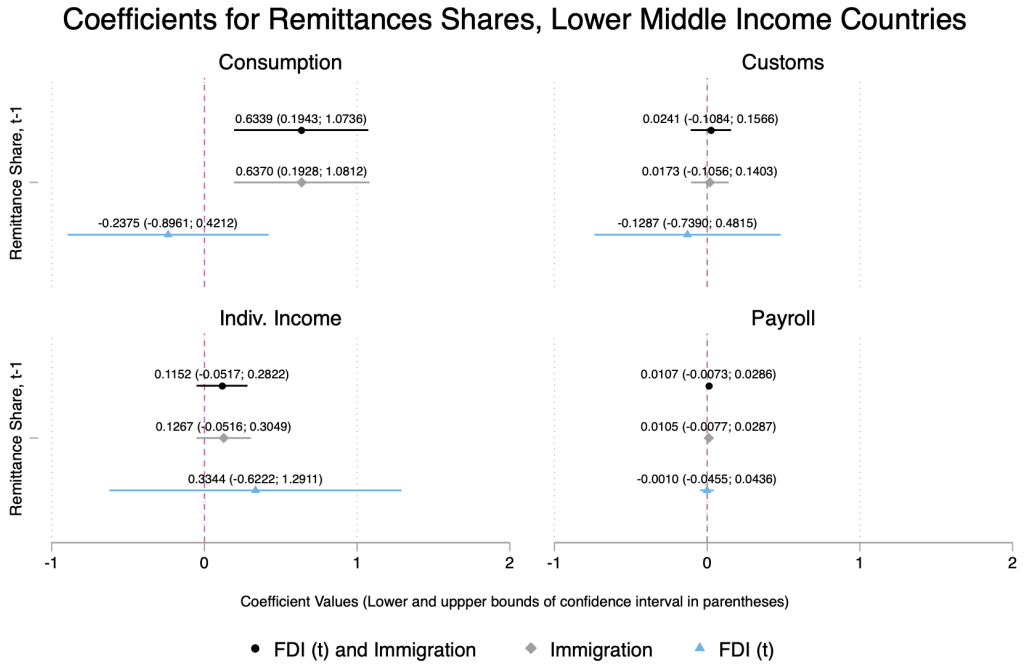


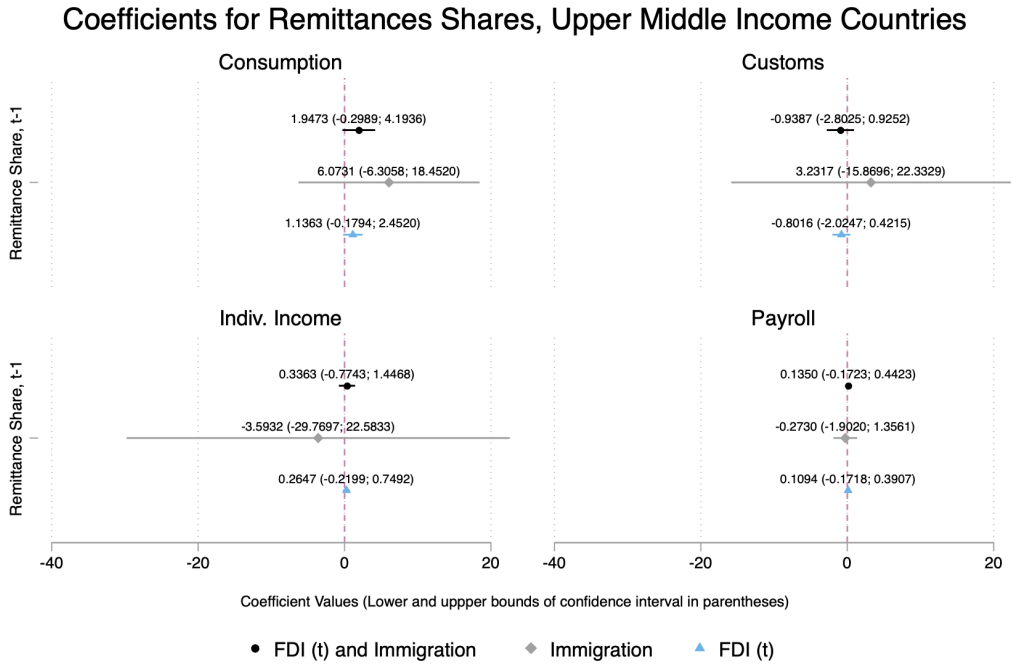
(b) Upper middle and lower-middle income countries



(c) OECD countries

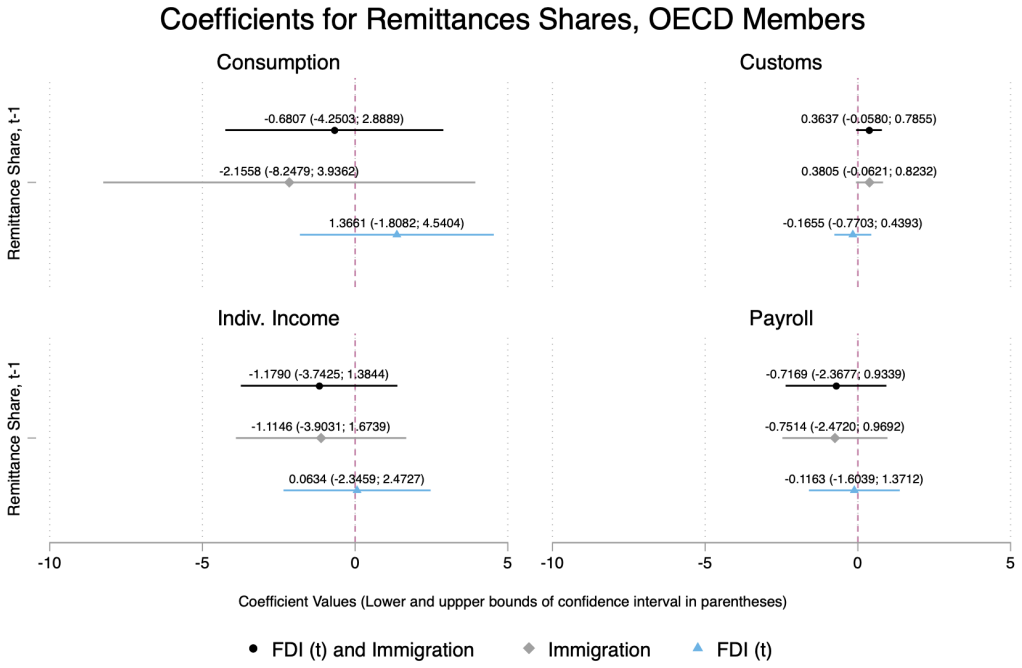
Figure B4: Subgroup Regression by Income Groups: Lower and Upper Middle-Income Countries





The income cutoff used for sorting countries to different categories are from the World Bank definition of lower middle income countries and upper middle income countries used in 2011. This can be found in https://blogs.worldbank.org/opendata/changes-country-classifications

Figure B5: Subgroup Regression by Income Groups: OECD countries



Appendix C Additional Tables

Table C1: First Stage, FDI share from year t-1 as IVs

	(1) Remittance Share, t-1	(2) Remittance Share, t-1	(3) Remittance Share, t-1	(4) Remittance Share, t-1
FDI share, t-1	0.00424***	0.00416***	0.00402***	0.00413***
	(0.000744)	(0.000750)	(0.000753)	(0.000788)
log(GDP per capita), t-1	0.680	0.145	0.650	0.130
	(0.629)	(0.590)	(0.574)	(0.548)
GDP per capita, t-1	-0.0000149	0.00000324	-0.0000153	0.00000282
	(0.0000282)	(0.0000274)	(0.0000180)	(0.0000261)
Inflation, t-1	-0.00323***	-0.000189***	-0.000156***	-0.000187***
	(0.000715)	(0.0000518)	(0.0000298)	(0.0000481)
Trade share, t-1	0.0128**	0.0131**	0.0107*	0.0135**
	(0.00606)	(0.00553)	(0.00561)	(0.00544)
Kleibergen-Paap F Stat	32.43	30.76	28.47	27.52
Obs.	1452	1646	1576	1676
Countries	90	90	89	91

* $p < .10$, ** $p < .05$, *** $p < .01$
Standard errors are in the parentheses and are clustered at the recipient country level. All variables are defined yearly. The regression includes both country and year fixed effects.

Table C2: First Stage, FDI share from year t as IVs

	(1)	(2)	(3)	(4)
	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1
FDI share	0.00575***	0.00571***	0.00554***	0.00573***
	(0.00105)	(0.00103)	(0.00102)	(0.00107)
log(GDP per capita), t-1	0.687	0.143	0.647	0.129
	(0.626)	(0.589)	(0.575)	(0.547)
GDP per capita, t-1	-0.0000146	0.00000343	-0.0000150	0.00000299
	(0.0000284)	(0.0000274)	(0.0000182)	(0.0000262)
Inflation, t-1	-0.00316***	-0.000190***	-0.000156***	-0.000187***
	(0.000717)	(0.0000517)	(0.0000297)	(0.0000479)
Trade share, t-1	0.0133**	0.0135**	0.0112**	0.0138**
	(0.00607)	(0.00553)	(0.00561)	(0.00544)
Kleibergen-Paap F Stat	29.72	30.85	29.79	28.45
Obs.	1454	1649	1579	1679
Countries	90	90	89	91

* $p < .10$, ** $p < .05$, *** $p < .01$
Standard errors are in the parentheses and are clustered at the recipient country level. All variables are defined yearly. The regression includes both country and year fixed effects.

Table C3: First Stage, FDI share from years t and t-1 as IVs

	(1)	(2)	(3)	(4)
	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1
FDI share, t-1	0.00139	0.00128	0.00122	0.00123
	(0.00153)	(0.00152)	(0.00148)	(0.00151)
FDI share	0.00496***	0.00499***	0.00484***	0.00503***
	(0.00145)	(0.00143)	(0.00139)	(0.00147)
log(GDP per capita), t-1	0.676	0.132	0.638	0.118
	(0.626)	(0.590)	(0.575)	(0.547)
GDP per capita, t-1	-0.0000140	0.00000375	-0.0000148	0.00000329
	(0.0000285)	(0.0000275)	(0.0000182)	(0.0000263)
Inflation, t-1	-0.00318***	-0.000190***	-0.000156***	-0.000188***
	(0.000712)	(0.0000518)	(0.0000297)	(0.0000480)
Trade share, t-1	0.0133**	0.0136**	0.0112**	0.0139**
	(0.00614)	(0.00559)	(0.00568)	(0.00550)
Kleibergen-Paap F Stat	24.29	23.96	22.80	22.39
Sargan-Hansen J-statistic	0.119	0.0176	0.382	0.159
(p-value)	0.730	0.894	0.537	0.690
Obs.	1451	1645	1575	1675
Countries	90	90	89	91

* $p < .10$, ** $p < .05$, *** $p < .01$
Standard errors are in the parentheses and are clustered at the recipient country level. All variables are defined yearly. The regression includes both country and year fixed effects.

Table C4: First Stage, FDI (year t) and Immigration

	(1)	(2)	(3)	(4)
	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1
Raise/Maintain Immigration	0.00597***	0.00834***	0.00574***	0.00830***
	(0.00216)	(0.00303)	(0.00197)	(0.00291)
FDI share	0.00690***	0.00696***	0.00684***	0.00690***
	(0.000955)	(0.000939)	(0.000917)	(0.000963)
log(GDP per capita), t-1	0.655	-0.0467	0.830	-0.0812
	(0.561)	(0.851)	(0.544)	(0.783)
GDP per capita, t-1	-0.0000343*	-0.0000133	-0.0000244	-0.0000135
	(0.0000205)	(0.0000153)	(0.0000162)	(0.0000146)
Inflation, t-1	-0.00313***	-0.000158***	-0.000139***	-0.000158***
	(0.000686)	(0.0000233)	(0.0000213)	(0.0000228)
Trade share, t-1	0.00938**	0.00992**	0.00770*	0.0104***
	(0.00437)	(0.00391)	(0.00399)	(0.00391)
Kleibergen-Paap F Stat	32.76	34.14	35.15	31.85
Sargan-Hansen J-statistic	1.166	1.927	1.218	0.971
(p-value)	0.280	0.165	0.270	0.325
Obs.	1240	1414	1357	1441
Countries	88	88	87	89

* $p < .10$, ** $p < .05$, *** $p < .01$
Standard errors are in the parentheses and are clustered at the recipient country level. All variables, including the migration policy variable, are defined yearly. The regression includes country fixed effects only, as inclusion of the migration policy variable, which is defined yearly, overlaps with the year fixed effect.

Table C5: First Stage, FDI share from year t-1 as IVs (with Urbanization)

	(1)	(2)	(3)	(4)
	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1
FDI share, t-1	0.00450***	0.00433***	0.00420***	0.00429***
	(0.000627)	(0.000630)	(0.000636)	(0.000646)
log(GDP per capita), t-1	0.555	-0.00941	0.548	-0.0339
	(0.513)	(0.597)	(0.491)	(0.552)
GDP per capita, t-1	-0.0000359*	-0.0000131	-0.0000334*	-0.0000136
	(0.0000210)	(0.0000321)	(0.0000197)	(0.0000305)
log(Urban Population), t-1	-3.116***	-1.699**	-1.862**	-1.704**
	(1.063)	(0.775)	(0.749)	(0.745)
Urban Population, t-1	7.33e-09**	1.02e-08	3.48e-09	1.05e-08*
	(3.31e-09)	(6.36e-09)	(2.72e-09)	(6.25e-09)
Inflation, t-1	-0.00224**	-0.000215***	-0.000181***	-0.000213***
	(0.00108)	(0.0000544)	(0.0000308)	(0.0000510)
Trade share, t-1	0.0126**	0.0128**	0.00982*	0.0129**
	(0.00617)	(0.00575)	(0.00571)	(0.00564)
Kleibergen-Paap F Stat	51.58	47.17	43.71	44.03
Obs.	1452	1646	1576	1676
Countries	90	90	89	91

* $p < .10$, ** $p < .05$, *** $p < .01$
Standard errors are in the parentheses and are clustered at the recipient country level. All variables are defined yearly. The regression includes both country and year fixed effects.

Table C6: First Stage, FDI share from year t as IVs (with Urbanization)

	(1)	(2)	(3)	(4)
	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1
FDI share	0.00595***	0.00580***	0.00563***	0.00578***
	(0.000859)	(0.000878)	(0.000847)	(0.000919)
log(GDP per capita), t-1	0.557	-0.0139	0.543	-0.0378
	(0.508)	(0.594)	(0.490)	(0.549)
GDP per capita, t-1	-0.0000351*	-0.0000128	-0.0000328*	-0.0000133
	(0.0000210)	(0.0000320)	(0.0000197)	(0.0000305)
log(Urban Population), t-1	-3.124***	-1.701**	-1.857**	-1.706**
	(1.054)	(0.772)	(0.746)	(0.743)
Urban Population, t-1	7.40e-09**	1.02e-08	3.52e-09	1.05e-08*
	(3.34e-09)	(6.36e-09)	(2.72e-09)	(6.25e-09)
Inflation, t-1	-0.00216**	-0.000216***	-0.000181***	-0.000214***
	(0.00107)	(0.0000544)	(0.0000309)	(0.0000510)
Trade share, t-1	0.0132**	0.0132**	0.0103*	0.0133**
	(0.00613)	(0.00572)	(0.00567)	(0.00561)
Kleibergen-Paap F Stat	47.98	43.61	44.13	39.60
Obs.	1454	1649	1579	1679
Countries	90	90	89	91

* $p < .10$, ** $p < .05$, *** $p < .01$

Standard errors are in the parentheses and are clustered at the recipient country level. All variables are defined yearly. The regression includes both country and year fixed effects.

Table C7: First Stage, FDI share from years t and t-1 as IVs (with Urbanization)

	(1)	(2)	(3)	(4)
	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1
FDI share, t-1	0.00162	0.00146	0.00143	0.00142
	(0.00169)	(0.00163)	(0.00158)	(0.00160)
FDI share	0.00502***	0.00496***	0.00480***	0.00497***
	(0.00133)	(0.00134)	(0.00128)	(0.00137)
log(GDP per capita), t-1	0.549	-0.0228	0.536	-0.0460
	(0.509)	(0.596)	(0.491)	(0.551)
GDP per capita, t-1	-0.0000351*	-0.0000126	-0.0000329*	-0.0000131
	(0.0000211)	(0.0000322)	(0.0000199)	(0.0000307)
log(Urban Population), t-1	-3.129***	-1.698**	-1.864**	-1.701**
	(1.060)	(0.777)	(0.751)	(0.747)
Urban Population, t-1	7.40e-09**	1.02e-08	3.53e-09	1.05e-08*
	(3.32e-09)	(6.36e-09)	(2.72e-09)	(6.24e-09)
Inflation, t-1	-0.00218**	-0.000216***	-0.000181***	-0.000214***
	(0.00107)	(0.0000544)	(0.0000308)	(0.0000510)
Trade share, t-1	0.0132**	0.0133**	0.0103*	0.0133**
	(0.00623)	(0.00581)	(0.00578)	(0.00570)
Kleibergen-Paap F Stat	35.91	32.19	32.16	30.62
Sargan-Hansen J-statistic	0.0960	0.154	0.369	1.298
(p-value)	0.757	0.695	0.544	0.255
Obs.	1451	1645	1575	1675
Countries	90	90	89	91

* $p < .10$, ** $p < .05$, *** $p < .01$

Standard errors are in the parentheses and are clustered at the recipient country level. All variables are defined yearly. The regression includes both country and year fixed effects.

Table C8: First Stage, FDI (year t) and Immigration (with Urbanization)

	(1)	(2)	(3)	(4)
	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1
Raise/Maintain Immigration	0.00583***	0.00725***	0.00484***	0.00723***
	(0.00177)	(0.00268)	(0.00171)	(0.00255)
FDI share	0.00754***	0.00748***	0.00721***	0.00740***
	(0.000843)	(0.000843)	(0.000833)	(0.000843)
log(GDP per capita), t-1	1.408***	0.412	1.284***	0.382
	(0.434)	(0.788)	(0.479)	(0.719)
GDP per capita, t-1	-0.0000288*	-0.00000857	-0.0000194	-0.00000839
	(0.0000165)	(0.0000152)	(0.0000129)	(0.0000145)
log(Urban Population), t-1	-3.414***	-1.792*	-1.508**	-1.818*
	(0.914)	(0.973)	(0.738)	(0.970)
Urban Population, t-1	5.91e-09	8.73e-09	-3.52e-10	9.07e-09
	(5.61e-09)	(8.06e-09)	(2.98e-09)	(8.04e-09)
Inflation, t-1	-0.00225**	-0.000216***	-0.000188***	-0.000218***
	(0.000914)	(0.0000471)	(0.0000343)	(0.0000466)
Trade share, t-1	0.0120***	0.0114***	0.00841**	0.0117***
	(0.00428)	(0.00399)	(0.00376)	(0.00394)
Kleibergen-Paap F Stat	53.10	42.63	47.27	41.95
Sargan-Hansen J-statistic	0.698	1.869	1.239	1.090
(p-value)	0.403	0.172	0.266	0.297
Obs.	1240	1414	1357	1441
Countries	88	88	87	89

* $p < .10$, ** $p < .05$, *** $p < .01$

Standard errors are in the parentheses and are clustered at the recipient country level. All variables, including the migration policy variable, are defined yearly. The regression includes country fixed effects only, as inclusion of the migration policy variable, which is defined yearly, overlaps with the year fixed effect.

Table C9: First Stage, FDI share from year t-1 as IVs (with Agriculture)

	(1)	(2)	(3)	(4)
	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1
FDI share, t-1	0.00427***	0.00412***	0.00401***	0.00407***
	(0.000745)	(0.000784)	(0.000809)	(0.000809)
log(GDP per capita), t-1	0.649	0.0973	0.226	0.170
	(0.806)	(0.911)	(0.845)	(0.801)
GDP per capita, t-1	-0.0000200	-0.0000103	-0.00000797	-0.0000118
	(0.0000323)	(0.0000229)	(0.0000231)	(0.0000212)
Share of agriculture, t-1	-0.0350	-0.0684	-0.0673	-0.0524
	(0.0801)	(0.0601)	(0.0599)	(0.0626)
Inflation, t-1	-0.00255	-0.000125***	-0.000145***	-0.000132***
	(0.00156)	(0.0000389)	(0.0000456)	(0.0000389)
Trade share, t-1	0.0137**	0.0125*	0.0110*	0.0125**
	(0.00680)	(0.00655)	(0.00651)	(0.00630)
Kleibergen-Paap F Stat	32.84	27.54	24.50	25.27
Obs.	1407	1504	1447	1514
Countries	90	90	89	90

* $p < .10$, ** $p < .05$, *** $p < .01$

Standard errors are in the parentheses and are clustered at the recipient country level. All variables are defined yearly. The regression includes both country and year fixed effects.

Table C10: First Stage, FDI share from year t as IVs (with Agriculture)

	(1)	(2)	(3)	(4)
	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1
FDI share	0.00592***	0.00570***	0.00567***	0.00567***
	(0.00107)	(0.00107)	(0.00108)	(0.00109)
log(GDP per capita), t-1	0.652	0.0905	0.220	0.165
	(0.800)	(0.908)	(0.841)	(0.798)
GDP per capita, t-1	-0.0000194	-0.00000989	-0.00000745	-0.0000115
	(0.0000323)	(0.0000229)	(0.0000232)	(0.0000212)
Share of agriculture, t-1	-0.0365	-0.0691	-0.0681	-0.0529
	(0.0800)	(0.0599)	(0.0597)	(0.0625)
Inflation, t-1	-0.00245	-0.000126***	-0.000145***	-0.000132***
	(0.00156)	(0.0000389)	(0.0000458)	(0.0000389)
Trade share, t-1	0.0142**	0.0130**	0.0115*	0.0129**
	(0.00680)	(0.00654)	(0.00650)	(0.00630)
Kleibergen-Paap F Stat	30.51	28.35	27.75	26.93
Obs.	1409	1506	1449	1516
Countries	90	90	89	90

* $p < .10$, ** $p < .05$, *** $p < .01$
Standard errors are in the parentheses and are clustered at the recipient country level. All variables are defined yearly. The regression includes both country and year fixed effects.

Table C11: First Stage, FDI share from years t and t-1 as IVs (with Agriculture)

	(1)	(2)	(3)	(4)
	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1
FDI share, t-1	0.00129	0.00122	0.00109	0.00117
	(0.00153)	(0.00146)	(0.00143)	(0.00145)
FDI share	0.00519***	0.00500***	0.00505***	0.00500***
	(0.00149)	(0.00145)	(0.00146)	(0.00147)
log(GDP per capita), t-1	0.634	0.0726	0.203	0.148
	(0.802)	(0.911)	(0.844)	(0.801)
GDP per capita, t-1	-0.0000187	-0.00000949	-0.00000709	-0.0000111
	(0.0000327)	(0.0000231)	(0.0000234)	(0.0000214)
Share of agriculture, t-1	-0.0374	-0.0698	-0.0688	-0.0538
	(0.0801)	(0.0600)	(0.0599)	(0.0626)
Inflation, t-1	-0.00245	-0.000125***	-0.000145***	-0.000132***
	(0.00156)	(0.0000388)	(0.0000457)	(0.0000388)
Trade share, t-1	0.0143**	0.0130**	0.0116*	0.0130**
	(0.00688)	(0.00662)	(0.00659)	(0.00637)
Kleibergen-Paap F Stat	25.08	22.74	21.99	21.56
Sargan-Hansen J-statistic	0.0974	0.0358	0.0560	0.279
(p-value)	0.755	0.850	0.813	0.598
Obs.	1406	1503	1446	1513
Countries	90	90	89	90

* $p < .10$, ** $p < .05$, *** $p < .01$
Standard errors are in the parentheses and are clustered at the recipient country level. All variables are defined yearly. The regression includes both country and year fixed effects.

Table C12: First Stage, FDI (year t) and Immigration (with Agriculture)

	(1)	(2)	(3)	(4)
	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1
Raise/Maintain Immigration	0.00607**	0.00463*	0.00530**	0.00473*
	(0.00266)	(0.00262)	(0.00269)	(0.00243)
FDI share	0.00696***	0.00696***	0.00680***	0.00690***
	(0.000969)	(0.000989)	(0.000979)	(0.00101)
log(GDP per capita), t-1	0.306	0.0508	0.175	0.105
	(0.894)	(0.961)	(0.953)	(0.848)
GDP per capita, t-1	-0.0000344	-0.0000123	-0.0000153	-0.0000125
	(0.0000216)	(0.0000188)	(0.0000183)	(0.0000170)
Share of agriculture, t-1	-0.0430	-0.0886	-0.0820	-0.0760
	(0.0796)	(0.0597)	(0.0613)	(0.0642)
Inflation, t-1	-0.00255*	-0.000109***	-0.000107***	-0.000114***
	(0.00153)	(0.0000323)	(0.0000328)	(0.0000344)
Trade share, t-1	0.00984**	0.00948**	0.00809*	0.00959**
	(0.00462)	(0.00452)	(0.00448)	(0.00438)
Kleibergen-Paap F Stat	29.76	27.78	27.40	26.61
Sargan-Hansen J-statistic	0.272	1.403	0.332	1.459
(p-value)	0.602	0.236	0.564	0.227
Obs.	1201	1286	1238	1298
Countries	88	88	87	88

* $p < .10$, ** $p < .05$, *** $p < .01$

Standard errors are in the parentheses and are clustered at the recipient country level. All variables, including the migration policy variable, are defined yearly. The regression includes country fixed effects only, as inclusion of the migration policy variable, which is defined yearly, overlaps with the year fixed effect.

Table C13: First Stage, Middle Income Countries

	(1)	(2)	(3)
	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1
Raise/Maintain Immigration	0.0151***	0.0153***	
	(0.00519)	(0.00529)	
FDI share	0.0423		0.0195
	(0.0320)		(0.0196)
log(GDP per capita), t-1	0.117	0.0408	-0.881
	(1.038)	(0.979)	(1.988)
GDP per capita, t-1	-0.0000736	-0.0000719	0.000167
	(0.000236)	(0.000229)	(0.000237)
Inflation, t-1	-0.00306***	-0.00328***	-0.00282***
	(0.000508)	(0.000483)	(0.000648)
Trade share, t-1	0.0111	0.0142*	0.0156
	(0.00802)	(0.00820)	(0.0133)
Kleibergen-Paap F Stat	4.492	8.409	0.994
Sargan-Hansen J-statistic	0.491	0	0
(p-value)	0.484	.	.
Obs.	570	570	655
Countries	54	54	56

* $p < .10$, ** $p < .05$, *** $p < .01$

Standard errors are in the parentheses and are clustered at the recipient country level. All variables, including the migration policy variable, are defined yearly. The regressions with migration policy being one of their instruments include country fixed effects only, as inclusion of the migration policy variable, which is defined yearly, overlaps with the year fixed effect. Regression with only FDI as an instrument includes both country and year effects.

Table C14: First Stage, High Income Countries

	(1)	(2)	(3)
	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1
Raise/Maintain Immigration	0.000905	0.00149	
	(0.00151)	(0.00159)	
FDI share	0.00631***		0.00646***
	(0.00128)		(0.00142)
log(GDP per capita), t-1	0.322	0.905	1.484
	(1.318)	(1.199)	(0.942)
GDP per capita, t-1	-0.0000118	-0.0000222	-0.0000180
	(0.0000311)	(0.0000274)	(0.0000363)
Inflation, t-1	0.00669	0.00583	0.0118
	(0.0222)	(0.0225)	(0.0239)
Trade share, t-1	0.00579	0.00276	0.00430
	(0.00477)	(0.00307)	(0.00473)
Kleibergen-Paap F Stat	13.25	0.881	20.57
Sargan-Hansen J-statistic	1.321	0	0
(p-value)	0.250	.	.
Obs.	656	670	766
Countries	39	39	39

* $p < .10$, ** $p < .05$, *** $p < .01$

Standard errors are in the parentheses and are clustered at the recipient country level. All variables, including the migration policy variable, are defined yearly. The regressions with migration policy being one of their instruments include country fixed effects only, as inclusion of the migration policy variable, which is defined yearly, overlaps with the year fixed effect. Regression with only FDI as an instrument includes both country and year effects.

Table C15: First Stage, Lower Middle Income Countries

	(1)	(2)	(3)
	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1
Raise/Maintain Immigration	0.0472***	0.0473***	
	(0.0129)	(0.0130)	
FDI share	0.0182		-0.0407*
	(0.0483)		(0.0207)
log(GDP per capita), t-1	8.941**	9.288**	3.598
	(4.482)	(4.641)	(5.910)
GDP per capita, t-1	-0.00398*	-0.00412*	-0.00248
	(0.00219)	(0.00226)	(0.00217)
Inflation, t-1	-0.0150	-0.0129	0.00339
	(0.0109)	(0.0112)	(0.0222)
Trade share, t-1	0.0686**	0.0695**	0.0915**
	(0.0296)	(0.0309)	(0.0353)
Kleibergen-Paap F Stat	7.689	13.16	3.861
Sargan-Hansen J-statistic	0.126	0	0
(p-value)	0.723	.	.
Obs.	234	234	252
Countries	28	28	30

* $p < .10$, ** $p < .05$, *** $p < .01$

Standard errors are in the parentheses and are clustered at the recipient country level. All variables, including the migration policy variable, are defined yearly. The regressions with migration policy being one of their instruments include country fixed effects only, as inclusion of the migration policy variable, which is defined yearly, overlaps with the year fixed effect. Regression with only FDI as an instrument includes both country and year effects.

Table C16: First Stage, Upper Middle Income Countries

	(1)	(2)	(3)
	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1
Raise/Maintain Immigration	0.00341	0.00298	
	(0.00266)	(0.00291)	
FDI share	0.0408		0.0458*
	(0.0323)		(0.0259)
log(GDP per capita), t-1	-7.942***	-8.265***	-5.734**
	(2.670)	(2.728)	(2.343)
GDP per capita, t-1	0.00115***	0.00119***	0.00108***
	(0.000393)	(0.000389)	(0.000325)
Inflation, t-1	-0.00537***	-0.00575***	-0.00429***
	(0.000628)	(0.000743)	(0.000657)
Trade share, t-1	-0.000423	0.00315	0.00190
	(0.00466)	(0.00354)	(0.00622)
Kleibergen-Paap F Stat	4.302	1.052	3.135
Sargan-Hansen J-statistic	3.308	0	0
(p-value)	0.0689	.	.
Obs.	333	333	389
Countries	34	34	38

* $p < .10$, ** $p < .05$, *** $p < .01$

Standard errors are in the parentheses and are clustered at the recipient country level. All variables, including the migration policy variable, are defined yearly. The regressions with migration policy being one of their instruments include country fixed effects only, as inclusion of the migration policy variable, which is defined yearly, overlaps with the year fixed effect. Regression with only FDI as an instrument includes both country and year effects.

Table C17: First Stage, OECD

	(1)	(2)	(3)
	Remittance Share, t-1	Remittance Share, t-1	Remittance Share, t-1
Raise/Maintain Immigration	0.00165	0.00169	
	(0.00154)	(0.00157)	
FDI share	-0.00428*		-0.00383**
	(0.00237)		(0.00184)
log(GDP per capita), t-1	2.771***	2.806***	2.925***
	(0.975)	(0.898)	(0.778)
GDP per capita, t-1	-0.0000712***	-0.0000735***	-0.0000349
	(0.0000247)	(0.0000225)	(0.0000313)
Inflation, t-1	0.0159	0.0166	-0.00169
	(0.0172)	(0.0173)	(0.0181)
Trade share, t-1	0.00843**	0.00805**	0.00857*
	(0.00404)	(0.00337)	(0.00494)
Kleibergen-Paap F Stat	2.019	1.157	4.359
Sargan-Hansen J-statistic	1.636	0	0
(p-value)	0.201	.	.
Obs.	654	668	752
Countries	34	34	34

* $p < .10$, ** $p < .05$, *** $p < .01$

Standard errors are in the parentheses and are clustered at the recipient country level. All variables, including the migration policy variable, are defined yearly. The regressions with migration policy being one of their instruments include country fixed effects only, as inclusion of the migration policy variable, which is defined yearly, overlaps with the year fixed effect. Regression with only FDI as an instrument includes both country and year effects.