

The Joint Effects of Emigration and Remittances on Public Goods Provisioning*

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Abstract

Although both emigration and remittances may affect public goods provision, their joint effects are seldom examined. We argue that both emigration *and* remittances may change the political economy of public goods provision in sending communities. Emigration may lead to political disengagement, as emigrants are more educated and motivated than the average citizen. Remittances may counteract this by providing resources to emigrants' families to engage in politics. Both emigration and remittances may also lead to changes in preferences over public goods. Examining emigration without remittances or vice-versa is therefore theoretically problematic and misses an important mechanism through which emigration works. Using data from Kerala, India, we employ a structural equation model to estimate how emigration and remittances affect public goods provision. Our results suggest that remittances “make up” for emigration: areas with large numbers of emigrants have no fewer public goods than areas without many emigrants.

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Economic openness — in trade in goods, services, capital, or labor — is thought to lead to economic growth and development. Yet, the impact of emigration and remittances has received relatively little attention in the literature. In fact, the attention that emigration has received has largely been negative: emigration is thought to deplete sending countries of their best and brightest, causing “brain drain” and “ghost towns” (e.g. Bhagwati and Hamada 1974, Massey, Goldring and Durand 1994). More recently, scholars have pointed out that migration has a positive impact on economic growth, since it allows the application of human capital where it would get the highest return, and since it could spur investments in human capital or “brain gain” (Chand and Clemens 2009). Remittances, on the other hand, have tended to be viewed very positively, and have even been declared the “new development mantra” by politicians and scholars (Kapur 2003). Still others fear that remittances lead to dependency rather than development (De Haas 2012). What are the effects of emigration and remittances on the political economy of development? Can remittances “make up” for the purported negative effects of emigration?

Unfortunately, we do not know the answer to these questions because scholars rarely examine emigration and remittances together. For example, Bhagwati and Hamada (1974) posit that their model on brain drain could be enriched by the inclusion of remittances but do not include them. Hanson and Woodruff (2003) argue that remittances relax credit constraints and thereby spur investments in education but only test for the effect of emigration and not remittances. Hildebrandt and McKenzie (2005) examine migration on health outcomes but do not consider the impact of remittances, and others like Stark (2004) and Stark and Fan (2007) barely mention remittances at all. Research on remittances has also often occurred without accounting for emigration: for example, Ahmed (2000) examines the role of remittances on development in Somaliland without discussing the role that emigration plays, Ahmed (2012) argues that remittances and foreign aid can increase autocratic regime stability but does not assess the simultaneous effects of emigration which also likely affects regime stability (Miller and Peters 2014), Amuedo-Dorantes and Pozo (2005) examine the

effect of remittances on health outcomes but do not control for emigration which was found to be a significant factor in Hildebrandt and McKenzie (2005), and so on.

The separate study of emigration and remittances is theoretically and empirically problematic. Theoretically, those who study emigration without remittances fail to examine an important mechanism through which emigration has its effects. We argue that this mechanism is particularly important since the positive effects of remittances on public goods provisioning counteract the possibly negative effects of emigration. Since emigration and remittances invariably accompany one another, any empirical estimates of the effects of emigration and remittances alone are likely to be biased. For these reasons, we argue that it is essential to account for the effects of emigration and remittances together.

In this paper, we examine the effects of emigration and remittances, through changes in political behavior, on public goods provision. We focus on public goods provision as our dependent variable since it has long been thought to be constitutive of and critical for development (Olson 1993, Sen 2001). We argue that emigration might worsen public goods provisioning, but that remittances may offset these negative consequences. Emigration and remittances affect public goods provision through two channels: the political influence channel and the preference channel. In a democratic setting, policy-makers allocate public goods based on the preferences of the median voter, the preferences of those who lobby them, and the preferences of those who provide political contributions in cash and kind. Emigration and remittances are likely to shift the identity of the median voter and the identity of those who lobby or provide political support to the policy-maker (the political influence channel) and to shift the preferences of the median citizen for different public goods (the preference channel).

In order to test for the joint effects of emigration and remittances, two problems must be overcome. First, we cannot simply control for both emigration and remittances in an ordinary least squares model or even in a two-stage least squares model since remittances occur in response to emigration and vice-versa. Placing both variables in the regression will

lead to post-treatment bias. On the other hand, examining the effects of emigration without considering the effects of remittances or vice-versa would lead to omitted variable bias, the sign and magnitude of which we do not know. Second, given that we hypothesize that remittances make up for emigration, we need an estimation strategy that would allow us to parse the direct effects of emigration and remittances, and the indirect effects of emigration via remittances, on public goods provision. Simply examining the reduced form of emigration on public goods would obfuscate these different effects. To overcome these problems, we employ a structural equations model (SEM) to simultaneously estimate the direct and indirect effects of emigration and remittances on public goods provision. Structural equations modeling allows us to specify a system of equations that explicitly describes the relations between the dependent and independent variables, including the mediating effect of remittances, while simultaneously accounting for the endogeneity of emigration and remittances.

We study the effects of emigration and remittances on the political economy of development in Kerala, India. Although much of the research on emigration and remittances focuses on Mexico, that context may not be a good test case for much of the migration that occurs today. Most Mexicans migrate to the United States where many settle permanently. In contrast, the majority of the world's migrants migrate to countries — like those in the Persian Gulf or East Asia — where migrants have little hope of permanent settlement, and expect to return to their home community. Because these migrants can only migrate temporarily, their effects may be different than migrants who have at least some expectation of migrating permanently. Our examination of the effects of emigration and remittances in India is particularly likely to shed light on the effects of emigration within the Global South and from the South to wealthy, autocratic states where permanent settlement is not an option.

Our study makes three contributions: it highlights the ways in which remittances might mediate the effects of emigration, it provides a method for estimating the effects of emigration and remittances simultaneously, and it studies emigration in a new, arguably more representative setting. We proceed by discussing the theoretical direct and indirect effects

of emigration and remittances on public goods provisioning. We then introduce the context, the data and the method — simultaneous equations models — that we employ. In the next section, we present our results, robustness tests, an examination of heterogeneous treatment effects, and demonstrate the payoffs to switching from ordinary least squares or instrumental variable analyses to the SEM strategy. To preview our results, we find that while emigration has positive and statistically significant indirect effects, via remittances, on the provision of schools, these effects are swamped by imprecisely estimated negative direct effects. Standard OLS and 2SLS estimates of these effects yield very different results. We conclude with a discussion of the substantive and methodological implications of our work.

1 Emigration, Remittances, and Public Goods Provision

Emigration could affect the provision of public goods directly, and also indirectly, through remittances. Much of the literature on the effects of emigration and remittances on development focuses on how they each *individually* change economic behavior (De Haas 2012, Nyberg-Sørensen, Hear and Engberg-Pedersen 2002). In contrast, we posit a theory on how they might *jointly* affect political behavior which affects development. Emigration and remittances have their effects on public goods provision through two channels: they both change the people who seek to influence politics (the political influence channel) and people’s preferences over public goods (the preference channel). We argue that while emigration likely leads to a “political motivation drain,” remittances can compensate for this with a “political resource gain.” Emigration and remittances also shift preferences in the community over public goods. The possibility to emigrate, even if emigration does not occur, may change preferences over public goods as well. We discuss the effect of emigration and remittances on political influence and then on preferences and lastly discuss their combined effect. We argue that the effects of emigration and remittances on public goods are likely to be oppositely signed, possibly leading to a null net effect.

1.1 The Political Influence Effect

To begin, we examine the political influence channel. We start with the preferences of the policy-maker who determines the allocation of public goods. By public goods, we refer to goods that are commonly thought of as public, such as those relating to education, health care, roads and water, although we acknowledge that these goods are not strictly public (in other words, they are not fully but are substantially non-rival and non-excludable). Consistent with the context, introduced below, in which we wish to test this theory, we assume that local governments control spending, but not taxation, which is decided by upper government tiers. Such an “imbalance” between spending and revenue-raising functions of local governments is a common feature in local governments in many developing countries (Bird and Vaillancourt 2008). Changes in the political process driven by emigration and remittances will therefore not change the total amount spent on public goods, but will rather affect how tax revenue is spent.

Imagine that a policy-maker in a democracy must allocate spending for public goods. If the provision of a certain good only depended on voting and everyone in the polity voted, the policy-maker would choose to provide the level of that good consistent with the position of the median citizen. If some citizens choose not to vote, the policy would reflect the median voter, who might or might not have the same preferences as the median citizen. Another way that the provision of public goods would be different from that of the median citizen would be if the policy-maker placed more weight on the preferences of some due to non-electoral activities such as lobbying, campaign contributions, and get-out-the-vote drives.

Emigration and remittances may affect the provision of public goods through changing who has both electoral and non-electoral political influence. These changes occur because emigrants and their families that receive remittances are not random samples of the population. Instead, emigrants are richer, more educated, more motivated and, likely, more politically connected than non-emigrants. The costs of migration are frequently financed through savings and loans, often from family members. Thus, migrants are not the poorest

of the poor. They are not the wealthiest or best connected, either, since these people have less to gain from migration. In terms of income, emigrants are from the “middle class.” We similarly know that emigrants tend to be more educated than non-migrants (e.g. Borjas 1987, McKenzie, Gibson and Stillman 2006), but again they are unlikely to be the most educated as the most educated are likely to have opportunities at home. Given that support for education usually runs in families, we expect that their families are also more educated or at least value education to a larger degree. Lastly, it is likely that migrants and their families have unobservable characteristics, such as motivation, that make them different from than non-migrants. Using a visa lottery to New Zealand, McKenzie, Gibson and Stillman (2006) found that Tongans who had applied for the lottery but had not gotten a visa to New Zealand earned more in Tonga than similarly skilled non-applicants. The authors attribute this difference to the greater motivation of would-be emigrants.

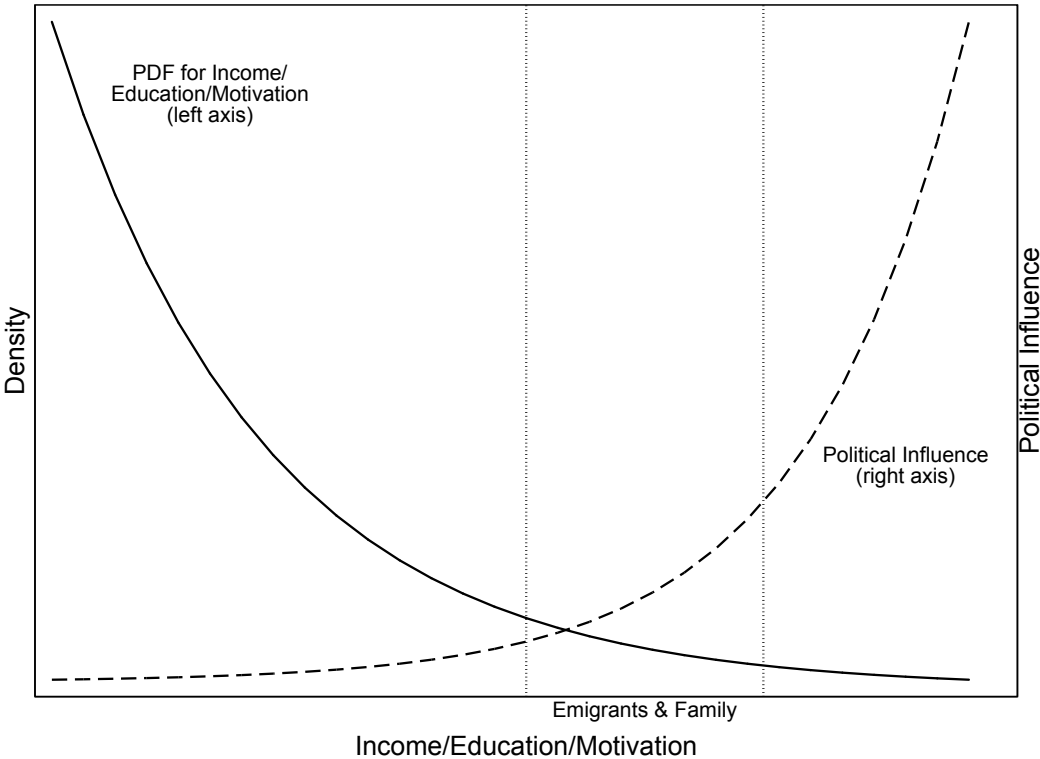
Figure 1 provides a stylized representation of who we think migrants are, and begins to suggest the possible effects of their exit on their communities. The downward sloping probability density function (PDF) shows the income (education or motivation) distribution in a poor country, wherein there are many poor people and few rich people. The upward sloping function shows the relationship between income (education or motivation) and political influence, which usually increases with income (education or motivation). Migrants are typically, as the figure indicates, at the upper end — but not at the very top end — of the income (education or motivation) distribution.¹ The loss of these individuals through migration and the money they send back to their families are therefore likely to have a different effect on public goods than would be the case if a random subset of the population left, or if poorer, less educated and/or less motivated people left.

[FIGURE 1 ABOUT HERE]

Emigration is likely to change the identity of the median voter. While overseas, most

¹Emigrants from some parts of India, however, do tend to come from the elite segment of society (Kapur 2010).

Figure 1: A stylized representation of the relationships between income, political influence and emigration



Notes: This figure depicts the distribution of income (and education, motivation) in a typical developing country, with many poor people and few rich people. It also depicts the relationship between political influence and income (and education, motivation): influence is increasing in income (and education, motivation). Lastly, emigrants and their families are shown to be in the upper part, but not the very highest part, of the income (and education, motivation) distribution.

emigrants cannot vote. Even those from countries that allow overseas voting find it difficult to vote, leading to very low turnout rates among emigrants (Lafleur and Chelius 2011). The loss of these citizens is probably greater in countries that do not have compulsory voting, as these more motivated citizens are likely to engage in politics. Emigration should therefore tip the balance in favor of greater influence for the wealthy and well-connected, leading to a different allocation of resources.

Emigration is likely to tilt the non-electoral means of political influence in favor of the wealthy and well-connected. One such means is lobbying; here we use lobbying in its most expansive definition as any action which attempts to influence policy outcomes. Lobbying may take the more official form of attending a city or village council (what is known as a *panchayat* in India) meeting or the less official form of meeting with a local representative. People may also support politicians through donating to campaigns, hosting events, canvassing for politicians, and undertaking other grassroots activities. All of these activities take motivation, time, resources, and connections. As we know that emigrants tend to be more motivated, the loss of these people while they are away may mean that there are fewer “middle class” villagers lobbying for public goods. Because the poor are less likely to have the time and connections to lobby local council members or support their campaigns, it is likely that the loss of emigrants will allow village elites to have even greater voice over the allocation of government resources, which may lead to less support for public goods.²

Remittances are likely to compensate for the effect of emigration, especially through the non-electoral means of political influence. On the one hand, in many electoral autocracies and developing democracies, local politics are imbued with patron-client ties. Remittances may reduce voter reliance on patrons, as migrant families develop a source of income independent from the patronage of local politicians, allowing them to disengage from politics rather than vote to ensure patronage (e.g. Diaz-Cayeros, Magaloni and Weingast 2003, Pfutze 2011). Further, if families who receive remittances can disengage from public life by obtaining

²Where local officials also control taxation, we might expect them to tax local elites less.

private forms of public goods — such as their own wells, generators, sending their children to private schools, etc. — they may choose to opt out of the political system (Adida and Girod 2011). We also know that in many contexts, including India, the wealthy are less likely to vote than the poor (Kasara and Suryanarayan 2014) and thus remittances may lead to further disengagement with politics. On the other hand, by providing income, remittances may increase the amount of time that families can spend on political behavior, which may make them more interested in politics and more likely to vote. Moreover, remittances are likely to give remaining family members more resources, and with more resources come greater access to politicians, and more time to engage in non-electoral politics. Thus, while remittances may make families more or less likely to show up to the voting booth, they are clearly likely to give families more resources to influence politics through non-electoral means.

In sum, we argue that emigration should lead to less political engagement by the “middle class” in developing countries. This should lead to greater political influence for the (relatively) wealthy and well-connected. Left at this, we would expect greater spending on policies that the wealthy favor and lower provision of public goods that the middle class and poor favor. However, remittances can compensate for the lower engagement by emigrants by increasing the influence of their families. Remittances should therefore lead to an increase in public goods favored by the middle class and the poor. Together, we may find zero net effect on provision of public goods for the poor and middle class as the emigration effect cancels out the remittance effect.

1.2 The Preference Effect

What are the kinds of public goods that emigrants and their families want? Emigration and remittances may change preferences for public goods through a demographic effect, a demonstration effect, and/or an income effect. Emigration leads to fewer people, especially fewer young men. This demographic effect is likely to lessen the demand for the public goods

that emigrants — mostly young men — use, such secondary and tertiary education. The ability to emigrate, even if people do not actually emigrate, may also affect the demand for public goods (we term this the demonstration effect). Chand and Clemens (2009) argues that when emigration requires higher levels of education, as it often does, emigration could spur emigrant-sending communities to invest in even more education. Because emigration requires a higher level of education, would-be emigrants invest in education in order to migrate, increasing the preference for schooling in the population. Similarly, we might expect increased demands for health care as most legal migrants need vaccinations and to pass medical tests in order to get visas for travel.

Lastly, remittances are likely to increase the demand for public goods, as migrant families' have more disposable income with which to consume and/or invest (Cox and Ureta 2003, Kapur 2003, Adida and Girod 2011). For example, remittances allow parents to keep their children in school longer, both as parents can afford to pay the school fees associated with schooling and as they are less likely to need the income provided by children. Similarly, remittances increase spending on health care, as families can afford health fees. Remittances therefore increase the demand for education- and health-related public goods. Remittance-fueled investments also frequently increase the demand for complementary public goods. For example, remittances allow for investments in small business and agriculture, which to be profitable need quality roads, ports, and other facilities that are unlikely to be privately provided. Remittances also allow families to increase the quality of their home, which might increase their demand for public goods such as those relating to sanitation.

Together, then, emigration and remittances change the demand for public goods. Emigration itself is likely to reduce the demand for public goods used by emigrants, who are mostly young adults, such as secondary and tertiary school and some health care. However, the ability to migrate is likely to increase the demand for these goods. Remittances are likely to reinforce this effect by increasing demand for schooling and health care along with increasing the demand for public goods like roads and ports needed by businesses.

1.3 Predictions

Here, we discuss our predictions for the public good in question for this study — schooling. Scholars have long argued that the development of human capital is one of the most important mechanisms for development; for example, investment in human capital provides large private and social returns (Psacharopoulos 1994), and human capital differences help explain the large wage and productivity differentials between rich and poor countries (Kremer 1993). We are interested in the provision of schools in general because they are the critical public good for increasing human capital (Duflo 2001), and we study the provision of secondary schools in particular because in our context, Kerala, India, primary education is already almost ubiquitous.³

Emigration and remittances change the demand for secondary schools. Because most emigrants are young, emigration is likely to decrease the demand for secondary schools through the demographic effect as some young people will choose to emigrate rather than complete their education. On the other hand, because emigration often requires greater levels of schooling, the possibility to emigrate may lead to a greater demand for secondary schooling through the demonstration effect. In sum, emigration by itself may increase or decrease the demand for secondary schools. Remittances are likely to increase the demand for secondary schools as families can afford to send their children to school longer.

Emigration and remittances also change who influences political decisions. Emigration decreases the influence of relatively well-educated middle class families while remittances increase their influence. We hypothesize that emigration should have a negative effect on the provision of secondary schools because it decreases the demand for secondary schools and decreases the political influence of the middle class which has a revealed preference for education. However, this effect may be weakened by the fact that the ability to emigrate may induce a greater demand for education through the demonstration effect. Remittances, on the other hand, should have an unambiguously positive effect on the provision of public

³By one count, 98% of children in Kerala attended primary school (Huebler 2007).

schools as they both increase the demand for schools and empower people to improve their provisioning. Which effect dominates or whether they off-set each other is an empirical question.

2 Context: Kerala, India

We consider the effects of emigration from and remittances to the south-western Indian state of Kerala. Kerala has often been held to be a model of economic and social development (Franke and Chasin 1989, Heller 2000, Sen 1991, Singh 2011). This is reflected in both its 95% literacy rate, which is substantially higher than India's 65% literacy rate, as well as its GDP per capita, which has been about 150% of the country's GDP per capita for the last 10 years. Nonetheless, while scoring high on development indicators like literacy and women's rights, Kerala has generally lagged behind in terms of industrialization, economic growth, and unemployment (Thomas 2005).

Kerala is India's largest emigrant-sending and remittance-receiving state. In 2011, 2.3 million Keralites or 6.8% of the state's population were emigrants across the world. The level of emigration is high both in comparison to all countries (about 3% of the world's population are migrants) and to the rest of India (0.9% of Indians are emigrants; see The World Bank 2011). Most of Kerala's emigrants go to the Persian Gulf (Iran, Iraq, Kuwait, Saudi Arabia, Qatar, Bahrain, United Arab Emirates and Oman), with the United Arab Emirates and Saudi Arabia as the most common destinations. Fueled by "oil money," these migrants are particularly known to send remittances home. Migrants from Kerala are mostly employed in education, office work and construction. Their incomes are substantial by developing country standards. Keralites send large amounts of remittances back home: in our data they sent approximately \$1,000 a year, or more than twice the state's GDP per capita.

Large-scale migration from Kerala has a long history. During the colonial period, Keralites migrated in large numbers to Sri Lanka, Malaysia, Singapore, Mauritius and the British

Caribbean (Kurian 1979, Nair 1991). Migration to the Persian Gulf from Kerala began in earnest after the 1973 oil shock, when rising oil prices increased the number and scale of construction projects, and spurred industrial growth, in the Gulf. Emigration to the Gulf further increased in the 1980s, as Gulf countries shifted their labor recruitment strategies from Arab to Asian countries.⁴ Keralites were well placed to take advantage of this change in strategy through their traditional trading links with the Gulf (Nair 1991, 30).

Most migrants find employment opportunities in the Gulf through informal, religion-based networks of family and friends (Koola and Ozden 2008). A survey of 696 migrants in 1984, for example, found that 92% of respondents found employment opportunities from a friend or relative, and that the remaining 8% were recruited through a formal agency (Nair 1991, 32).⁵ Recruitment agencies are themselves often run or staffed by Keralites who use their connections to find workers (Martin 1996). The religious aspect of migration networks means that Christians tend to emigrate through Christian networks, and that Muslims tend to emigrate through Muslim networks. Hindus are less likely to migrate, relative to their share in the population (while Muslims, Christians and Hindus formed 44, 25 and 31% of emigrants, they formed 23, 20 and 57% of the population). There is also a geographic aspect to the networks, with areas that are better connected with Kerala's coast sending more migrants. Lastly, these networks have an arguably idiosyncratic and path dependent aspect, with regions with longer ties to the Gulf tending to have larger networks of migrants.

In demographic terms, emigrants from Kerala fit the assumptions of our theory. The high costs of emigration — in our data, approximately \$1,000 per emigrant, more than double average state GDP per capita — means that only families that are relatively well-off can afford to send a migrant. Migrants also have relatively high levels of education: 73% of emigrants in our data have finished secondary schooling versus only 62% of the non-migrant

⁴Gulf nations were concerned that Arab immigrants would increase support among natives for Pan-Arabism, which would erode local elites' control over oil rents and/or lead to increased demands for social welfare benefits from non-Gulf Arabs (Abella 1995).

⁵Similarly, a survey in the late-1990s found that 76% of return migrants had had help from friends and relatives to migrate (Prakash 2000, 4536).

population.⁶ Given the conventional wisdom of Asian migrants in the Persian Gulf as low-skill, it may be surprising that they are relatively educated. Note, however, India's Office of the Protector of Emigrants (POE) regulates the employment contracts of emigrants without secondary education, which disincentivizes the less educated from leaving. Further, Indian secondary school education is less rigorous than in the OECD, as measured by the low scores of Indian students on the Programme for International Student Assessment (PISA) test (Chhappia 2012).

While migration distinguishes Kerala from the rest of India, Kerala is not atypical in cross-national perspective. Approximately 43% of all migrants from developing countries go to other developing countries and another 14% go to high-income non-OECD countries (The World Bank 2011, 12). The India-United Arab Emirates migration corridor was the 9th largest migration corridor in the world in 2011, with 2.2 million migrants, and the India-Saudi Arabia corridor was the 16th largest (The World Bank 2011, 5). Keralite migrants to the Persian Gulf are similar to many other migrants, including those from other parts of Asia (Sri Lanka, the Philippines, Pakistan and Bangladesh) and the Middle East (Egypt and Jordan) who migrate to the Gulf. None of these migrants can settle permanently in receiving countries and therefore undertake short-term or circular migration and send home remittances. Keralite migrants are similar in some respects even to migrants that have the opportunity to settle permanently. For example, a 2006 survey of Latino immigrants in the US found that 34% do not plan to stay in the US for good and 51% send home remittances (Waldinger 2007). Thus, studying the effects of Keralite migration will help shed light on the effects of emigration for a large portion of the world's migrants, who migrate specifically to send remittances home and do not have plans to settle permanently abroad.

⁶Keralite emigrants, while more educated than the average Keralite, are less-educated than the average Indian immigrant. Kapur (2010) finds that 43% of all Indian immigrants have post-secondary education. These more elite emigrants tend to go to the US and other English-speaking, developed nations whereas Keralite emigrants tend to go to the Persian Gulf. Keralite emigrants tend to be more representative of the average emigrant from all countries than the average Indian emigrant.

3 Data and Empirical Strategy

To examine the effects of emigration and remittances on public goods provision, we draw on several data sources. The first is an unusually rich household dataset — the South Asia Migration Survey — collected in 2003 by the Center for Development Studies in Thiruvananthapuram, Kerala. The survey sampled a random selection of households across the state, after stratifying by district. For each household, we have detailed data on the number of people who left the country (emigrants), their jobs, data on the remittances they sent back home and the use to which they were put, their education and so forth. We collapse this dataset to the village level and combine this with data on public goods provisioning and socio-economic outcomes from the 1981 and 2001 censuses of India. We also include local election data from 2000 in the dataset.⁷ Together, these data allow us to examine how public goods provision varies with emigration and remittances across local jurisdictions.

Table 1 displays the summary statistics from our local-level dataset. There are 115 villages in the dataset; 4,918 households were enumerated across these jurisdictions to create the variables from the survey, including those on emigration and remittances. The table summarizes the key variables used the analysis. These include the number of secondary schools per capita,⁸ which is our dependent variable, and the percent of emigrants in each village and log remittances per capita, which are our key independent variables. In order to examine heterogeneous treatment effects, the dataset also includes the Congress-led, right wing UDF coalition vote share, and pre-treatment village literacy rates, from the 1981 census.

[TABLE 1 ABOUT HERE]

There are two methodological issues that need to be addressed to determine the effects of emigration and remittances. First, emigration and remittances invariably accompany one

⁷To match the emigration data with the outcomes data, we exclude those who left from 2001 on from our calculation of the proportion of emigrants in the population.

⁸While most of Kerala’s secondary schools are government-funded and government-run, some secondary schools are publicly-funded but are privately run.

Table 1: Dataset summary

	Obs.	Mean	Std. Dev.	Min.	Max.
Secondary schools/population in 1000s	115	11.7	8.9	0.0	39.5
Reg. pvt. health workers/population in 1000s	115	0.12	0.13	0.00	0.72
Log % emigrants	115	1.4	0.7	0.0	2.8
Log remittances per capita	115	6.9	1.2	3.0	9.2
Std. dev. of temperature, 1973–1986	115	0.33	0.01	0.30	0.35
Std. dev. of temperature, 1999–2003	115	0.23	0.06	0.14	0.33
Emigrants' mean year of departure	113	1995	3	1987	2003
% Literacy	115	69.4	9.7	45.3	84.7
% UDF vote	100	37.2	8.9	11.6	55.4
Log population	115	9.7	0.7	7.3	11.1
% SC/ST	115	11.6	5.8	0.9	38.3
% Ezhava	115	21.5	18.4	0.0	85.6
% Christian	115	19.1	23.8	0.0	81.1
% Muslim	115	25.2	29.6	0.0	100.0

another. Therefore, the effects of emigration and remittances must be simultaneously examined. This is particularly the case as we hypothesize that remittances can compensate for emigration. Second, emigration and remittance are endogenous to public goods. Emigrants often leave because there is little economic opportunity and they send remittances to make up for a lack of public goods. Researchers ought take this endogeneity into account.

We argue that a simultaneous (or structural) equations model (SEM) is an appropriate way deal with these methodological issues, and that using ordinary least squares (OLS) or two-stage least squares (2SLS) regression leads to biased inferences. Recall that we had hypothesized that emigration would have a direct negative effect on public goods but that it indirectly, via remittances, would compensate for this effect. Thus, if we only examined the effect of emigration on public goods, we would have an incomplete picture of the true effect of emigration of public goods provisioning. Also, examining the effects of remittances on public goods provisioning — without accounting for the direct effects of emigration — would lead to the introduction of omitted variable bias. The problem with using OLS or 2SLS to examine the effects of emigration is that if scholars include remittances they introduce post-treatment bias but if they fail to include remittances they may introduce omitted variable bias. Furthermore, including remittances in one model but excluding it in another does allow us to bound the bias in the estimated effect of emigration (King and Zeng 2006).

SEM allows for the simultaneous estimation of the relations between emigration, remittances, and public goods provision. The method allows us to estimate both the direct effects of emigration and remittances, and the indirect effect of emigration through remittances, on public goods provision. In particular, it allows us to measure how much of the effect of emigration is driven through the remittance mechanism. The specific model we employ is described by the following system of three equations:

$$secondaryschools_i = \alpha_1 + \beta_1 emigrants_i + \gamma_1 remittances_i + \lambda_1 \mathbf{X}_i + \epsilon_{1i} \quad (1)$$

$$emigrants_i = \alpha_2 + \kappa oilweathershock_i + \lambda_2 \mathbf{X}_i + \epsilon_{2i} \quad (2)$$

$$remittances_i = \alpha_3 + \beta_2 emigrants_i + \lambda_3 \mathbf{X}_i + \epsilon_{3i} \quad (3)$$

The first equation relates our dependent variable, secondary schools, to emigration, remittances and \mathbf{X} , which is a set of controls for recent weather, religion, caste and population size. The second equation, which identifies the system, models emigration as a function of an instrument, *oilweathershock_i*, and controls. The third equation models remittances as a function of emigration and controls. Together, this set of equations allows emigration and remittances to directly affect the provision of secondary schools, and for emigration to indirectly affect the provision of secondary schools via its effect on remittances. We employ this relatively simple structural model based on our theoretical expectations about how the variables affect each other, and in order to demonstrate the payoffs to SEM. To control for district fixed effects, we difference the data from the district mean. Later, and in order to demonstrate the payoff to SEM as compared with OLS or 2SLS, we compare the estimated direct and indirect effects of emigration and remittances using these three methods.

Our instrument for emigration, *oilweathershock_i*, is the standard deviation in temperature in 1973–1986, calculated for each village or observation in the dataset. This instrument captures plausibly exogenous *pull* and *push* factors that cause emigration. In 1973, world oil prices jumped from under US\$20 (2010 dollars) a barrel to over US\$40 a barrel. Oil prices remained around that level until the late 1970s, when they jumped again to over US\$70 a barrel. In 1986, oil prices crashed, returning to just over US\$20 a barrel. Due to the high oil prices, Persian Gulf countries were flush with cash and began recruiting large numbers of workers from Kerala to work on construction projects and in other jobs. The high oil prices during this time period therefore created the *pull* factors that attracted immigrants. Large fluctuations in temperature in Kerala during this time period created the *push* factors. Most migrants from Kerala are from rural areas and large temperature fluctuations would have

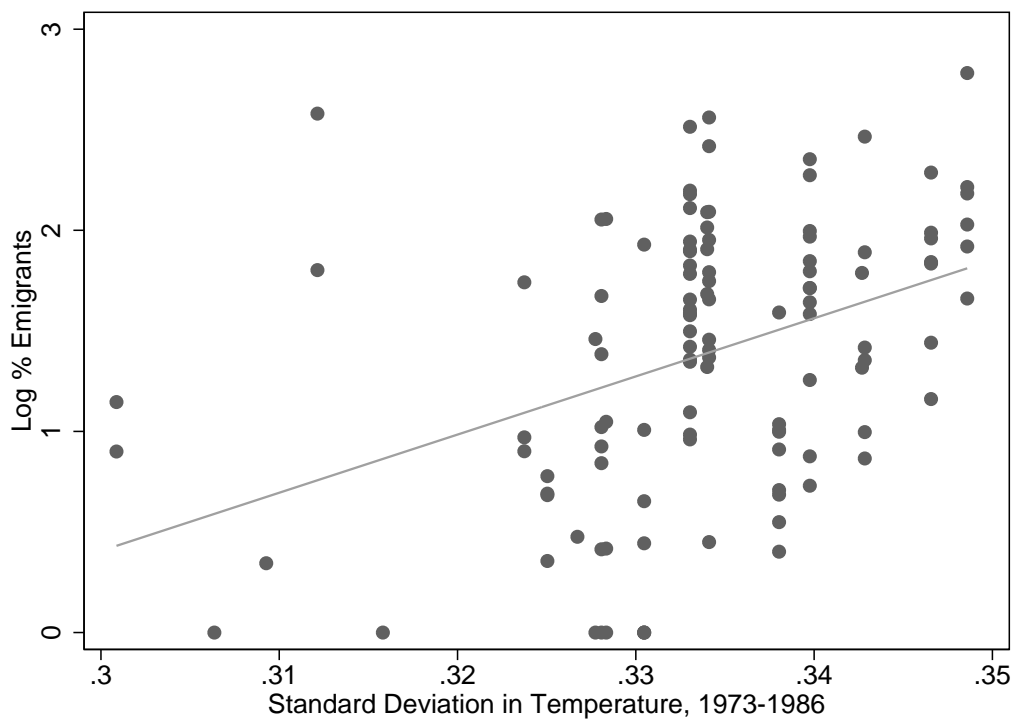
made farming more risky. As families often send migrants as part of a risk-mitigation strategy, areas that have larger temperature fluctuations during this time period will have sent more migrants. As migrants oftentimes stay abroad for long periods, and as new migrants frequently travel along existing migration networks, the networks created in the 1970s and 1980s will have led to a larger stock of emigrants in 2000.

$oilweathershock_i$ is an appropriate instrument for emigration for three reasons. First, and as described above, we have theoretical reasons to believe that variation in temperature during the oil shock years will have caused emigration, by “pushing” people out of Kerala and “pulling” them to oil-rich countries. Second, the data suggest that $oilweathershock_i$ is indeed positively related to emigration ($\rho = .22, p < 0.01$). As Figure 2 suggests, villages that had greater variation in temperatures in 1973–1986 have many more emigrants in 2000 than those areas with less variation in temperature. Third, $oilweathershock_i$ — controlling for recent temperature variation over five years, which might directly impact emigration — likely meets the exclusion restriction, in that it only affects public goods via its effect on emigration. By controlling for current temperature variation, we control for the possibility that recent five-year temperature variation directly influences the provision of secondary schools. Although the exclusion restriction can naturally never be tested, we conduct balance or placebo tests for the “effect” of the instrument on the five variables in our control set (Online Appendix Table A1). Reassuringly, the instrument is orthogonal to these observables.

[FIGURE 2 ABOUT HERE]

To review, the system defined by equations 1–3 is identified by $oilweathershock_i$, controlling for recent five-year variation in temperature. The principle underlying this strategy is that variation in historical temperatures during a high emigrant demand period should have no effect on public goods provisioning today, controlling for recent temperature variation. The $oilweathershock_i$ instrument is used to predict emigration in equation 2. Emigration is in turn used to predict remittances in equation 3. Finally, emigration and remittances are used to predict public goods in equation 1. Although a number of other more complex

Figure 2: First stage relationship between emigration and its instrument



specifications are plausible (and are presented in the robustness tests below), this system of equations describes the essential relationships that we seek to model.

4 Empirical results

Table 2 shows the results of the structural equation model described by equations 1–3. We begin considering the second, identifying equation, which instruments for emigration with the standard deviation of the mean temperature between 1973 and 1986, controlling for recent 5-year standard deviation of the mean temperature, among other variables. Consistent with Figure 2, the instrument is strongly and significantly related to emigration. An increase in the instrument — which captures the degree to which emigrants were “pushed” out of Kerala due to variation in the temperature at a time of high demand for emigrants — from the 25th percentile to the 75th percentile increases emigration by 1.3 emigrants, or about two-thirds of a standard deviation.⁹ Consistent with accounts that emphasize co-religiosity as a driver of emigration (Koola and Ozden 2008), places with larger Muslim populations are also more likely to send emigrants. The third equation models remittances as a function of emigration and the standard control set. As expected, remittances are strongly influenced by emigration, with a 10% increase in emigration increasing remittances by 12% per capita.

[TABLE 2 ABOUT HERE]

The first equation estimates the direct effects of emigration and remittances on secondary schools per capita, suggesting that emigration decreases secondary schools per capita, and that remittances do the reverse. Although neither effect is statistically significant, their signs are as expected. Emigration has a negative direct effect on public goods, while remittances have a positive effect. Recall that these effects do not account for the indirect effects of emigration, via remittances, on secondary schools.

⁹In a bivariate 2SLS regression, and where emigration is instrumented by the standard deviation of temperatures between 1973–1986, the first stage F -statistic for emigration is 33, well above the critical threshold of 10.

Table 2: SEM estimates for the effects of emigration and remittances

	Secondary schools/population 1	Log % emigrants 2	Log remittances per capita 3
Log % emigrants	-1.387 [2.489]		1.176*** [0.169]
Log remittances per capita	0.840 [0.783]		
Std. dev. of temperature, 1973–1986		27.45** [9.236]	
Std. dev. of temperature, 1999-2003	-43.52 [54.58]	-6.557 [3.691]	-2.784 [6.206]
Log population	-1.035 [1.440]	-0.0679 [0.108]	0.0400 [0.106]
% SC/ST	-0.117 [0.150]	0.00458 [0.00959]	-0.00649 [0.0200]
% Ezhava	0.0191 [0.0622]	0.00136 [0.00420]	-0.00346 [0.00453]
% Christian	-0.00234 [0.0457]	-0.00156 [0.00263]	-0.00184 [0.00925]
% Muslim	0.00592 [0.0421]	0.0122*** [0.00268]	0.000322 [0.00278]
Observations	115	115	115

Notes: All variables were demeaned to include district fixed effects; constant is constrained to be zero. Robust standard errors, clustered by district, in brackets. * significant at 10%; ** 5%; *** 1%.

To aid with the interpretation of the structural equation model, Table 3 summarizes the direct, indirect and total impacts of emigration from the above model. Note that the direct effects reported in the table, for both emigration and remittances, are the same as the coefficients in the regression table, and are both statistically indistinguishable from zero. However, the indirect effect of emigration of schools via remittances is positive and statistically and substantively significant. The table suggests that a one standard deviation or 3.6% increase in emigration from the mean of 4% of the population causes an increase in 0.36 secondary schools per 100,000 people, which is the equivalent of a 3% increase in schools. The indirect effect of emigration, via remittances, on secondary schools per capita is therefore substantively large. However, Table 3 also reports the total — direct and indirect — effects of emigration and remittances on secondary schools per capita. This shows that the statistically significant indirect effect of emigration is neutralized by the substantial variation in the direct effects of emigration.

[TABLE 3 ABOUT HERE]

To sum up, the data suggest that the positive and substantively and statistically significant indirect effect of emigration, via remittances, on secondary schools per capita is neutralized by the statistically insignificant negative direct effect of emigration on secondary schools. As a result, the total effect of emigration of public goods is statistically indistinguishable from zero.

4.1 Robustness tests

In this section, we note that our results are robust to a number of specification changes. First, the results are robust to the exclusion of a number of arguably “post-treatment” demographic controls, specifically percent Muslim, Christian and Ezhava (Ezhavas are a lower-caste Hindu group; see model 1 of Online Appendix Tables A2 and A3). We included these variables in the main specification even though they were measured by the survey

Table 3: Direct, indirect and total effects of emigration and remittances

	Direct effect	Indirect effect	Total effect
Log % emigrants	-1.387 [2.489]	0.988*** [0.142]	-0.399 [2.584]
Log remittances per capita	0.84 [0.783]		0.84 [0.783]

Notes: Robust standard errors, clustered by district, in brackets. * significant at 10%; ** 5%; *** 1%.

after emigration had occurred since the religious composition of a village is an important determinant of emigration patterns (Muslims and Christians tend to emigrate). The Indian census does not make available information on religion or the percent of Ezhavas and so pre-migration measures of these variables are not available. As expected, the estimated effects of emigration and remittances in this regression are larger than in the main specification, suggesting that controlling for post-treatment variables attenuates the estimated effects of emigration and remittances.

Second, we examine whether the results are robust to no longer differencing the village-level data from the district mean (and therefore, in effect, no longer controlling for district-specific time-invariant variables) and instead controlling for a lagged dependent variable from the 1981 census of India (model 2). We do not include the lagged dependent variables in the main specification since including these with district fixed effects leads to Nickell bias. The results are largely robust to this change.

Third, we examine whether our results are robust to the inclusion of two additional possible confounds, the effects of which are of interest in of themselves (model 3). One of these is pre-treatment literacy, which might affect the demand for secondary schools, while the second is the presence of return migrants. Most return emigrants returned due to changes in the ability to work in the Persian Gulf. The UAE tightened immigration laws in 1996 and Saudi Arabia and Bahrain followed suit in 1997; these new laws were designed to curtail migration by sending migrants home at the end of their contracts. They additionally decreased the demand to migrate by reducing job opportunities for migrants and lowering wages for low-skill workers. Prakash (2000) surveyed these return emigrants and found that over 40% returned because they did not have a job and another 25% returned due to lower wages. Thus, we can have some confidence that emigrants did not return due to conditions in Kerala but returned due to conditions in the Gulf. The results are robust to the addition of these controls.

Fourth, we examine a different public good as our dependent variable, the number of

registered private health workers per capita (model 4). As is the case with schooling, Kerala is an outlier on health outcomes in India, with lower infant mortality rate (14 per 1,000 live births compared to 58 per 1,000 for India as a whole), lower maternal mortality (1.1 deaths per 1,000 live births versus 3 for India as a whole), and higher life expectancy (73 years compared to 63 years for India as a whole; Government of India 2015). The better health outcomes in Kerala are due in part to the availability of primary care, with an average of one primary care facility for each 33 square kilometers (Government of India 2015). Nonetheless, Kerala still has a high level of morbidity including outbreaks of many tropical diseases and a high incidence of diseases like heart disease and cancer that affect wealthier populations (Government of India 2015). We focus our attention on registered private health workers for two reasons. First, the public health system in India notoriously suffers from high rates of absenteeism and thus many in India seek medical attention from private health workers (Banerjee, Duflo and Glennerster 2008). Many private health workers are unregistered and are not qualified to provide care; state-based registration is a way for citizens to know that the health care provider is qualified and, thus, is a desirable quasi-public good. Second, many of the diseases that are likely to affect Keralites are ones that need a higher level of care, those that are likely to be treated by a qualified, private health worker.

As in the case of schooling, we argue that emigration and remittances may change the overall preference for health care services and will affect the politics around health care delivery by changing the identity of the median voter and the resources available for non-ballot box political activities. The need for potential emigrants to be relatively healthy or for them to have medical exams prior to emigrating may lead to a greater demand for registered medical services. Remittances should lead greater demand for higher quality health care services as remittances are often spent on health care (Lopez-Cordova and Olmedo 2005). While home, as part of the “motivated middle class,” emigrants likely pushed for higher quality health care. The exit of emigrants may lead to less political pressure for higher quality health care, as politicians may not want to provide public goods that would challenge

entrenched public sector employees in the health sector. Remittances may make up for this as they give emigrants' family members more resources to affect politics. Together, we expect that emigration and remittances should affect these public goods in the same way that they affect schooling: emigration may (or may not) decrease the number of registered private health workers but remittances should increase their numbers.

We find similar effects as with the provision of secondary schools. Emigration directly has a negative and statistically significant effect on the number of registered private health workers. Remittances have a positive and statistically significant effect on their numbers. The total effect, however, is zero as the effect of emigration is neutralized by the effect of remittances. Thus, remittances are in some ways making up for emigration. The fact that our results are robust across education *and* health-related public goods is suggestive of the external validity of our results.

4.2 Heterogeneous treatment effects

In this section, we examine the heterogeneity in the effect of emigration on secondary schools per capita. We use this analysis to examine an observable implication of our theory, and to also explore the likely mechanisms through which emigration and remittances work. The direct, indirect and total effects for this analysis are summarized in Table 4; SEM results are in Online Appendix Table A4.

Recall that we have so far found that while emigration has an ambiguous direct effect on schools per capita, they indirectly, via remittances, have a positive effect on schools. Since remittances typically follow emigration with a lag, we would expect the indirect positive effect on emigration on schools to be attenuated in places with more recent migrants. The data support this observable implication (see the first set of rows in Table 4), insofar as the indirect positive effect of emigration is indeed attenuated in villages with an above-average mean year of departure (in our sample, this is 1995).

In our theory section, we had posited that emigration and remittances could affect public

goods provisioning through changing people’s political influence and preferences. Although we are unable to test these mechanisms directly,¹⁰ our examination of the heterogeneous treatment effects of emigration and remittances — in places with above- and below-average literacy, and in places with above- and below-average UDF vote shares — provides evidence that is consistent with the proposed mechanisms. To start with, consider how the impact of emigration and remittances might vary by literacy. More literate populations might be able to ensure that emigration and remittances lead to improved public goods provisioning by better holding politicians to account (the political influence channel) or simply because more literate populations have been shown to have a preference for literacy (the preference channel). If either or both mechanisms operate, we would expect that emigration would have a greater effect of public goods provisioning in places with high pre-treatment (1981) literacy. The data (the second set of rows in Table 4) do indeed suggest that emigration and remittances improve public goods provisioning to a greater degree in places with high literacy rates in 1981.

Lastly, in order to specifically explore the political preference channel, we examine the effects of emigration and remittances on schools in places with below- and above-average support for the Congress-led UDF coalition (the right-leaning coalition; see the final two rows of Table 4). Although political parties from across Kerala’s political spectrum are thought to be committed to education (Singh 2011), it is plausible that the right is less supportive of efforts to build secondary schools than the left. The data do indeed suggest that this is the case: places that support the UDF coalition less experience greater improvements in public goods provision in response to emigration-induced remittances. This suggests that emigration and remittances have a larger effect on the provision of schools in places that have a preference for education. To summarize, the analysis of heterogeneity in the direct and indirect effects of emigration and remittances on public goods provision by literacy and partisan vote share provides evidence that is consistent with the operation of both the

¹⁰Doing so would require survey data on who engaged in voting and non-voting-related political activities, and individual-level data on people’s preferences over public goods.

political influence and preference mechanisms.

[TABLE 4 ABOUT HERE]

4.3 A comparison with OLS and 2SLS

To illustrate the payoff of simultaneous equations modeling, we compare it with the results from OLS and 2SLS estimators (see Table 5). The latter is the state-of-the-art in the literature (for example, see Ahmed 2012 or Hildebrandt and McKenzie 2005). To start with, we model secondary schools per capita as a function of emigration (models 1 and 4) and remittances (models 2 and 5). As with the SEM, we instrument for emigration using the standard deviation of the mean temperature between 1973 and 1986. We instrument for remittances using the proportion of emigrants in the Persian Gulf (this strategy is problematic—more on this below), as these emigrants are more likely to send remittances than those who have moved to countries that they can move to permanently, such as Australia, Canada, or the US. Models 3 and 6 control for both endogenous variables simultaneously.

There are two noteworthy things about the exercise. First, the OLS and 2SLS estimates of the effects of emigration and remittances are different from the (direct, indirect and total) SEM effects of emigration and remittances. The coefficients from OLS are smaller in magnitude than the coefficients from the SEM and in model 1 and the effect of emigration takes the opposite sign of the SEM model. The coefficients from 2SLS are much larger in magnitude and also take the opposite sign from the SEM coefficients. Assuming that the SEM estimates of the direct and indirect effects of emigration, and the direct effects of remittances, are correct, both OLS and 2SLS yield biased estimates. Further, the 2SLS estimator, which is the current “state-of-the-art” in the literature, does not allow scholars to estimate the mediating role that remittances play on the provision of schools.

A second point worth noting about the 2SLS estimator is that it needs at least two instruments in order to simultaneously estimate the effects of emigration and remittances,

Table 4: Heterogeneous treatment effects: Direct, indirect and total effects of emigration and remittances

	Direct effect	Indirect effect	Total effect	Direct effect	Indirect effect	Total effect
	Below-avg. mean departure year			Above-avg. mean departure year		
Log % emigrants	-0.108 [2.450]	2.007*** [0.269]	1.900 [2.550]	-4.170 [3.378]	0.175*** [0.035]	-3.995 [3.400]
Log remittances per capita	1.548 [1.714]		1.548 [1.714]	0.147 [0.441]		0.147 [0.441]
	Below-avg. % literacy			Above-avg. % literacy		
Log % emigrants	-3.046 [2.305]	0.352*** [0.073]	-2.694 [2.365]	-0.770 [2.808]	2.124*** [0.383]	1.353 [3.064]
Log remittances per capita	0.333 [0.922]		0.333 [0.922]	1.619 [1.172]		1.619 [1.172]
	Below-avg. % UDF vote			Above-avg. % UDF vote		
Log % emigrants	-0.528 [3.828]	1.751*** [0.212]	1.223 [3.847]	-1.887 [2.009]	0.824*** [0.219]	-1.062 [2.092]
Log remittances per capita	1.303 [2.407]		1.303 [2.407]	0.882* [0.468]		0.882* [0.468]

Notes: Robust standard errors, clustered by district, in brackets. * significant at 10%; ** 5%; *** 1%.

whereas the SEM estimator only needs one. This is problematic for two reasons. First, interpreting a regression with two instrumented endogenous variables is inadvisable (Angrist and Pischke 2008, 64–66; Angrist 2010). Second, it is difficult to think of valid instruments for remittances that would meet the exclusion restriction for emigration (that is, that would not affect emigration) and vice-versa, which is necessary for identification (Acemoglu and Angrist 2001). So while the instrument for remittances used above — proportion of emigrants in the Persian Gulf — is problematic because the ability to move to the Persian Gulf is likely to affect emigration, similar problems bedevil other instruments that we can think of. Noteworthy, and in contrast with the 2SLS estimator, the SEM estimator can be identified using just one instrument, thereby facilitating identification.

[TABLE 5 ABOUT HERE]

5 Conclusions

How do emigration and remittances affect development? Can remittances compensate for the negative effects of emigration? In this paper we argue that emigration can lead to a political influence drain. Emigrants in most developing countries are from what might be termed the “motivated middle class.” The loss of these citizens gives the well-off relatively more voice, leading to a lower provision of public goods that benefit the general population. Remittances, however, can make up for this by providing families with the resources — time and money — they need to influence political outcomes. The flows of emigrants and remittances also alter people’s preferences for public goods. The total effect of emigration on public goods provision is likely to be small, as the negative direct effect of emigration is compensated by its positive indirect effect through remittances.

We tested our argument in the context of Kerala, India. Migrants from Kerala are similar to the very large numbers of migrants who migrate in the Global South, which now makes up for more than half of the total flow of migrants. Like most migrants from the Global South,

Table 5: OLS and 2SLS estimates of the effects of emigration and remittances

	OLS			2SLS		
	1	2	3	4	5	6
Log % emigrants	0.233 [2.163]		-0.749 [2.873]	2.166 [3.254]		3.086 [4.698]
Log remittances per capita		0.583 [0.677]	0.811 [0.989]		-1.340 [1.381]	-3.067 [3.043]
Std. dev. of temperature, 1999-2003				-24.26 [80.04]	-66.24 [53.30]	-61.23 [53.59]
Log population	-1.106 [1.508]	-1.108 [1.517]	-1.122 [1.559]	-1.141 [1.480]	-1.323 [1.379]	-1.254 [1.338]
% SC/ST	-0.150 [0.207]	-0.144 [0.202]	-0.140 [0.200]	-0.161 [0.171]	-0.173 [0.187]	-0.197 [0.210]
% Ezhava	0.0297 [0.0770]	0.0304 [0.0768]	0.0321 [0.0771]	0.0236 [0.0666]	0.0241 [0.0590]	0.0173 [0.0596]
% Christian	0.00692 [0.0586]	0.00780 [0.0545]	0.00807 [0.0527]	-0.000467 [0.0596]	-0.0159 [0.0559]	-0.0167 [0.0689]
% Muslim	-0.000909 [0.0496]	-0.00783 [0.0453]	-0.000566 [0.0488]	-0.0331 [0.0532]	0.0186 [0.0436]	0.00339 [0.0511]
Constant	18.22 [15.37]	14.56 [14.25]	14.10 [13.85]	20.06 [27.52]	40.62 [22.29]	46.97* [20.40]
Observations	115	115	115	115	115	115
First stage F-stat. for emigrants				6.2		15.7
First stage F-stat. for remittances					17.1	9.7

Notes: All regressions include district fixed effects. Robust standard errors, clustered by district, in brackets. * significant at 10%; ** 5%; *** 1%.

emigrants from Kerala go to countries in which they cannot settle permanently. These people migrate with the intentions of remitting funds home and of eventually returning. As developed democracies have increasingly made it more difficult for low-skill migrants to enter their countries (Peters 2015), more low-skill migrant flows will resemble that of Kerala's migrants to the Persian Gulf.

In order to test our theoretical expectations, we employed a structural equations model, which allowed us to parse the direct and indirect effects of emigration and remittances, as well to account for their endogeneity. We examined the effects of emigration and remittances on the provision of secondary schools and, as a robustness check, registered private health workers. We found that the positive and statistically significant indirect effects of emigration on schools, via remittances, are overwhelmed by the less precisely estimated negative direct estimated effects of emigration on schools. Without modeling the effects of emigration and remittances in a structural equations model, scholars would conclude that there was no effect of emigration and remittances on secondary schools instead of concluding that the positive effect of remittances is neutralized by the negative but imprecisely estimated effect of emigration. Our paper should prompt scholars to re-examine previous studies of the effect of emigration and remittances. The effect of remittances likely cannot be known without taking emigration into account and the full effect of emigration likely cannot be known without taking into account the mediating role that remittances play.

Further, this paper provides a theory of how both emigration and remittances affect the political economy of development. While we could not fully test the mechanisms of how emigration and remittances affect political behavior, we found evidence consistent with our theory that emigration and remittances can affect political influence and preferences. We leave it to future work to study these mechanisms in more detail.

To some in the development community, our net null net findings of the effects of emigration and remittances may be distressing, as these flows have been thought to better people's lives. However, our findings, read in conjunction with the fact that emigration and

remittances generally help emigrants and their families, and the recipients of remittances, are reassuring. At the very least emigration and remittances do not have a net detrimental effect on home communities, as some have long feared.

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Online Appendix for “Emigration, Remittances and the Political Economy of Development: Insights Using New Methods and Data from Kerala”

Table A1 Balance tests for the instrument for emigration (standard deviation in temperature, 1973–1986)

Table A2 Robustness tests: SEM estimates

Table A3 Robustness tests: Direct, indirect and total effects of emigration and remittances

Table A4 Heterogeneous treatment effects: SEM estimates

Table A1: Balance tests for the instrument for emigration (standard deviation in temperature, 1973–1986)

	Std. dev. of temp., '99-'03	Log population	% SC/ST	% Ezhava	% Christian	% Muslim
Std. dev. of temperature, 1973–1986	-0.524 [0.623]	15.61 [9.456]	-93.00 [113.4]	-81.88 [210.2]	-360.3 [267.5]	263.4 [345.4]
Std. dev. of temperature, 1999-2003		-4.354 [5.944]	-25.44 [35.82]	-82.38 [89.97]	-309.8* [127.7]	-126.3 [147.3]
Log population	-0.00217 [0.00281]		-0.352 [0.745]	2.600 [2.520]	-4.107 [2.498]	-0.717 [3.156]
% SC/ST	-0.000273 [0.000392]	-0.00757 [0.0165]		-0.216 [0.306]	-0.739 [0.392]	-0.163 [0.340]
% Ezhava	-0.0000854 [0.0000921]	0.00541 [0.00481]	-0.0209 [0.0283]		-0.422** [0.119]	-0.558** [0.165]
% Christian	-0.000335 [0.000162]	-0.00891 [0.00769]	-0.0745 [0.0359]	-0.439** [0.129]		-0.644*** [0.130]
% Muslim	-0.0000961 [0.000114]	-0.00110 [0.00509]	-0.0116 [0.0251]	-0.409*** [0.0741]	-0.453*** [0.0800]	
Constant	0.437 [0.220]	5.693 [4.136]	53.98 [37.06]	63.44 [92.33]	278.9* [112.2]	-0.826 [147.8]
Observations	115	115	115	115	115	115
Adjusted R-squared	0.94	0.12	0.42	0.40	0.65	0.68

Notes: All regressions include district fixed effects. Robust standard errors, clustered by district, in brackets.

Table A2: Robustness tests: SEM estimates

	1		2		3		4		
	Secondary schools / population	Log % emigrants	Log remittances per capita	Secondary schools / population	Log % emigrants	Log remittances per capita	Registered private health workers per 1000	Log % emigrants	Log remittances per capita
Log % emigrants	-1.285 [2.105]	36.88*** [9.251]	1.210*** [0.172]	-0.575 [1.894]	7.067* [3.310]	1.191*** [0.187]	-0.0627* [0.0308]	27.45** [9.236]	1.176*** [0.169]
Log remittances per capita	0.822 [0.851]	-4.955 [4.234]	-2.011 [5.041]	0.874 [1.076]	-4.579*** [1.269]	1.080 [2.306]	0.0383** [0.0117]	-6.557 [3.691]	-2.784 [6.206]
Std. dev. of temperature, 1973-1986									
Std. dev. of temperature, 1999-2003	-41.54 [48.83]	-0.0430 [0.115]	0.0391 [0.122]	-16.34 [12.21]	0.830 [0.665]	0.484*** [0.0726]	0.0207* [0.00965]	-0.0679 [0.108]	0.0400 [0.106]
Log population	-0.930 [1.291]	-0.117 [0.106]	-0.00494 [0.0166]	0.0293 [0.0947]	-0.117 [0.0871]	0.0114 [0.0164]	0.000249 [0.000875]	0.00458 [0.00959]	-0.00649 [0.0200]
% SC/ST	-0.117 [0.149]	0.0106 [0.00839]		0.0293 [0.0947]	-0.00871 [0.0133]				
Lagged dependent variable									
% Ezhava									
% Christian									
% Muslim									
Log % return emigrants									
% Literacy									
Observations	115	115	115	115	115	115	115	115	115

Notes: All variables were demeaned to include district fixed effects; constant is constrained to be zero. Robust standard errors, clustered by district, in brackets. * significant at 10%; ** 5%; *** 1%.

Table A3: Robustness tests: Direct, indirect and total effects of emigration and remittances

	Direct effect	Indirect effect	Total effect
<u>Table A1, model 1</u>			
Log % emigrants	-1.285 [2.105]	0.995*** [0.141]	-0.290 [2.133]
Log remittances per capita	0.822 [0.851]		0.822 [0.851]
<u>Table A1, model 2</u>			
Log % emigrants	-0.575 [1.894]	1.041*** [0.163]	0.466 [1.864]
Log remittances per capita	0.874 [1.076]		0.874 [1.076]
<u>Table A1, model 3</u>			
Log % emigrants	-0.488 [1.907]	1.031*** [0.148]	0.543 [2.000]
Log remittances per capita	0.875 [0.782]		0.875 [0.782]
<u>Table A1, model 4</u>			
<i>DV: Registered private health workers per 1,000</i>			
Log % emigrants	-0.063* [0.031]	0.045*** [0.006]	-0.018** [0.030]
Log remittances per capita	0.038** [0.012]		0.038** [0.012]

Notes: The dependent variable for models 1–3 is the number of secondary schools per 1,000 people. Robust standard errors, clustered by district, in brackets. * significant at 10%; ** 5%; *** 1%.

Table A4: Heterogeneous treatment effects: SEM estimates

	1			2			3		
	Below-avg. mean departure year			Above-avg. mean departure year			Below-avg. % literacy		
	Secondary schools/population	Log % emigrants	Log remittances per capita	Secondary schools/population	Log % emigrants	Log remittances per capita	Secondary schools/population	Log % emigrants	Log remittances per capita
Log % emigrants	-0.108 [2.450]	1.296*** [0.116]	1.190*** [0.239]	-4.170 [3.378]	22.90*** [8.339]	1.190*** [0.239]	-3.046 [2.305]	31.34*** [8.019]	1.056*** [0.220]
Log remittances per capita	1.548 [1.714]			0.147 [0.441]			0.333 [0.922]		
Std. dev. of temperature, 1973-1986		26.04* [11.45]			22.90*** [8.339]			31.34*** [8.019]	
Std. dev. of temperature, 1999-2003	-54.89 [71.00]	-8.236 [5.419]	8.545 [7.498]	14.72 [97.95]	-0.924 [3.092]	-16.46*** [3.920]	-104.4 [80.35]	1.106 [2.904]	7.585 [4.519]
Log population	-0.200 [2.677]	-0.268* [0.126]	-0.0330 [0.202]	-0.0332 [1.749]	0.0463 [0.0833]	0.0446 [0.153]	0.365 [2.033]	0.184* [0.0732]	0.0784 [0.156]
% SC/ST	-0.0308 [0.240]	0.0137 [0.122]	-0.0116 [0.0228]	-0.156 [0.158]	0.00403 [0.00899]	-0.00501 [0.0159]	-0.194* [0.0950]	0.0122* [0.00538]	-0.00789 [0.0291]
% Ezhava	-0.0359 [0.0887]	0.00727 [0.00393]	0.00148 [0.00470]	0.0685 [0.117]	0.00249 [0.00556]	-0.0158* [0.00698]	-0.0329 [0.0742]	-0.00234 [0.00621]	-0.00523 [0.00888]
% Christian	0.0123 [0.0972]	0.00440 [0.00464]	0.0148 [0.00842]	-0.0318 [0.104]	-0.00345 [0.00324]	-0.0129 [0.0136]	-0.0692 [0.106]	0.00195 [0.00401]	0.000443 [0.0108]
% Muslim	0.0268 [0.0796]	0.0152*** [0.00376]	0.00530 [0.00639]	0.0234 [0.0817]	0.0119*** [0.00274]	-0.00558 [0.00441]	-0.00541 [0.0668]	0.0129*** [0.00355]	-0.00120 [0.00442]
Observations	60	60	60	53	53	53	57	57	57
	4			5			6		
	Above-avg. % literacy			Below-avg. % UDF vote			Above-avg. % UDF vote		
	Secondary schools/population	Log % emigrants	Log remittances per capita	Secondary schools/population	Log % emigrants	Log remittances per capita	Secondary schools/population	Log % emigrants	Log remittances per capita
Log % emigrants	-0.770 [2.808]	1.312*** [0.237]	1.344*** [0.163]	-0.528 [3.828]	28.50*** [9.922]	1.344*** [0.163]	-1.887 [2.009]	25.08 [14.55]	0.935*** [0.249]
Log remittances per capita	1.619 [1.172]			1.303 [2.407]			0.882 [0.468]		
Std. dev. of temperature, 1973-1986		32.47 [20.45]			28.50*** [9.922]			25.08 [14.55]	
Std. dev. of temperature, 1999-2003	100.1 [97.20]	-15.88*** [4.143]	-17.25 [11.00]	-112.4** [39.67]	-3.939 [2.138]	7.293 [4.051]	-114.9 [60.54]	0.539 [4.003]	5.611 [10.55]
Log population	-2.314*** [0.606]	-0.267* [0.104]	0.162 [0.150]	-4.383*** [1.183]	-0.102 [0.261]	0.0459 [0.0861]	1.135 [1.501]	-0.0199 [0.0726]	0.147 [0.139]
% SC/ST	0.183 [0.261]	-0.0151 [0.0176]	-0.0207 [0.0217]	0.0449 [0.171]	0.0125 [0.00779]	-0.0208* [0.00908]	-0.0444 [0.242]	-0.00563 [0.0135]	0.00517 [0.0288]
% Ezhava	0.0698 [0.112]	0.00216 [0.00463]	-0.00363 [0.00234]	0.0138 [0.0966]	0.00901* [0.00423]	-0.0149* [0.00632]	0.0841 [0.122]	-0.0119* [0.00516]	0.00927 [0.00980]
% Christian	0.0706 [0.0397]	-0.00151 [0.00378]	0.000267 [0.0108]	-0.0725 [0.0909]	0.00523 [0.00278]	0.00268 [0.00672]	0.0490 [0.0602]	-0.00767 [0.0143]	0.00553 [0.0143]
% Muslim	0.0705 [0.0763]	0.00850 [0.00518]	0.00639 [0.00657]	-0.0517 [0.0951]	0.0147*** [0.00275]	-0.00524 [0.00675]	0.0618 [0.0839]	0.00578 [0.00344]	0.00670 [0.00554]
Observations	58	58	58	50	50	50	50	50	50

Notes: All variables were demeaned to include district fixed effects; constant is constrained to be zero. Robust standard errors, clustered by district, in brackets. * significant at 10%; ** 5%; *** 1%.