International labor migration and economic development: Evidence from Bangladesh

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Abstract

International labor migration offers significant employment opportunities for migrant workers from populous, low-income countries through increased wages and improved economic conditions of their household members. However, the extent of spillovers for non-migrants in regions with high rates of out-migration remains largely unexplored. By comparing non-migrant households in regions with different out-migration rates between 2011 and 2019, I estimate the causal effects of migration on the labor and socio-economic outcomes for these households in rural Bangladesh. Regional variation in migration rates and household-level economic outcomes can be simultaneously determined by unobserved factors. To address this challenge, I employ an instrumental variable strategy that exploits a region's pre-study period migration exposure to various destination countries to predict contemporaneous migration rates. My findings show that international migration led to some economic improvements for non-migrants in the form of increased labor market opportunities, especially in non-farm based activities. They also experienced significant improvements in access to safe water. However, the extent of economic improvements is limited to labor effects with no notable changes in expenditure, access to financial resources and other socio-economic measures of development. My paper contributes to the migration literature by enabling us to better understand the economic spillovers for non-migrants. Furthermore, these results can inform policy-makers when allocating scarce state resources to promote labor migration as an active labor market policy in other similar contexts.

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1 Introduction

International labor migrants comprised over half of the world's migrant population with remittances in low- and middle-income countries surpassing USD 450 billion in 2018, which is more than three times the size of official development assistance over the corresponding period (*Bangladesh: Survey on drivers of migration and migrants' profile* 2020). For populous, low-income countries, international labor migration (hereafter referred to as migration), can provide significant macroeconomic benefits by easing unemployment pressure and augmenting capital inflows through remittances sent by migrants abroad. While the direct effects on migrants themselves are now established at the mirco-economic level, the spillover effects on those remaining behind at the origin communities remain under-studied in the migration literature (Clemens 2022; Mckenzie and Yang 2014; Ruhs 2006). Migration is widely promoted as a popular active labor market policy with significant public resources spent to promote migration in many low-income countries like Bangladesh, Indonesia, Nepal, Pakistan, the Philippines and Sri Lanka where remittances account for more than 5 percent of the countries' GDP. Furthermore, given the economic and cultural incentives of migration, incomplete financial markets (Taylor 1996), and elevate social status (Ruiz, Siegel, and Vargas-Silva 2015), there is strong grass-roots support for such policies.

Despite the broad acceptance of migration as a development strategy in low- and middle-income countries (Wickamasekara, 2016), questions still remain on the widespread effects of migration especially for the non-migrant households in regions with high migration rates (McKenzie 2017; Gibson, Mckenzie, and Rohorua 2014; Taylor 1996). Migration has a direct impact on migrants and their households by affecting labor supply, consumption, and investment decisions. Migration can also have second-order effects on non-migrating households in regions with a stronger exposure to out-migration through labor market and remittance channels. Economic models of migration remain inadequate for incorporating the pluralistic and transitory nature of migration decisions (Dustmann, Frattini, and Rosso 2015) to adequately predict spillover effects for non-migrating individuals (Clemens 2022). This notable gap in the theoretical literature is accompanied by data limitations in the countries of the Global South, which drives a significant portion of recent labor migration flows (*Bangladesh: Survey on drivers of migration and migrants' profile* 2020). The combined theoretical and empirical limitations created a large bias in early studies to focus on labor market effects at the countries of destination (Borjas 1996; Card 2001), a trend which has only

shifted in the past two decades (see review in Mckenzie and Yang 2014). Consequently, there still remains large gaps in understanding origin country effects in the context of migration research.

Thus, while it is well established that international migration and development are closely linked, existing studies show considerable variation in the impact of large-scale migration on regional labor markets and economic outcomes for households remaining behind in the communities of origin (Clemens 2016; de Haas 2006). Only a handful of earlier studies have explored the non-migrant effects at a micro-economic level (Mishra 2007; Dustmann, Frattini, and Rosso 2015; Shrestha 2017; Akram, Chowdhury, and Mobarak 2017) and my paper contributes to this growing empirical literature.

In this paper, I estimate the labor market and broader socio-economic impact of large-scale migration from rural Bangladesh between 2011 to 2019 (see Figure 1). I study the impact of migration on household-level labor market outcomes and indicators of development including expenditure on food and non-food items, financial access and other socio-economic measures of living standard using panel data from an integrated national survey representative of rural Bangladesh.

Directly comparing households in regions with different migration rates can lead to biases when estimating the effects of migration on development. For example, unobserved or non-measurable factors such as a culture of work ethic can lead to both higher rates of migration as well as higher participation in labor markets. This is especially relevant in the context of migration decisions, which is subject to many unobservable regional characteristics. To mitigate the bias in the estimation and causally identify the effect of migration on a household's labor and development indicators, I use an instrumental variable approach to address the endogenous nature of migration (see Figure 2).

I use the insight that there is regional variation in the pre-study period exposure to out-migration to different destination countries for devising my instrument. Specifically, I combine two sources of variation at the regional and national level to calculate a weighted "*Bartik style*" (Bartik 1991; Blanchard and Katz 1992; Card 2001; Autor, Dorn, and Hanson 2013) instrument to predict each region's rate of contemporaneous out-migration rate. The first is variation in a region's (*subdistrict level*) exposure to different destination countries at a period prior to the study, which is the "*share*" component. The second comprises of national level demand for Bangladeshi migrant to each destination country as a consequence of their

respective visa policies during the study period, which is the "*shift*" component. For each region, I first weigh the latter "*shift*" with its respective initial "*share*", and then aggregate the interactions to compose the weighted instrument.

Using this "*shift-share*" instrumental strategy [2], I identify the causal impact of out-migration on the labor and socio-economic indicators for rural non-migrating households in regions that are more strongly impacted by migration over the last decade. This identification strategy relies on the initial regional share of migrants for each destination to be independent of the change in the outcome variable. I establish the credibility of this strategy and highlight the limitations in my study context subsequently in the paper noting the potential effects for the interpretation of the results.

Bangladesh provides a unique context for studying the broader labor market and socio-economic impacts of migration given the significance of labor migration to the national economy. The government focused on implementing bi-lateral contracts that facilitated an average of 700,000 Bangladeshis to migrate to over 150 destinations in the past ten years beating even the government's own annual target of 400,000. Bi-lateral agreements between the government of Bangladesh and a number of countries in the Middle East and South-East Asia enable migration using temporary work visa contracts. Furthermore, as clearly stated in the government's Eight Five Year Plan, the rationale to continue to promote labor migration as a policy instrument is driven by the strong assumption that, "*multiplier effects of remittance inflows are a major contributor to rural transformation and diversified employment and income base for the rural poor*" (GoB, 2022).

My results show that international migration has significant consequences for the supply of labor by non-migrating households in high migration regions but limited effects on consumption and other socio-economic indicators. The average hours worked by employed household members significantly increased. However, these increased hours of work do not translate into strong income effects. Neo-classical theories (Lewis 1954; Harris and Todaro 1979) would suggest that the local labor market conditions in communities with high emigrant population should tighten, increasing wages of the remaining households. However, these effects may be less relevant in the context of rural, developing countries with

[2]Notable recent studies that have also exploited similar types of instruments include estimating the labor market effects of international trade (Autor et al. 2013) and immigration (Card et al. 2006; see Jaeger, Ruist, and Stuhler 2018 for a review), firm productivity and migration (Imbert et al. 2019), and, immigration and innovation at US universities (Stuen, Mobarak, and Maskus 2012aStuen et al, 2012).

large surplus of low-skill workers leading to persistent low wages and underemployment. My results do indicate some positive effects development in the form of redistribution in hours worked from farm to non-farm activities. A structural shift out of agricultural activity is an important indicator of economic development in the context of developing countries (Clark, 1940; Nurske, 1953; Rostow, 1960; Kuznets, 1966; Syrquin, 1975; Gollin, Parente and Rogerson, 2002, 2007).

Despite the high remittances reflected in the national accounts during the study period, these remittances did not translate into large multipliers into the local economy as predicted in earlier macro-economic studies (see Lucas, 1996). I find limited evidence of spillovers for non-migrating households through increased food and non-food expenditure, access to better financing opportunities, and, improved living standards. Spillovers occur when remittances are not just used for consumption but also spent on local investments by the remittance-receiving migrant households. Systemic evidence of such investments remains elusive in other contexts. Although (Yang 2008) showed that a positive shock in migrant remittances lead to increased levels of entrepreneurial investment by migrant households in the Philippines, there is negative or no impact of remittances on likelihood of owning a business by migrant households in Dominican Republic (Dorantes and Pozo, 2004) and Ecuador (Vasco, 2013) (review by Naudé, Siegel, and Marchand 2017). Consequently, the lack of spillovers in the context of rural Bangladesh is conceivable. These remittance driven investments and spillovers may also take longer periods to manifest, indicating a large lag between the out-migration, remittance and subsequent development motivating future studies of long-term impact of international migration.

This paper is a significant contribution to two main strands of literature: international migration and economic development. The empirical evidence of the impact of migration on the non-migrating population at the origin remains limited (Mckenzie, 2015). Some comparative studies find varied effects of small bi-lateral migration programs between Pacific Islands nations and New Zealand (Rohorua and McKenzie, 2014). Positive wage effects of international migration have been found in Mexico-US migration (Mishra 2007), which has a significantly greater proportion of mid- to higher skill migration compared to Bangladesh. Also, positive consumption effects were found for remaining households in Nepal (Shrestha 2017), with a significantly smaller migrant and labor force population relative to Bangladesh. While these studies offer important motivation for my research, my

paper offers greater generalizability for larger, more populous, developing countries that act as a significant source of labor migrants globally. My paper also motivates an important area for future theoretical research to explicitly model the link between migration and non-migrant development outcomes. Finally, by focusing on a labor migration model that is driven almost entirely by bilateral agreements, I provide a better understanding of the value of pursuing temporary migration programs (Piore 1979; Massey 1987; Dustman and Gorlach, 2016) as an active labor market policy by developing countries and implications for the future of these policies.

In the remaining paper, I proceed as follows: I provide a literature review of the relevant theoretical and empirical work to motivate my study and highlight the deficiency in the current literature. I then provide a contextual background of migration from Bangladesh and why it demands attention in the migration literature. I follow with a section on data and methods that provide: a description of the data; construction of the variables; empirical strategy; and, framework for predicting the outcomes. I then discuss my results and finally conclude with implications for policy and further research.

2 International Migration Literature: Past, Present and Future

Research on international migration evolved significantly in the past few decades. Estimating the impact of immigration on the destination countries dominated the early research and was based on the canonical model of immigrant selection (Roy 1951; Borjas, 1987; Borjas 1994, 1995; Hu, 2000; Chiswick, Lee and Miller, 2005). Outcomes were limited to wages and the assimilation trends between incomes of natives and immigrants. These studies followed from the neoclassical theories (Lewis, 1954; Todaro, 1969; Harris-Todaro, 1970), where migration is modelled as an individual optimization problem: the decision to migration is permanent and undertaken as an investment in human capital accumulation to maximize earnings. Consequently, skill-specific wage-differentials between the origin and destination serve as the dominating push factor in determining migration decisions. The model predicts that migration flows should equilibrate as the countries of origin develop and wages equalize. While these traditional models predict impact on local labor markets, they do not address the characteristics of the recent migration trends from low- and middle-income countries (LMICs) including temporary migration decisions; non-economic migration pull from the destination countries initiated by guest worker programs, dual labor markets, and migrant

social networks (Massey et al, 1998; Piore, 1979); and, the phenomenon of remittance trends described earlier.

With the growing importance of LMICs; emerging trends of temporary labor migration; and, associated remittance flows back to the countries of origin, there is a growing literature on quantifying the labor and socio-economic effects of the migration for the migrant-sending regions (Taylor et al, 1996; Clemens, 2014; McKenzie and Yang, 2014) and my paper contributes to this area of research. I combine two main frameworks that prevail in understanding the effects of migration at the origin to estimate the spillover effects for non-migrant households. The first focuses on modelling the direct effects of out-migration on wages and labor supply on the non-migrating individuals (Akram et al, 2017; Shrestha, 2017; Dustmann et al; 2015; Mishra 2007); and, the second uses the remittance channel to estimate the effects of migration on socio-economic outcomes like consumption, investment, education, health and women's empowerment (Clemens, 2011; De Hass, 2010; Rapoport ad Docquier, 2006). The predicted effect of migration on development can diverge in two directions (Taylor, 1999): a pessimistic "Dutch disease" or "migrant syndrome" perspective arising from the adverse effect on capital to labor (Rivera-Batiz, 1982) versus an optimistic model of development via the remittance channel in the pluralistic model of migration developed in the New Economics of Labor Migration (NELM) (Djajic, 1986). While the economic developmental impact at the origin skews towards being largely positive, the extent of the impact is contingent on various conditions at the origin such as such as labor market tightness, skill distribution of the migrants, sectoral productivity, use of remittances (Lucas, 2005).

The link between out-migration and wages of non-migrating workers at the countries of origin was developed by Dustmann, Frattini and Rosso (2015) using a traditional two-factor economic model with multiple labor types. The model predicts that out-migration is associated with wage improvements regardless of the skill distribution of migrants and non-migrants as long as capital is imperfectly mobile. They find that out-migration from Poland between 1998 to 2007 led to a slight increase in wages for high- and medium-skilled workers, which are the two groups with the largest relative outmigration rates whereas workers at the low end of the skill distribution might have experienced wage decreases. These results for Polish non-migrant wages correspond to findings from another middle-income country Mexico, which also has a significant skill variation amongst its migrant population. Mishra (2007) finds that emigration from Mexico to the US between 1970 and

2000 led to a strong and positive effect on Mexican wages, although with adverse distribution effects. It is notable here, that skills variations in these two studies are not applicable to the Bangladesh context, where almost all of the labor migration is concentrated in unskilled or very low-skilled occupations. In the neighboring migrant-sending South Asian country of Nepal, Shrestha (2017) finds that non-migrants experienced improvements in wage and labor force participation in Nepal. With an economy about a tenth of the size of Bangladesh and significantly different proportions of out-migrants to natives, the implications of migration for Bangladesh and Nepal can vary significantly and warrants a separate exploration. Finally, Akram, Chowdhury and Mobarak (2017), who study the general equilibrium effects of internal migration from north-west Bangladesh, show that increased seasonal migration from Bangladesh increased wages and the availability of jobs in migrant-sending villages while pushing up food prices. My paper builds on these latter results by extending the scope of the study to all of rural Bangladesh. Furthermore, I study the effects of the large scale international program, which goes beyond the experimental set up of Akram at al (2017). On aggregate, while these studies predict generally positive income effects for non-migrants in migrant-prone areas, the degree of effect may vary with local factors like skill distribution and relative size of migrants.

The second framework I use builds on the NELM models, which fundamentally changed the theoretical underpinnings of migration research by modelling decisions at the household rather than at the individual level (Stark and Levhari 1982; Stark and Bloom 1985; Katz and Stark 1986; Stark 1984; 1991). In this framing, the decision to migrate can address, (i) various financial and other market failures in developing countries; and, (ii) provide an alternative source of capital for families to smooth consumption and facilitate investment. The household model can explain the phenomenon of temporary migration and associated remittances, which subsequently create second order effects of migration on the non-migrating members of migrant-sending communities. The household model is used to predict effects on indicators of development for non-migrating members at the origin (see (Clemens, Ozden, and Rapoport 2014) for review).

Remittances are a significant phenomenon of temporary migration from LMICs and an important channel for economic development in migrant-sending communities. Research shows that migrants' remittances are motivated by altruism (Aggarwal and Horowitz 2002), exchange (de la Briere et al. 2002), both altruism and exchange, (Brown and Jimenez,

2011), insurance (Yang and Choi 2007), and, loan repayment (Ilhahi and Jafarey 1999). Remittances can sometimes be earmarked for specific purposes (De Arcangelis, Giuseppe, et al. 2015) although in most cases they remain fungible across various categories ranging from consumption to investment in human and business capital (Rapoport and Docquier 2005; pg 1177). In credit constrained rural economies, remittances can generate growth linkages by providing liquidity through informal loans to non-migrant households (Stark 1991). These results underscore the importance of the remittance channel.

In general, results from various studies indicate positive effects of migration on the migrant themselves given wage improvements. A comparison between winners and losers in national lottery for low-skill migration from Bangladesh to Malaysia found improvements in migrant income with corresponding increase in the consumption of household members and female involvement in household decision making (Mobarak et al, 2020). Not only might the level of consumption be affected, but also the type of consumption as Pessar (2005) shows that remittances and earnings of lower skilled temporary migrants are usually spent on conspicuous non-productive assets in Mexico.

However, the effects for non-migrating household members with regards to consumption and other socio-economic indicators can vary implying that the effects via the remittance channel is less straightforward and can depend on the conditions at the origin. Households of migrants from the Pacific Islands to New Zealand experienced contrasting effects in the studies of small-scale bi-lateral programs of seasonal migration between these countries (Gibson et al. 2018; Gibson and McKenzie 2014; Gibson and McKenzie 2011). The direction of the effects depends on the duration and size of the programs, and, outcomes of interest. There was reduced consumption with deterioration in socio-economic indicators for migrant-sending households in the short-term (Gibson et al., 2011) and in Vanuatu (Rohorua et al, 2009). On the other hand, there was reduction in poverty, and improvements in income, savings, and expenditure in the medium term (Gibson and McKenzie, 2011, 2013; Gibson et al, 2013). In Nepal, where there is a relatively high proportion of migrants in the labor population, Shrestha (2017) finds rural households with migrants benefited directly from the increased earnings of migrants leading to significant reduction in poverty: migrant households experienced increase in consumption and children's school enrollment.

Impact on agricultural investment is of particular interest in the context of these largely rural and agro-based economies in the origin countries. Agricultural productivity may be

impacted by the loss of labor to migration that negatively impact labor supply. Remittances by migrants can relax credit constraints in the local economy and induce over investment in agricultural short-term. An important empirical test of the household migration model links migration and agricultural production (Rozelle et al, 1999). The study finds evidence of a negative and significant relationship between migration and agricultural yield in China part of which is offset by increased remittances.

In addition to income, consumption and agricultural outcomes, studies have looked into a wide variety of outcomes for migrant households such as investments in education, health and assets. Increased expenditure on education by migrants can improve long-term outcomes through human capital accumulation in communities with greater migrant exposure (Dinkelman and Mariotti 2016). Similarly, higher expenditure on health can improve the productivity of the future workforce (Gibson, McKenzie and Rohorua 2018). There can be additional improvement on gender parity if there is greater schooling for girls and better gender parity with regards to female income (Anjali 2016). Meanwhile, positive regional shocks to remittance earnings were found to increase assets, schooling, education investments, hours in self-employment and likelihood of starting a capital-intensive enterprise amongst migrant households in the Philippines (Yang 2008).

Much of the recent empirical work on migration and development has focused on migrants and their households without sufficiently extending to the spillover effects of remittances on non-migrating households. Non-migrating households can be impacted by large-scale migration through first-order effects on income and labor as well as second-order effects through the remittance channel. The household model predicts second-order implications for non-migrant households with outcomes pertaining to consumption, incomes, agricultural investment and production, education, health and gender. The mechanism for these effects work through the spin offs of remittance spending by migrant households or through peer-to-peer social network effects. High levels of consumption spending by remittance receiving households can trigger investments by non-migrating households in regions of high intensity of out-migrants. The degree of impact depends on the type and size of the consumption of the migrant households. For example, consumption, and nonproductive investment provides limited spin offs for non-migrants in the community while investment in entrepreneurial activity can generate more positive effects of temporary migration. Similarly,

rural households who have a higher propensity to spend income in the local market can have a stronger multiplier effect than urban recipients.

The earlier studies found large multiplier effects of remittances on development using macro-models (see review in Taylor,). Recent studies (Dustman et al, 2015; Mishra 2007; Shrestha 2017; Akram et al 2017) have started to build on the macro-level results using micro-level household data. However, this remains understudied and my paper adds to this growing evidence base for the non-migrant effects by extending the scope of past studies and providing evidence for one of the largest low-skilled labor migration programs globally to estimate the causal effects of migration for non-migrants at the national level. The results are representative of rural Bangladesh, which covers two-thirds of Bangladesh's 160 million people. Furthermore, this paper goes beyond wages and labor supply and offers insights into the role of migration in shifting workers from farm to non-farm activities.

3 Context: Labor Migration from Bangladesh and Policy Context

Bangladesh is a populous, developing country with a population of 160 million with a significant proportion (about 60 million) in the working age range. The country, despite starting with high poverty levels at its independence in 1971, has grown through its exports in the textile sector and reached lower middle-income status in 2015. Despite these improvements, Bangladesh continues to have about two-thirds of its population living in rural areas and 40 percent of its population living at or below the poverty line. With the goal to reaching middle-income status by 2031, the government faces significant challenges in creating jobs and employment opportunities for its large workforce (World Bank, 2021). The workforce suffers from notable skills deficiency with low levels of completion of secondary education and, only about a fifth of those who complete, enroll into tertiary education (BANBEIS, 2019). The low literacy level significantly affects the pipeline of workers entering into employment as they lack the foundational skills needed to be productive and engage in a knowledge-based economy.

The combination of a large, low-skilled workforce makes international labor migration an attractive development and labor market policy for the Government of Bangladesh. The commitment to *"make a comprehensive push to expand overseas employment and remittance*

earnings through G2G negotiation,..." (pg. 13, Eight Five Year Plan, Planning Commission, Government of Bangladesh, 2020) is based on the *"multiplier effects of remittance inflows (that) are a major contributor (sic.) to rural transformation and diversified employment and income base for the rural poor"*) (pg. 10. Ibid.) and *"Unlike domestic job creation, the progress on this count was much better"* (ibid.). Consequently, there are strong assumptions that increasing migration, even into low skill jobs internationally, will increase wages and ease pressure on the local labor market while remittances sent back by migrants will lead to economic development through spillovers.

Consequently, remittance earnings and international labor export has played an important role in the country's growth over the past few decades. Temporary migration is an integral part of economic development process in Bangladesh with about 700,000 migrant workers leaving the country for various destinations over the past ten years. It is the sixth largest country of origin for international migrants globally with close to 8 million Bangladeshis living abroad in 2019 with remittances contributing to over 5 percent of the GDP. The Government of Bangladesh (GoB) set up Bureau of Manpower, Employment, and Training (BMET) in 1980s to formalize the migration process. Bangladeshi migrants travelled to over 150 destinations over the past decade with countries in the Persian Gulf and South-East Asia being the main destinations, namely, Saudi Arabia (KSA), U.A.E., Qatar, Oman, Bahrain, Kuwait, Malaysia and Singapore. Almost all migrants are considered low- or unskilled with less than two per cent of all migrants being in the "professional"category (IOM, 2017; BMET, 2019).

GoB has set up a number of bi-lateral agreements that account for the majority of labor migration from Bangladesh into temporary work contracts that vary between the two to three years in duration. Consequently, migration from Bangladesh is largely temporary and technically legal as they all pass through licensed private recruitment agencies – no migrant worker can travel on a work visa without a corresponding authorization card issued by the BMET to the migrant worker. Based on interviews with BMET officials, over 90 percent of migrant workers who apply for SMART cards are represented by an agency.

While bi-lateral agreements facilitate the passage of migrants to various destinations, migrant social networks and visa restrictions imposed by destination countries further facilitate or impede the out-migration process. While all migrant workers have to process their administrative documents and permits through licensed agencies, a large proportion

of migrants (about 50-70 percent based on various surveys) rely on migrant networks at the destination countries to inform them about job opportunities before approaching the agent. Furthermore, despite existing agreements, a number of major destination countries imposed unexpected restrictions on the issues of work permit visas for Bangladeshi nationals that caused an exogenous shock to the inflow of Bangladeshi migrant workers to those destinations.

The majority of the jobs are in the no and low-skill category with average wages USD 200-300 per month (KNOMAD, 2018) (Figure 2 - bottom panel). In comparison, the textile and ready-made garments sector, the largest manufacturing sector in Bangladesh that accounts for over 80 of its export earnings, has a minimum wage of USD 95 per month. Based on recent World Bank surveys, costs of migrating from Bangladesh ranges widely from USD 2000 to USD 7000 depending on destination, local demand, and layers of intermediaries amongst others (IOM, 2021). Descriptive reports on high migration costs amongst Bangladeshi migrants indicate that migrant families and communities use large portions of remittances to pay back debts incurred to fund migration journeys during the first few years following the migration journey (Rahman, 2013). Consequently, this implies that local spillovers may not take place at the origin despite high rates of migration.

Despite the significant annual out-migration, the inflow of remittances, and, the importance of international migration in the national policy debate, evidence of the impact of migration for non-migrant households in the origin remain based on extrapolations from other country context or descriptive studies. Furthermore, anecdotal reports indicate that official remittances can be under counted as remittances are sent though unofficial channels, indicating that studying only the direct effects of remittances is insufficient and a more general study on the impact of out-migration maybe more relevant for capturing the spillover effects. Consequently, by studying the effects of out-migration on a nationally representative rural sample and focusing on the spillover effects for non-migrating households, my study fills an important gap in the literature and the results have important implications for future migration and development policy for Bangladesh.

4 Empirical Strategy, Data and Framework

In the following section, I describe the empirical strategy along with the data and framework used to operationalize the strategy. I present the data used to construct the main dependent

variable, the regional out-migration rate. I then describe the national integrated household survey data panel from IPFRI that is used for constructing the main outcome variables. I then describe construction of the instrumental variable to predict the change in migration rate using historical regional exposures to different destination countries and the exogenous shifts in national growth in migration to these destinations and present a simple framework justifying the rationale for using historical regional exposures for predicting contemporaneous out-migration.

4.1 Empirical Specification

I estimate the impact of migration on non-migrant household outcomes, y_{hrt}, by comparing non-migrant households in sub-districts with different migration rates, m_hrt, using the specification below. The unit of observation is a household, h, in region, r (the region is a sub-district, the third level of administrative division in Bangladesh), measured at time t. Outcomes are measured at three different points, that is, $t = 2011, 2015, 2019$ allowing me to estimate the within-household changes in outcome between the start and end of the period.

$$y_{hrt} = \alpha + \beta_1 m_{rt} + \gamma_t + \eta_h + X_{hrt} + \varepsilon_{hrt} \tag{1}$$

In the above equation, γ_t and η_h are time and household fixed effects, respectively. m_{hrt} is the regional (sub-district level) out migration rate. Note that this rate, which is a measure of the *intensity to treat*, is at the regional level, r, while outcomes are observed at the household level. Accordingly, standard errors for all regressions are clustered at the appropriate regional level. X_{hrt} are a set of household level controls that can impact the outcomes directly [3].

Directly comparing households in regions with different migration rates can lead to biases when estimating the effects of migration on labor and development outcomes of households. For example, unobserved or non-measurable factors such as a culture of work ethic can lead to both higher rates of migration as well as higher participation in labor markets. To mitigate the bias and causally identify the effect of migration on a household's labor and development indicators, I estimate the equation above using a 2SLS specification, where the endogenous net migration rate is predicted by an instrument, $\tilde{z}_{hrt}$, which is defined as below.

$$\tilde{z}_{rt} = \Sigma_D D_{dt} \frac{M_{rd2009}}{M_{r2009}} \frac{\Delta M_{dt}}{Pop_{rt-1}} \tag{2}$$

[3] Controls include: numbers of household members in each five-year age group; household assets; number of international and domestic migrants.

where, $\frac{M_{rd2009}}{M_{r2009}}$ is the share of migrants from region r in the pre-study period, ΔM_{dt} is the national migration growth to destination d, at time t, at the national level, and, Pop_{rt} is the local population at period t. The dummy, D_{dt}, is equal to 0 if destination d had restrictions or limitations for Bangladeshi migrants to enter the country at time t, and set to 1 otherwise.

The expected net migration flow rate $\tilde{z}_{rt}$ is therefore a weighted average of the national net migration rates to each destination country (the "shift"), with weights that depend on the distribution of earlier exposure to migrants from that destination at a time t_0 (the "shares"). The net migration at each period is further interacted with a the visa restriction policy, D_{dt}. I choose $t_0 = 2009$ as the pre-study period reference date for t_0.

4.2 Data

I use two main sources of data in implementing the empirical analysis described above.

Firstly, I use an administrative dataset from the Bureau of Manpower, Employment and Training (BMET), which is under the Ministry of Expatriates Welfare and Overseas Employment (MoEW&OE). The data contains details for all out-going labor migrants from Bangladesh to all destination countries from 2009 onwards, which is roughly about 6.4 million observations. For each observation, I know the date of registration, age, gender, address at origin, destination country, and job occupation category at destination. Similar datasets have been used to estimate the the responsiveness of destination GDP shocks on the number and wages of migrants from the Philippines (McKenzie et al, 2014) and to estimate the impact on fraud by local recruiting agencies in Sri Lanka (Fernando and Lodermeier, working paper). Based on detailed interviews conducted with administrative officers, agents and migrants, date of departure is about 1 to 2 weeks after the registration with BMET.

The second dataset is the Bangladesh Integrated Household Survey (BIHS) that is collected by IFPRI in 2011, 2015 and 2019 panels to construct my outcome variables. The BIHS is an integrated household panel survey that is representative of the rural population of Bangladesh, which accounted on average for about 65 percent of the national population of Bangladesh (World Bank, 2020). Any other data sources for the sensitivity analysis and robustness checks will be addressed subsequently.

Regional migration rate

Using the BMET dataset, I calculate the number of outgoing migrants at the regional sub-district level, $Migs_{rt}$. Finally, I calculate the growth rate in regional out migration in between 2009-2011, 2011-2015 and 2015-2019, respectively per 1,000 of the sub-district level population.

Region-destination migrant share

In order to estimate the initial share of share of migrants from region r to destination d, that is, $\frac{M_{rd2009}}{M_{r2009}}$, I use the reference period $t_0 = 2009$ that predates t and aggregate data at the originating sub-district and destination pair level, as well as at the sub-district level.

National migration shocks and destination-specific visa policies

The main *shift* or *shock* is estimated by calculating the national level growth in the net number of migrants to each destination, ΔM_{dt}. I calculate the destination specific annual migration growth for the three time periods. I use the same calculation method as used by the parallel immigration literature (Card, 2001; see **Jaeger2018** for a full review) where the growth in immigrants from different origin countries are used as the sources of shock.

I then interact the net migration growth rates with a visa policy variable, D_{dt}, which acts as an additional shock to the demand for migration from the destination country-side. This policy variable acts as an indicator of the openness of the destination to provide temporary work permits to Bangladeshi workers [4]. The specific values of the dummy, D_{dt}, for the different destinations are coded using information about visa restrictions reported in local newspaper articles between 2011 and 2019. I downloaded these articles from Factiva, reviewed them for all the destinations for Bangladeshi migrants for the study period, and, coded the D_{dt} as follows:

- United Arab Emirates (UAE) recruited heavily from Bangladesh following an MOU signed in 2006, however, UAE imposed a ban in 2011 for work permits for migrant workers from Bangladesh and the number of migrants to UAE dropped to negligible levels in that year. These visa were not re-instated in the remaining period of the study.

[4] Note that a similar policy dummy interaction was also used in Stuen, Mobarak, and Maskus 2012b to study the effect of skilled (foreign doctoral students) immigration on innovation at US universities.

Consequently, the dummy is 1 until 2011, and 0 afterwards when restriction went into effect.

- Kingdom of Saudi Arabia (KSA) was not a major destination for Bangladeshi migrants until 2015 when an MOU was signed between the two governments and recruitment actively went into effect. Consequently, the migration rate jumped from nearly negligible rates at a very steep rate following the MOU. So I code the value of the dummy for KSA as 0 in 2011 and 1 for 2015 and after, when the MOU cleared the path for Bangladeshis to migrate.
- Qatar (QTR) won the lottery for hosting the FIFA World Cup in 2013 and subsequently, starting in 2014, went into a heavy recruitment drive to support the surge in construction work in preparation of the event. During that period, they also signed an MOU with Bangladesh that facilitated a significant increase in the migration to Qatar. As a result, the dummy for QTR is coded as 0 in 2011 and 1 from 2014 onward.
- Kuwait (KUW) placed a ban on the import of Bangladeshi workers in 2006 and the ban remained in effect until early 2015 when restrictions were eased and as a result, the dummy for KUW is 1 from 2015 onward.
- Libya (LIB) announced a ban of Bangladeshi workers entering Libya in 2015 and as a result, the dummy for LIB is 0 from 2015 onward.
- Malaysia (MSA) banned the access of Bangladeshi labor migrants in 2008, which remained in place until a new government-to-government treaty was signed in 2011, with a pilot of entries starting in 2013 and full fledged entry following that, until it was once again stopped in 2018 due to corruption allegations (Shrestha et al, 2018). Consequently, the dummy for Malaysia is 1 in 2015 and 0 otherwise.
- All other countries remain open to entry throughout the period and thus, dummies are 1 for all time periods.

Panel data from households surveys

The outcome variables are measured using three rounds of the Bangladesh Integrated Household Survey (BIHS) that were conducted in 2011, 2015 and 2019. To date, BIHS is the most comprehensive, nationally representative household survey and administered to the same

sample of households in all rounds, creating a panel dataset. The BIHS measures indicators of household poverty, income, investments, savings and financial situation, food security, agricultural development, and women's empowerment in Bangladesh. Specifically, the BIHS is the only nationally representative survey in Bangladesh that collects detailed data on plot-level agricultural production and practices, detailed household consumption, and data to measure women's empowerment in agriculture index (WEAI).

Using the BIHS, I construct my main outcome variables at the household level as described below. The outcome variables can be divided into five main areas: labor market outcomes; household expenditure; measures of financial market access; farming and agricultural outcomes; other socio-economic outcomes.

Household labor market outcomes: The household roster contains detailed information of each member of the household including details of each employed member. Using these details, I calculate the main labor market variables: average weekly hours the average hours worked per each employed member of the household; total monthly income of the household; and, ratios of employed household members in non-farm and farm activities, respectively. I use the number of hours spent each week on work related activity to calculate the average hours worked in a week by each employed member of the household. I use the classification of the work activity to calculate the ratio of household members employed in farm and non-farm related activities. Finally, for each activity, the survey collects information on the wage or monthly salary each by each household member. I use this data to calculate the total monthly household income. All income measures are reported in nominal Bangladesh Taka values, so I adjust for inflation by calculating the real income using 2010 as the base year.

Household expenditure: The BIHS collects detailed modules to record the value of the household food consumption over a seven day period for each item consumed. The range of products include a comprehensive list of items under all the main categories of food (proteins, cereals, fruits and vegetables) whether the item was purchased, produced at home or received from other sources. I aggregate and infer the annual food consumption by the household. Similarly, the BIHS also collects the value of the household's monthly and annual expenditure on non-food items in all different categories. The variation in the recall period is based on the type of consumption. The former includes including fuel, cosmetics, washing and cleaning, transport and travel, while the latter comprises of clothing, household, medical, education amongst others. For comparability, I aggregate and extrapolate the variables at the

annual level and adjust the nominal amounts in Bangladesh Taka for inflation using 2010 as the base year.

Measures of financial market access: Using the modules on access to savings and loans, I estimate an indicator for the probability of a household to save (or borrow) in the past 12 months using a binary variable that is coded as 1 if a member of the household in the sample saved (or borrowed) during the respective period. I also create a variable for the total amount saved (or borrowed) during the corresponding period by aggregating all the savings (or loans) of all household members. For all variables measured in nominal Bangladesh Taka, I adjust for inflation by calculating the real income using 2010 as the base year.

Other socio-economic indicators: In addition to the above measures of economic development; I look at a few standard measures of socio-economic development in the context of rural developing countries used in the literature. Given the importance of water and sanitation in rural Bangladesh (CITE), I look at two indicators: the first is the probability that a household uses a sanitary latrine versus using unhygienic options such as open defecation or open pit latrines; the second is the probability that the household has access to a clean water source such as tubewell, piped or bottled water versus open water bodies or rain water.

I also calculate the Household Dietary Diversity Score (HDDS) on a scale of 12, which acts as a population-level indicator of household food access. Household dietary diversity can be described as the number of food groups consumed by a household over a given reference period, and is an important indicator of food security for many reasons. A more diversified household diet is correlated with caloric and protein adequacy, percentage of protein from animal sources, and household income (Swindale and Bilinsky, 2006). The HDDS indicator allows us to infer the household's ability to access food as well as its socioeconomic status based on the previous 24 hours (Kennedy et al., 2011).

Finally, I calculate three indicators of women's position in the household. The first measures if a woman has been subject to domestic violence, abuse and threats. The second measures if a woman can make the decision to work on economic activities. The third measures if a woman is able to decide if they can travel outside the house by themselves. Since majority of migrants are men in migrant-prone communities, a large exodus of the men from these communities might have potentially important effects for women in both non-migrant and migrant households.

Agricultural and Farm Investments: The BIHS collects extensive information on agricultural investment and production at the plot level. In 2011, data was collected for only the largest plots of the household and consequently, this analysis is restricted to this sample. Using data on agricultural production, I calculate the use of aggregate labor hours by household and hired workers in all stages of agricultural production; the total cost of using the physical capital such as ploughs, animals and other equipment; the total cost of working capital used in the form of fertilizers; the total weight of the harvest from agricultural production. For the variables measured in nominal Bangladesh Taka, I adjust for inflation by calculating the real income using 2010 as the base year.

4.3 Framework

Initial exposure to migration and subsequent migration

The proposed theory characterizes the response of the rural labor markets to migration driven by variations in pre-study period migration exposure to different destinations. Migration is predicted to affect the local labor supply, which then impacts other local labor market outcome, primarily wages. The relevant local labor market is at the sub-district (*upazila*) level and there are two types of households, those with migrants and those without any migrants. As noted, in my proposed empirical design, the migration rate at the sub-district level is predicted by pre-study period intensity of migration exposure, x. Following the social capital theory in the migration literature (Massey and Portes, 1986), I predict that the degree of a region's pre-study period exposure to a destination is predicted to affect contemporaneous migration rates. This can happen since the size of a migrant network at the destination can reduce the reduce the pecuniary and non-pecuniary costs of migration at the destination for all households in that region.

A household will send a migrant abroad if the net benefits of migration are greater than the wage income from the local market, thus:

$$W_D - C_h - C_r(x) \geq W_r(x) \tag{3}$$

In the above equation, W_d is the wage at the destination, C_h $G(.)$ is the individual specific cost of migration, C_r is the migration cost that is common to the region and consequently impacted by the initial migration exposure, x, and W_r is the local wage that is affected by the out-migration rate, which is turn is a function of x. A full model detailing the impact of

out-migration rate on local wages is based on the model developed in Dustmann et al (2013) and replicated in the Appendix. Not that given the relatively small impact of Bangladeshi migrants from each region to the respective destination countries, we can safely assume that W_d is independent of the regional migration exposure, x.

Consequently, for each household located in region, r, the probability of migration is also a function of the initial migration exposure, x, and expressed as following, which is equivalent to the regional migration rate, $M_r(x)$:

$$M_r(x) = Pr(C_h \leq W_D - C_r(x) - W_r(x)) = G(W_D - C_r(x) - W_r(x)) \tag{4}$$

Taking first order conditions of the above, yields the change in the migration rate as a function of the initial exposure:

$$M_r'(x) = Z(-\frac{\delta C_r}{\delta x} - \frac{\delta W_r}{\delta x}) \tag{5}$$

where, $Z = -\frac{\delta C_r}{\delta x}$ is a positive number. Given that the common cost of migration is a decreasing function of the exposure, that is, as the number of migrants to each destination from a region increases, the shared costs of migrating decreases with more information being available for the new out-migrants, and consequently, we have $\frac{\delta C_r}{\delta x} < 0$ and this boosts the rate of migration. The expression, $\frac{\delta W_r}{\delta x}$ indicates the change in equilibrium wages when there is a greater exposure to migration and is positive if the skills of migrants and non-migrants are comparable (Dustmann et al, 2017). Thus, the sign of $(-\frac{\delta C_r}{\delta x} - \frac{\delta W_r}{\delta x})$ depends on whether having more migrants from the region reduces the cost of migrating by more that the benefits of staying back at their origin to benefit from the higher wages.

In my paper, I can test whether the cost or the wage effect is strong by looking at the first stage of my 2SLS specification. A strong and positive first stage implies that when comparing regions with a high and low initial exposure to migration, a strong and significant coefficient for bot migrant and non-migrant households mean that $-(\frac{\delta C_r}{\delta x})$ is greater than $(\frac{\delta W_r}{\delta x})$.

Model implications and potential for spillovers

The above model proposes a mechanism by which the decision to migrate may depend on the number of migrants who are already located at different destination countries. Since migration can affect labor supply and wages, there is possibility that wage effects would act lead to a offset the the migration intensity. However, a strong, positive and significant

relationship between my instrument and the predicted out-migration rate in the first stage shows that the reduction in migration costs through the social capital effect dominates.

My proposed framework, combined with the findings of the Dustmann et al. (2015) model, implies that a higher exposure to initial migration, leads to higher out-migration. Higher out-migration is associated with a rise in the labor supply of the non-migrant households when capital is immobile and the production functions remains unchanged, which are reasonable assumptions in the short to medium term. This implies an associated wage rise for the non-migrants in similar skill categories as the out-going migrants. There is an assumption here that local labor markets are relatively closed to other types of domestic migration in the short run. This is a reasonable assumption in light of the findings from Bryan et al (2014) which argue that risk aversion can act as a sufficient deterrent to internal migration and works through different exposure links than international migration.

A large out-flow of population can subsequently have multiplier or spillover effects in the local economy as a consequence of the inflow of remittances correlated with out-migration. Remittances can directly impact the expenditure of migrant households in food including diversity of food intake as well as non-food expenditure such as education, medical and household durables. Remittances can also be spent on investments such as agriculture or non-agriculture related enterprises, improvements to standards of living such as improved water and sanitation. These can have spillover effects on non-migrant households, especially if markets are not well integrated nationally.

5 Results and discussion

Tables 1, 2 and 3 provide the summary statistics for the BIHS data for 2011, 2015 and 2019 panels, for the non-migrant and migrant household sample including the key outcome variables. The summary statistics are presented for the full samples (columns 1, 4 and 7), the non-migrant household (columns 2, 5 and 8), and, migrant household samples (columns 3, 6 and 9) for each panel respectively. In columns 10 and 11, I also present the difference in means for each variable, between 2011 and 2019, for the non-migrant and migrant sample, respectively.

The 2011 sample had 475 households had migrants who were abroad for 6 months or longer since 2007 (that is the five years preceding the survey). In 2015, 138 additional households had migrants who had migrants after the follow up while in 2019, 287 households

added a new migrant in their household. The fraction of male members is generally lower and women as household heads higher in household with migrants compared to those without. The number of illiterate or uneducated household members reduced over the decade. With regards to labor outcomes, the average number of hours worked per week by employed household members decreased over the decade while total monthly household income went up after accounting for inflation. All types of household expenditure went up for all groups with the exception of non-food expenditure for households with new migrants in 2019. Similarly, the increase in savings (borrowings) was lower (higher) for households with the new migrants in 2019, relative to those with no migrants. For the largest plots of the households, although labor hours increased in agriculture, the cost of capital spending and total harvest decreased over the decade. While access to sanitary latrines increased, the access to safe water deteriorated slightly while food diversity index improved for everyone.

The primary results are presented in Tables 4 to 7. For the non-migrant households, I find evidence of out-migration on labor market participation with no corresponding significant effects on household income. There is a significant increase in the ratio of hours worked in non-farm activities with a corresponding decline in the hours of farm work. The former includes various types of non-wage labor in construction, light manufacturing, self-employment in low-skill occupations. A further breakdown of the farm investment and productivity is presented in Table 8, using farming data for the largest plots of the households. There are no effects on spillovers on the food and non-food expenditure, financial market access or other measures of socio-economic development indicators.

Table 4 shows the impact of out-migration on four main variables that reflect labor market outcomes for non-migrant households in regions with high migration rates, namely, average weekly hours worked per employed member of the household; the total monthly income of the household; and ratios of hours worked by household members in non-farm and farm activities, respectively. Column (2) shows that out-migration has a significant and positive impact on the number of average hours worked by the household members employed in non-migrant households. Specifically, an increase in out-migration rate by 10 (that is 10 migrants for every 1,000 natives of the region), will increase the average weekly hours for each employed non-migrant household member by 38 percent from the (geometric) mean of 17 hours. Columns (6) and (8) indicate, the out-migration is also associated with a significant and positive (negative) effect in the ratio of hours worked in non-farm (farm) activities,

implying that the increase in labor supply was followed by a shift into non-farm (from farm) activities.

The low means in the average hours worked per week indicate underemployment in the Bangladesh rural sector and subsequently, as column (4) shows, the rise in the labor hours only leads to moderate increases in the total monthly income of the households. Specifically, an increase in out-migration rate by 10 (that is 10 out-migrants for every 1000 natives of the region), will increase the average weekly hours for each employed non-migrant household member by 25 percent from the (geometric) mean of BDT 4,125 (equivalent to about BDT 1,238 or USD 15 per month), although this is not a very significant effect.

Table 5 focuses on the annual food and non-food expenditure for non-migrant households. While I find that there is no significant impact on any of these indicators, the direction of the impact is negative for non-food and positive for food related expenditure. This increase in food expenditure could indicate a change in preferences towards food-related items. However, with no change in the Food Diversity Index in Column (3) of Table 7, there is less support for this explanation. The more likely explanation follows from the findings of Akram et al (2017), where increased internal migration was associated with rising food prices in more migration-intensive regions as a consequence of local food markets in rural areas being imperfectly integrated with national markets. This trend has important policy implications from a food security perspective for high migrant prone regions and is discussed further in the conclusions.

Table 6 reports the results of the regressions on indicators of financial market access, specifically the likelihood of a household to save (and borrow) and the total amount of household savings (and loans). The general trends indicate that for non-migrant households, the savings and borrowings decreased. One hypothesis proposed with the household migration model is that with higher remittances from out-migration, migrant households can act as informal financial intermediaries for the other households in their communities. I do not find support for this hypothesis.

In Table 7, I report the results of the regressions on a number of other socio-economic variables as follows: probability that a household uses a sanitary latrine versus using unhygienic options such as open defecation or open pit latrines; probability that the household has access to a clean water source such tubewell, piped or bottled water versus open water bodies or rain water; Household Dietary Diversity Score (HDDS); and, three variables that

measure various aspects of a women's position in the household include some abuse from other household members; freedom of mobility; and, decision power over income. These variables are chosen as they are likely to be impacted especially in households directly impacted by migration. Column (1) and (2) shows that while sanitation and water access improves, it is only significant for the latter. There are no significant changes in the food diversity or the female empowerment indicators with the estimates being tightly clustered around zero (Figure 2; Panel d).

Given the importance of farming to the rural economy and the change in the ratio of labor hours spent in farm versus non-farm activities, I investigate the impact of out-migration on the farm investment and production. These results are reported in Table 8. The BIHS survey only collected data for on faming for the largest plot for each household, so the results of this table are restricted to this sample. Results indicate that for the non-migrant households, there was a significant decrease in the use working capital investments in farming including labor and fertilizer. The fall in the use of physical capital and total harvest are minimal and not significant but there is some significant increase in the labor productivity due to the reduced number of labor hours. One of the main issues for a populous country like Bangladesh with a small land area is that the agricultural sector is dominated by the presence of small farms with more workers than optimal. These results indicate that migration might be correctly these inefficiencies to some extent, although a detailed study on farm productivity is needed to establish this relationship.

In all the regressions reported above, due to the panel nature of the survey, I include households fixed effects that control for any time-invariant idiosyncratic factors allowing me to look at within-household changes in outcomes over time due to migration. I also include year fixed effects that control of any other year specific shocks during the study period. I also include household level controls for the number of male household members, the number of international and domestic migrants, land owned by the household, and, the number of household members in each age group (0-5; 6-10; 11-15; 16-20; 21-25; 26-30; 31-35; 36-40; 41-45; 46-50; 51-60; 60 and above). As expected, while standard errors increase with 2SLS over OLS estimates, the size of the estimates are larger indicating that effects on non-migrants are stronger when we account for the endogeneity of the out-migration rate between regions.

Some indicative results on migrant households

In Appendix Tables 10 to 14, I present the results for both the non-migrant and migrant household samples, respectively. Note that the sub-sample of migrant households in the sample is relatively small, in total about 10 percent of the survey population. Migrant households are defined as those households who had someone abroad for a period of more the six months since 2007. The small sample makes the effect size and standard errors difficult to interpret. The IV analysis is also less reliable for this sample due to the low Kleibergen-Paap statistic and thus results are only presented for reference purposes only.

Table 10 indicates that the labor outcomes for migrant and non-migrants move in the same direction. These results provide some support for the model that remaining migrant household members substitute for the loss in the income earner through migration. The results also indicate that given the low rural household incomes, any remittances sent back to the household is not sufficient to cover all household needs. Migrant households also exhibit the same pattern of movement out of farm into non-farm activities, thus showing a positive trend towards economic development.

Table 11 shows that food and non-food expenditures for households with migrants showed mostly similar patterns as the non-migrants, no strong effects for annual expenditure in food and non-food items with positive increases in food and negative in non-food with one exception in education. This corresponds to other studies of migrant households discussed earlier especially with regards to increased expenditure on education and food consumption Furthermore, there is a significant, positive effect on the food diversity index implying the household's with migrants improve their dietary intake.

Table 12 indicates similar savings (borrowing) trends amongst for migrant as with non-migrant households with reduced (increased) likelihood and amount saved (borrowed). These results provide some signal that migrant households in high migrant-prone areas might be crowding out the financing opportunities for the non-migrants given that they are in a position to offer better collateral due to the remittances received from their household members who are migrating. However, it is difficult to ascertain this prediction without detailed information from the credit institutions and remains to be further explored in future studies.

Finally, Table 13 shows the indicative directions of movements on a number of other socio-economic variables. Access to safe water and food diversity increases as expected. However, the three measures of female household positions pose some causes for concern in

migrant households. A large portion of women in migrant households represent the spouses left behind with in-laws. Consequently, without their partners present in the house, they may experience increased abuse, reduced mobility and decision over finances as reflected in the direction of the estimates. Given the small sample size, these estimates require further exploration and provide an important area of research in the context of migration.

Instrument validity, robustness and limitations

Instrument validity

An instrumental variable strategy such as the one proposed in my paper relies on two fundamental assumptions of the instrument used for identification of the causal effects of migration on development. The first is that instrument has a significant and strong effect on out-migration rates that it is predicting. This is reflected in the positive and significant first-stage reported in the regression tables by the strong F-statistics and the Kleibergen-Paap (KP) statistic (both above their respective reference values of 10). The latter statistic is relevant due to the clustering of the standard errors at the region level.

The second assumption relates to the exclusion principal, which states that the only effect of the instrument on the household's outcome variables is through the out-migration rate and not through any other direct means. Since my instrument aggregates a combination of past shares of a regions exposure to few different migrant destination countries interacted with national level migration growths to those respective destinations, it makes the exclusion restriction complicated to interpret. However, due to recent econometric work by Goldsmith-Pinkham et al (2020), authors show that in this type of instrument, it is possible to first disaggregate the instruments and compute the Rotemberg weights, which identifies the main destination countries whose shares drive the identification for the instrument. My Rotemberg weights indicate that the shares of Saudi Arabia, United Arab Emirates (UAE) and Italy have positive weights and therefore drive the identification in the instrument (**??**). The other main destination countries, Qatar, Oman, Bahrain, and Malaysia, have small negative weights and therefore not driving the identification for the instrument.

Given that the instrument is determined by the initial 2009 shares of Saudi Arabia, UAE and Italy it is then sufficient to show that the pre-study period (that is, 2009) shares meet the exclusion criteria, meaning that the variation in the shares of migrants to these three specific

destinations effect the household's change in outcomes only through migration and not other factors.

While it is not possible to directly test for the identifying assumptions, I use some of the assessments proposed by Goldsmith-Pinkham et al (2020) to check the plausibility of the assumption. Firstly, I look the correlates of the destination composition, that is, I explore the association between the destination shares and the characteristics available for these regions at the pre-study (or initial) period, which in the case of this paper would be 2009. However, due to significant constraints in acquiring detailed sub-district level data for Bangladesh from that period, I use the next best alternative. The Household Income and Expenditure Survey (HIES), is a nationally representative household survey that collects detailed information on the income and consumption of households in the sample. The HIES data was collected for the year 2010, which is one year after the 2009 base year, but still prior to the start of the study period in 2011 and therefore can be used the closest proxy. Using this data, I estimate the correlations between the Saudi Arabia, UAE and Italy 2009 migrant shares, and the outcomes of household characteristic, income, consumption and education that is available in the HIES data. These results are presented in Table 9. Only the total number of household members and the number of male members. Subsequently, in my main results I show robustness to baseline controls for both these characteristics. No other significant sources for concern are raised for the migrant shares for these primary destinations. Furthermore, unlike in other countries, such as in the case of Mexico-US migration, where there is significant heterogeneity in the population of migrants with regards to skill and education, the majority of migration from rural Bangladesh to any of the major destinations are in unskilled or low-skilled categories (see Figure 3a) so the variation in exposure in unlikely to to be caused by factors apart from the migrant social network connection at the destination.

As suggested in Goldsmith-Pinkham, Sorkin, and Swift 2020, I also calculate the Bartik instrument using an alternate measure of the shock, where instead of using the interaction of the national growth in migration with the visa policy variable, I take only the national growth in migration as the shock. Using this alternate instrument, I run the main regressions (see columns 3, 6, 9, and 12 of Table 15) and find no major differences in the size of the estimates from the original measures (see columns 2, 5, 8, and 12 of Table 15).

Robustness

In Table 16 in the Appendix, I present the results of the main regressions with and without household controls and find that my results are stable for the non-migrant households for both types of specifications. In Table 17, I present the results of the main regressions using inverted hyperbolic sine (IHS) transformation of the main outcome variables and find that the results are robust to this different specification.

The results presented in this paper reflect the short-term impact of migration on the labor market outcomes. However, the issue of conflating long-term and short-term impacts in immigration research is addressed in **Jaeger2018** and can be a concern. I address this using the proposed correction of using an additional lagged migration outflow predicted with an adjusted Bartik instrument using the same base period exposure shares but lagged national outflow. Results are presented in Table 18. These results show that indeed the short term-effects can get diluted by the longer term effects captured by the lag variable, particularly for the wage effects, where the size of the positive effect on short-term wages are stronger when we adjust for the small opposing effect with some long-term adjustment. These effects are still not very significant as in the model without lags. Also as we note, the F-statistics for the regressions with lags are low indicating a (joint) weak instrument issue since the two instruments for the contemporaneous and lag periods are likely to be highly correlated. In the context of this particular study, where the period is just under a decade and combined with the results in Akram, Chowdhury, and Mobarak 2017 of relatively closed local labor markets in the Bangladeshi rural context, the risk of long term adjustments to wages and subsequent effects on migration is low. However, this indicates to the need for future studies that captures a longer time period to be studied to adequately study the long-term effects.

I also run the regressions using interactions between the migration rate, m_{rt} and a dummy for households that were identified to have an international migrant in the 2011, 2015 and 2019 BIHS surveys, Mig_{hrt}. I then run the 2SLS regressions with m_{rt} instrumented by $\tilde{z}_{rt}$ as before, and its interaction $m_{rt} * Mig_{hrt}$ is instrumented by $\tilde{z}_{rt} * Mig_{hrt}$. Consequently, all the households that had someone who migrated for 6 months or more from 2007 till 2019 are considered as migrant households for this purpose. This allows me to interpret the coefficients on the m_{rt} as the marginal effect of migration for non-migrants relative to the migrants. These results are presented in Table 19 in the Appendix and reflect the results in the main tables. The significant coefficients on the non-migrants indicate that they experienced more positive

increase in labor hours and income relative to the households with migrants, which indicate that labor market effects were stronger for this group and corresponds to prior studies.

Limitations

One important assessment for the plausibility of the identification of an IV is a pre-trends test, which is not possible in this paper since there is no defined pre-period for the visa policies that I study, since there was variation over the whole study period. An area for further improvement would be to find more detailed and sub-district level set of confounders from the 2009 period for checking can be used to check for the correlates of the 2009 industry shares. Further work can also be done to ascertain the quasi-random shock assignment using a large number of shock exposures suggested in Borusyak, Hull, and Jaravel 2018. However, given the significant dependence of Bangladesh on about a dozen significant destination countries, this approach may be somewhat more complicated to address.

An important area for future research would be to collected migration and local data for a longer time-period (such as from 2000 to 2019) and better distinguish the long and short-term effects. Also finding data for an earlier base period for the shares can allay some of the concerns for instrument validity.

6 Conclusion

Migration and development are closely linked with migration having strong first order effects on migrant incomes. Past research on migration shows variation on the estimated impact of migration and remittances on the remaining households at the origin. Income and consumption increase for migrant household conditional on the size and skill-profile of the migration programs. For example, for with variation in skill levels of migrants from Mexico or with a high proportion of migrant households in the community, there can be strong positive effects. However, when migration happens in primarily unskilled job categories and from countries with large, unskilled rural labor force such as Bangladesh, the extent of the effects and migration's contribution to rural development are less obvious.

In my paper, I use an instrumental variable strategy to causally identify the effects of migration on income, consumption and other socio-economic indicators for non-migrant households in Bangladesh. My paper indicates that in the case of Bangladesh, which has one

of the largest "labor-exporting" programs and is one of the top five remittance-earning nations globally, the contemporaneous effects of migration for non-migrating rural households located in high-migrant prone regions remains limited in the context of developmental outcomes. Specifically, I find that non-migrating households significantly increase their labor supply and that the increased hours of labor are re-allocated to non-farm activities. The primary development effects manifest from increased opportunities for labor in non-farm activities, implying some structural transformation out of the rural agricultural sector. The corresponding wage effects are positive but not very significant. These results indicate that while out-migration can ease employment pressure in the local economy by creating more opportunities for work by non-migrants, the associated wage gains are limited mostly as a consequence of limitations in the rural labor market structure and labor market adjustments offset any positive gains. There are no other significant effects estimated on household expenditure, various measures of socio-economic development or access to financial access. To conclude, despite the strong correlation in out-migration and national remittances, I find limited evidence of spillovers through remittances to other socio-economic variables at the micro-level unlike in the Mexico and Nepal studies.

My paper makes an important contribution to the academic literature on migration and development by expanding the understanding about the more widespread effects of migration amongst non-migrating households living in high migrant prone areas while also offering some implications for migration policy in Bangladesh and other migrant-sending LMICs along with some key areas of future research to explore the digression in findings from the Mexico and Nepal cases.

The effects on labor supply and shift to non-farm activities without strong income effects suggest that wages are continue to remain depressed or do not rise in proportion with labor due to the structural construct of the labor market. Meanwhile, despite increased migration, the remittances are not ploughed back into the local economy in a productive way to generate economic improvements amongst non-migrants. While the NELM model predicts linkages between migration, remittances and socio-economic development for the remaining members of migrant households, exact mechanism for spillovers into non-migrating households remain under-developed. This paper highlights the need for more integrated theories of migration that can explain the empirical results for both migrants and non-migrants.

The results from my paper suggests that there is a pressing need to update the assumptions underlying the Bangladeshi government's policy to promote migration as a formal employment strategy. A number of policy implications follow from this paper. Firstly, despite the labor market opportunities created by the departing migrants, non- migrants do not experience the large wage gains predicted by the economic models possibly due to the low farm wages and under-employment. Furthermore, inefficiencies in farm production is prevalent and creating more non-farm investment opportunities along with greater financial access for non-migrants remain significant for creating local jobs along with promoting migration.

Secondly, without the remittance spillovers from the migrant households, there is a continued need for local safety nets to support these non-migrant households. Research show that safety nets such as public works programs tend to be heavily over-subscribed and households with political connections benefit more than the poor from these programs. Taking these results together, the implication is that migration alone cannot mitigate rural poverty but rather it has to be complemented with a strong social safety net programs that expand the scope of the public works program with greater transparency in job allocation amongst non-migrating households.

The lack of remittance spillovers from migrant-households into the local economy can have two implications on the nature of the remittances being sent back. The first is that the size and frequency of remittances may not be sufficient for migrants to spend on productive assets. Secondly, the costs of migration for Bangladeshis migrants are disproportionately higher relative to the wages earned as migrant workers (IOM, 2021). As a result, a significant share of initial remittance transfers following out-migration are spent towards loan repayments instead of household spending. Policies that address up-skilling potential migrants prior to their migration can address this issue by helping migrants to secure higher wage jobs. Tighter policies to regulate migration costs can also be effective, however with a high demand for migration with limited institutional resources for enforcement, this latter approach may be less effective.

Next, I find some evidence of increased expenditure in food items, which is not associated with improved food diversity amongst non-migrants. This indicates that food prices may be rising faster in the high-migrant prone areas due to poor integration of local food markets with national production networks (Akram et al, 2017). A more extensive study on the food prices is needed to ascertain this theory and migrant-prone areas may need stronger

policies that ensure equity in access to affordable food sources. However, the overall lack of significance in the expenditure corresponds to the lack of strong income effects of migration.

Finally, existing research indicate both negative and positive consequences for women in migrant households. While there are no strong spillover effects are detected amongst non-migrants, my indicative results amongst migrant household imply that increased abuse combined with economic and mobility restrictions might be prevalent amongst female spouses of migrants and this is an important area to explore in future research.

Given strong policy drive in Bangladesh as well as in other developing countries to promote temporary labor migration, the need to understand the broader effects of migration in the community, including non-migrating households are especially relevant. As I demonstrated, in addition to the academic contribution, my paper allows policy makers to have to more comprehensive understanding of the spillovers from remittances underlying the implementation of these policies. International labor migration can be incorporated and complement other development policies rather be a strategy in itself for increasing income of rural Bangladeshi workers. Finally, the empirical findings in this paper support the need for better economic models that capture the spillover effects of migration for non-migrant households.

7 Tables and Figures

Table 1: HH Descriptive Stats - Part 1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)		(11)	
	F11	NM11	M11	F15	NM15	M15	F19	NM19	M19	Diff(8-2)		Diff(9-3)	
	mean	mean	mean	mean	mean	mean	mean	mean	mean	b	p	b	p
Household Characteristics													
Male Mem	0.47	0.47	0.38	0.43	0.43	0.33	0.37	0.38	0.27	-0.09	0.00	-0.11	0.00
Fem Head	0.18	0.15	0.49	0.25	0.25	0.51	0.35	0.34	0.54	0.19	0.00	0.05	0.18
Mem<15 Yrs	0.35	0.35	0.37	0.31	0.31	0.26	0.27	0.27	0.22	-0.08	0.00	-0.15	0.00
Mem 15-40 Yrs	0.39	0.39	0.34	0.33	0.32	0.25	0.28	0.28	0.21	-0.11	0.00	-0.13	0.00
Mem>40 Yrs	0.26	0.26	0.29	0.36	0.36	0.48	0.46	0.45	0.57	0.19	0.00	0.28	0.00
Illit	0.29	0.29	0.26	0.23	0.22	0.18	0.18	0.18	0.13	-0.11	0.00	-0.13	0.00
Lit/semi-lit	0.71	0.71	0.74	0.68	0.69	0.55	0.62	0.62	0.53	-0.08	0.00	-0.22	0.00
Uneduc	0.43	0.43	0.37	0.33	0.32	0.26	0.28	0.28	0.22	-0.15	0.00	-0.15	0.00
PrimSch or Less	0.46	0.45	0.48	0.45	0.45	0.35	0.39	0.39	0.32	-0.06	0.00	-0.15	0.00
Sec/PostSec Sch	0.11	0.11	0.15	0.13	0.13	0.12	0.12	0.12	0.11	0.01	0.00	-0.04	0.00
Tertiary	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.05
Non-Earn	0.57	0.56	0.72	0.56	0.56	0.52	0.57	0.58	0.53	0.01	0.00	-0.19	0.00
Farm/Pltry	0.24	0.25	0.20	0.18	0.17	0.13	0.08	0.08	0.07	-0.17	0.00	-0.13	0.00
Wage/SelfEmp	0.16	0.17	0.07	0.15	0.15	0.07	0.12	0.13	0.05	-0.04	0.00	-0.01	0.16
Own Plot Val (BDT)	714523	667329	1313436	902542	893831	1286718	898059	880261	1197665	212932	0.00	-115771	0.41
Migrant Status	0.07			0.02			0.06						
Observations	6503	6028	475	6824	6086	138	5118	4831	287	10859		762	
Weekly Labor Hrs	65.1	66.2	47.7	67.7	68.0	53.0	72.1	73.2	50.9	7.0	0.0	3.2	0.4
Tot HH Mem	4.2	4.2	4.3	5.0	5.1	5.9	6.3	6.2	7.7	2.1	0.0	3.4	0.0
Tot HH Mem Emp	4.6	4.6	4.2	5.0	5.0	4.6	5.4	5.5	4.9	0.8	0.0	0.6	0.0
Avg HH Age	27.6	25.6	31.4	26.7	25.6	30.1	24.3	23.5	27.0	-2.1	0.0	-4.4	0.0
AvgYrsEduc	4.4	4.4	4.9	5.8	5.7	6.4	6.4	6.4	6.9	2.0	0.0	1.9	0.0
Remit Rec	37937	16537	101599	43364	38723	109079	34549	23506	113929	6969	0	12331	0

Table 2: HH Descriptive Stats - Part 2

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)		(11)	
	F11	NM11	M11	F15	NM15	M15	F19	NM19	M19	Diff(8-2)		Diff(6-3)	
	mean	mean	mean	mean	mean	mean	mean	mean	mean	b	p	b	p
Labor Outcomes													
Avg LabHrs/mem	23.55	23.90	18.05	21.47	21.54	18.15	19.77	20.06	14.57	-3.84	0.00	-3.47	0.00
Mnth HH Inc	6457	6579	4579	7310	7362	4749	8092	8202	6104	1623	0	1525	0
Rat Farm Emp	0.62	0.61	0.77	0.65	0.65	0.74	0.67	0.66	0.78	0.05	0.00	0.01	0.66
Rat NonFarm Emp	0.39	0.40	0.24	0.36	0.36	0.28	0.34	0.34	0.24	-0.06	0.00	-0.01	0.75
Household Expenditure													
Med Exp	5509	5159	9943	7205	7138	10145	8383	8167	12002	3008	0	2059	0
Educ Exp	2315	2213	3613	3448	3431	4194	3865	3818	4655	1605	0	1042	0
NonFood Exp	42831	40007	78681	54665	54268	72180	55338	54345	72051	14338	0	-6630	0
Protein Exp	11644	11011	19676	14036	15215	23069	18537	18192	24353	7181	0	4677	0
Food Exp	48748	47385	66046	88911	88384	112157	107969	106847	126853	59462	0	60807	0
Financial Market Access													
SavingsProb	0.65	0.65	0.63	0.78	0.76	0.71	0.80	0.80	0.76	0.15	0.00	0.13	0.00
SavingsFreq	0.48	0.49	0.34	0.56	0.52	0.46	0.54	0.54	0.46	0.05	0.00	0.12	0.00
TotalSavings	12223	11544	20843	15924	15690	26254	21633	21409	25413	9865	0	4570	0
BorrowProb	0.80	0.80	0.83	0.85	0.93	0.95	0.98	0.98	1.00	0.18	0.00	0.16	0.00
TotalLoans	26958	24049	63882	37432	35788	109921	45194	42278	94285	18229	0	30403	0
Migrant Status	0.07			0.02			0.06						
Observations	6503	6028	475	6824	6086	138	5118	4831	287	10859		762	

Table 3: HH Descriptive Stats - Part 3

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)		(11)	
	F11	NM11	M11	F15	NM15	M15	F19	NM19	M19	Diff(8-2)		Diff(6-3)	
	mean	mean	mean	mean	mean	mean	mean	mean	mean	b	p	b	p
Agricultural and Farming Outcomes													
AgLabHrs	255	260	189	319	351	286	287	289	247	29	0	57	0
AgLabCost	3071	3088	2849	3906	4286	4115	3839	3841	3795	753	0	946	0
AgCapCost	1462	1453	1604	1424	1432	1099	1116	1125	961	-328	0	-643	0
AgFertCost	692	695	641	696	702	411	682	696	456	0	1	-185	0
TotalHarvest	3249	3181	4367	1768	1771	1642	1757	1768	1557	-1412	0	-2811	0
LivestockLabHrs	516	525	404	573	574	514	579	585	492	59	0	88	0
ValLivestockProd	12.62	12.47	14.59	10.75	10.72	12.14	11.16	11.14	11.46	-1.33	0.00	-3.13	0.01
Other Socio-economic Indicators													
ProbSanLat	0.28	0.27	0.43	0.44	0.44	0.56	0.49	0.48	0.64	0.21	0.00	0.22	0.00
ProbSafeWater	0.66	0.66	0.73	0.53	0.53	0.54	0.56	0.56	0.58	-0.10	0.00	-0.15	0.00
FoodDivInd	9.90	9.85	10.49	10.55	10.54	10.93	10.73	10.71	11.02	0.86	0.00	0.54	0.00
FemEmpInd	0.52	0.53	0.49	0.60	0.61	0.56	0.68	0.68	0.67	0.16	0.00	0.18	0.00
Migrant Status	0.07			0.02			0.06						
Observations	6503	6028	475	6824	6086	138	5118	4831	287	10859		762	

Table 4: Regressions of Out-migration Rate on Labor Outcomes for Non-Migrant HHs

Dependent variable								
Labor Outcome Indicators								
	AvgHrs per member		Monthly HHinc(ln)		Ratio NonFarmHrs		Ratio FarmHrs	
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Out-Mig	0.014	0.038	0.006	0.025	0.007	0.011	-0.007	-0.010
	(0.007)*	(0.018)**	(0.010)	(0.019)	(0.003)***	(0.005)**	(0.003)**	(0.004)**
First Stage Instrument								
SSIV		0.31		0.31		0.31		0.31
Rob SE		0.04		0.04		0.04		0.04
F-stat 1st stage		72.2		72.5		72.2		72.2
KP stat		18.1		17.8		18.1		18.1
N	16,180	15,643	15,883	15,272	16,181	15,645	16,181	15,645
Mean Dep Var	2.86	2.86	8.36	8.36	0.37	0.37	0.64	0.64
SD Dep Var	0.73	0.73	1.43	1.43	0.33	0.33	0.33	0.33
HH controls		Yes		Yes		Yes		Yes
HH FE		Yes		Yes		Yes		Yes
Year FE		Yes		Yes		Yes		Yes

Standard errors in parenthesis. * p<0.10, ** p<0.05, *** p<0.01. All standard errors are clustered at the sub-district level. Controls include: numbers of household members in each five-year age group; household assets; number of international and domestic migrants; regional population. A migrant household had at least one-household member who migrated since 2010.

Table 5: Regressions of Out-migration Rate on Household Expenditure on Non-Migrant HHs

Dependent variable	**Expenditure Indicators**							
	Educ Exp (ln)		All non-food (ln)		Protein (ln)		All food (ln)	
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Out-Mig	-0.032	-0.041	-0.032	-0.016	-0.022	0.017	-0.018	0.000
	(0.011)***	(0.028)	(0.006)***	(0.016)	(0.009)**	(0.020)	(0.006)***	(0.011)
First Stage Instrument								
SSIV		0.32		0.31		0.31		0.31
Rob SE		0.04		0.04		0.04		0.04
F-stat 1st stage		66.8		65.7		65.9		65.7
KP stat		17.1		19.2		18.6		19.2
N	11,637	10,363	16,940	16,591	15,533	14,798	16,939	16,587
Mean Dep Var	7.69	7.69	10.30	10.30	9.20	9.20	11.06	11.06
SD Dep Var	1.36	1.36	0.98	0.98	1.10	1.10	0.70	0.70
HH controls		Yes		Yes		Yes		Yes
HH FE		Yes		Yes		Yes		Yes
Year FE		Yes		Yes		Yes		Yes

Standard errors in parenthesis. * p<0.10, ** p<0.05, *** p<0.01. All standard errors are clustered at the sub-district level. Controls include: numbers of household members in each five-year age group; household assets; number of international and domestic migrants; regional population. A migrant household had at least one-household member who migrated since 2010.

Table 6: Regressions of Out-migration Rate on Indicators of Financial Market Access (2SLS)

Dependent variable	**Indicators**				
	ProbSave	FreqSave	TotalSave	ProbBorrow	TotalLoans
	(1)	(2)	(3)	(4)	(5)
Out-Mig	0.009	-0.003	-0.052	-0.002	-0.003
	(0.009)	(0.008)	(0.029)*	(0.006)	(0.018)
First Stage Instrument					
SSIV	0.31	0.31	0.30	0.31	0.30
Rob SE	0.04	0.04	0.04	0.04	0.04
F-stat 1st stage	65.8	65.8	66.5	65.8	52.9
KP stat	19.2	19.2	17.3	19.2	16.7
N	16,595	16,595	8,969	16,595	10,169
Mean Dep Var	0.73	0.51	8.59	0.90	9.98
SD Dep Var	0.44	0.50	1.81	0.30	1.28
HH controls	Yes	Yes	Yes	Yes	Yes
HH FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes

Standard errors in parenthesis. * p<0.10, ** p<0.05, *** p<0.01. All standard errors are clustered at the sub-district level. Controls include: numbers of household members in each five-year age group; household assets; number of international and domestic migrants; regional population. A migrant household had at least one-household member who migrated since 2010.

Table 7: Regressions of Out-migration Rate on socio-economic indicators

Dependent variable	**Indicators**					
	ProbSanLatrine	ProbSafeWater	FoodDivInd	FemAbuse	FemMobility	FemDecideMoney
	(1)	(2)	(3)	(4)	(5)	(6)
Out-Mig	0.020	0.030	-0.008	0.004	0.006	0.008
	(0.013)	(0.011)***	(0.021)	(0.013)	(0.016)	(0.012)
First Stage Instrument						
SSIV	0.31	0.31	0.31	0.31	0.31	0.31
Rob SE	0.04	0.04	0.04	0.04	0.04	0.04
F-stat 1st stage	65.8	65.8	65.7	65.7	65.5	65.7
KP stat	19.2	19.2	19.2	19.2	19.1	19.2
N	16,595	16,595	16,593	16,594	14,748	16,594
Mean Dep Var	0.39	0.58	10.34	0.36	0.56	0.75
SD Dep Var	0.49	0.49	1.34	0.48	0.50	0.43
HH controls	Yes	Yes	Yes	Yes	Yes	Yes
HH FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parenthesis. * p<0.10, ** p<0.05, *** p<0.01. All standard errors are clustered at the sub-district level. Controls include: numbers of household members in each five-year age group; household assets; number of international and domestic migrants; regional population. A migrant household had at least one-household member who migrated since 2010.

Table 8: Regressions of Out-migration Rate Farm Outcomes for Non-Migrant HHs

Dependent variable	**Farm Outcomes for Non-migrant (2SLS)**					
	FarmLabHrs	FarmLabCost	FarmFertCost	FarmCapCost	FarmHarvestKg	FarmLabProd
	(1)	(2)	(3)	(4)	(5)	(6)
Out-Mig	-0.047	-0.042	-0.105	-0.008	-0.021	0.031
	(0.022)**	(0.025)*	(0.041)***	(0.019)	(0.023)	(0.018)*
First Stage Instrument						
SSIV	0.33	0.33	0.33	0.33	0.33	0.33
Rob SE	0.04	0.04	0.04	0.04	0.04	0.04
F-stat 1st stage	84.7	77.9	80.6	83.2	84.2	84.2
KP stat	15.1	15.1	13.7	15.2	15.0	15.0
N	8,028	6,743	6,731	7,833	7,983	7,983
Mean Dep Var	5.91	8.34	6.30	7.16	7.45	1.52
SD Dep Var	0.94	1.26	1.26	1.02	1.18	0.74
HH controls	Yes	Yes	Yes	Yes	Yes	Yes
HH FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parenthesis. * p<0.10, ** p<0.05, *** p<0.01. All standard errors are clustered at the sub-district level. Controls include: numbers of household members in each five-year age group; household assets; number of international and domestic migrants; regional population. A migrant household had at least one-household member who migrated since 2010. Sample comprises data from only the largest plots of the households in the sample.

Table 9: Relationship between destination shares and regional HH characteristics

Characteristics	**Shares**			**IV**
	Saudi Arabia	UAE	Italy	Bartik-2009 shares
	(1)	(2)	(3)	(4)
Consumption Exp	0.202	0.203	-0.290	1.811
	(0.346)	(0.225)	(0.448)	(1.797)
Food Exp	0.636	0.008	0.471	0.277
	(0.622)	(0.347)	(0.864)	(3.228)
Educ Exp	-0.072	-0.086	0.120	-0.968
	(0.063)	(0.047)	(0.183)	(0.520)
HH income	0.000	-0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Food Intake PerCap	-0.000	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.001)	(0.002)
No. HH members	0.036	0.188	-0.167	2.390
	(0.119)	(0.069)**	(0.192)	(0.618)**
No. Male members	-0.310	-0.112	0.164	-2.410
	(0.179)	(0.111)	(0.273)	(1.005)*
Mean Class Passed	-0.023	0.043	0.030	0.286
	(0.037)	(0.034)	(0.086)	(0.279)
N	306	306	186	306
R2	0.07	0.16	0.08	0.13

Each column reports results of a single regression of a 2010 destination share on 2010 mean regional household characteristics obtained from the HIES 2010. The final column is the Bartik instrument constructed using the 2009 shares with growth rates for 2011 to 2019. Standard errors in parenthesis. * $p<0.05$, ** $p<0.01$. All regressions are weighted by population in 2010.

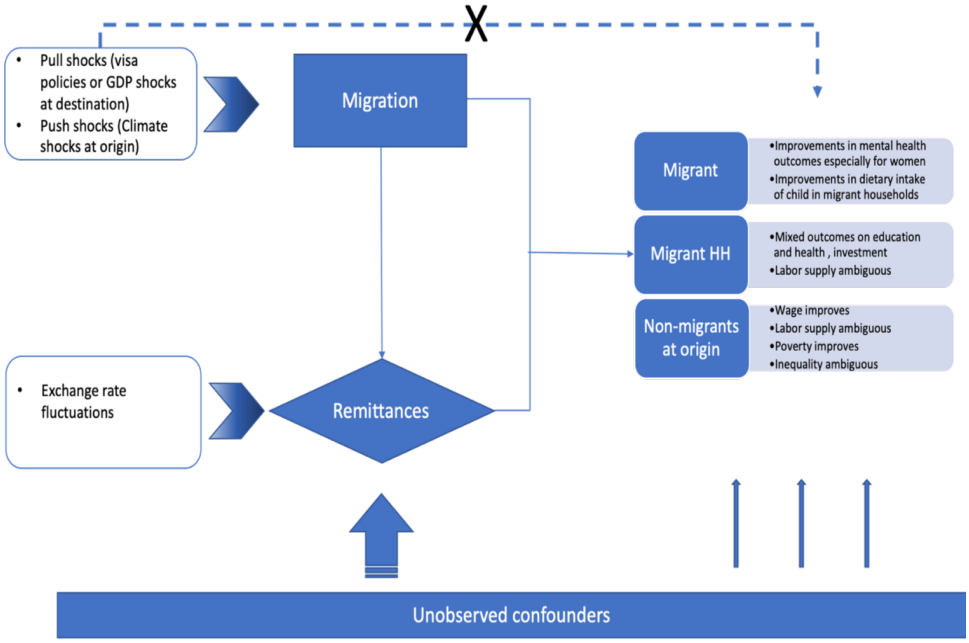
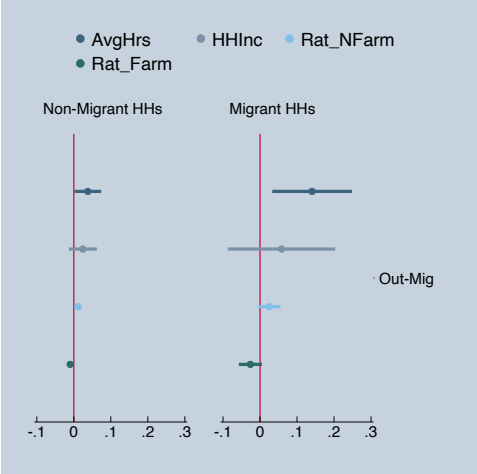
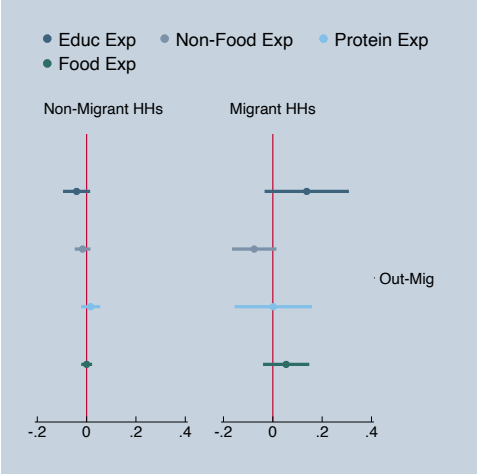


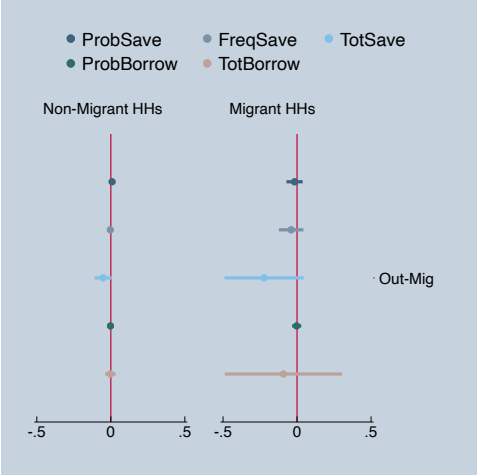
Figure 1: *Migration and Development Link*



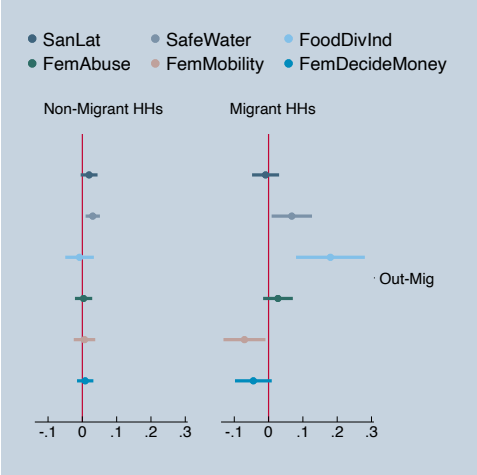
(a) Labor Outcomes



(b) Exp Outcomes

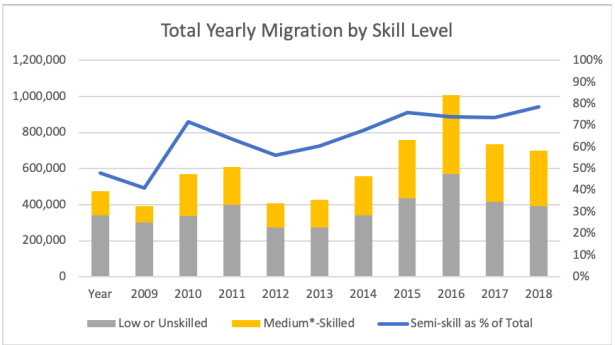


(c) Labor Outcomes

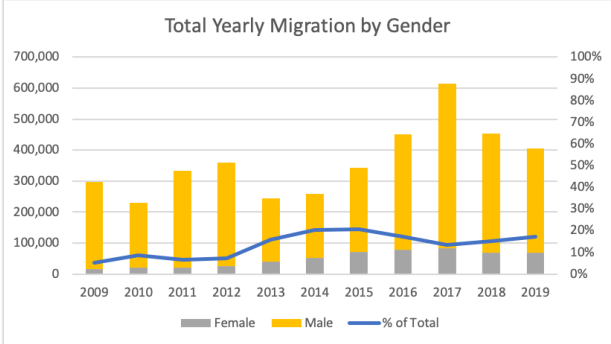


(d) Exp Outcomes

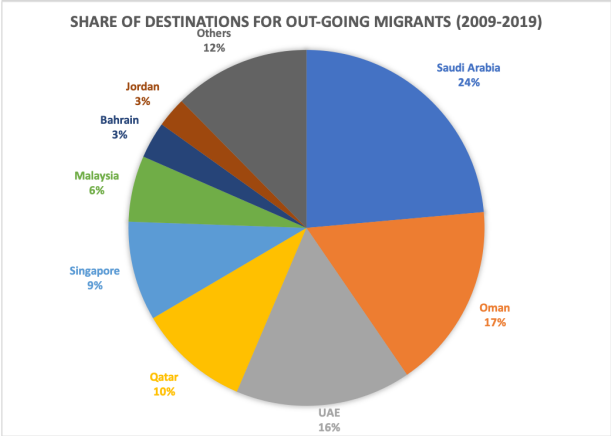
Figure 2: Coefficient Estimates



(a) Skill Distribution of migrants



(b) Gender Distribution of Migrants



(c) Destination Distribution of Migrants

Figure 3: Characteristics of Bangladeshi Migrants

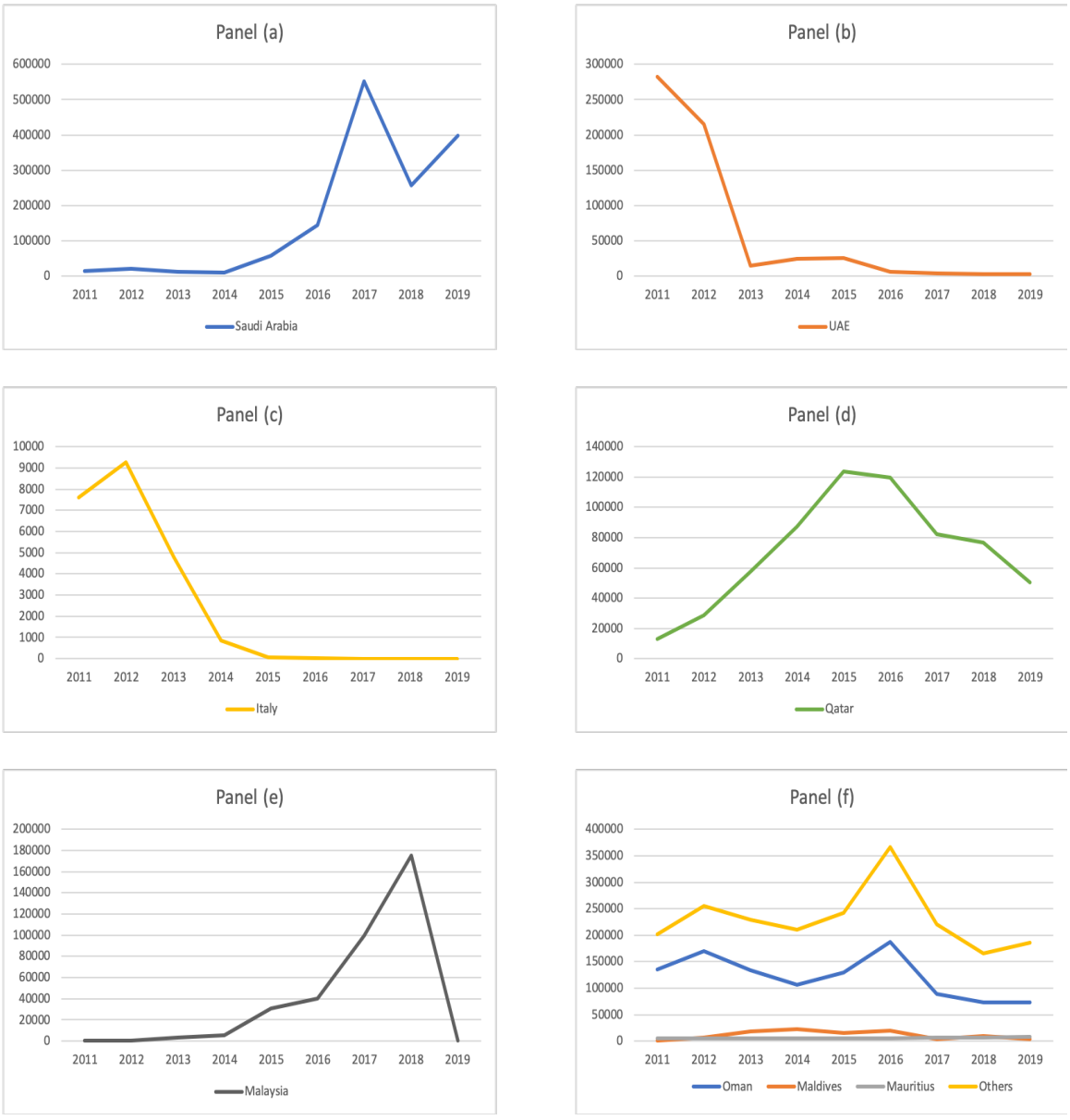


Figure 4: *Year-wise total out-migration trends by destination*

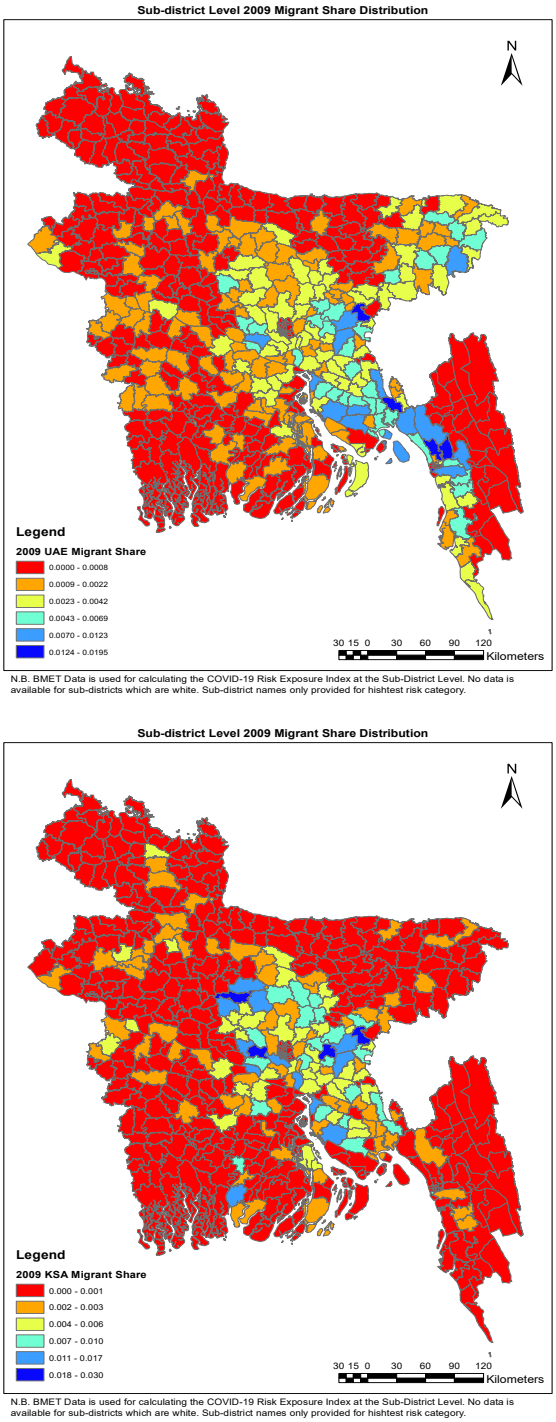


Figure 5: *Sub-District-wide exposure to 2009 Migration Shares for UAE and KSA*

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